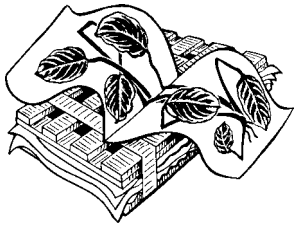
Department of Systematic Biology - Botany & U.S. National Herbarium



The Plant Press

Smithsonian
National Museum of Natural History

New Series - Vol. 5 - No. 2 April-June 2002

Special Symposium Issue - see page 7

Botany Profile

Coming to Terms with Biodiversity

By Robert DeFilipps

The Second Smithsonian Botanical Symposium, held on April 5-6 at the National Museum of Natural History in Washington, DC, gave 200 participants an opportunity to delve into the impact of the United Nations Convention on Biological Diversity (CBD) in relation to scientific investigations during the past decade, and to explore the convention's many ramifications for understanding our natural world. A treaty and strategy for the conservation, sustainable development, and equitable sharing of the benefits of biodiversity, the Convention was adopted at the famous 1992 Earth Summit in Rio de Janeiro, Brazil, and has to date been ratified by approximately 180 countries. The Secretariat of the Convention is in Montreal, Canada, and its financial mechanism is the $2.7 billion Global Environmental Fund (GEF). The entire world is affected in one way or another by the CBD, an ever-widening phenomenon which W. John Kress, Head of Botany at the Smithsonian, has referred to as the "Globalization of Nature."

The panel of specialist speakers was international, with representatives from the United States, Brazil, Panama, Kenya and Spain, and the scope of their presentations was truly comprehensive. In fact, it soon became evident that the vocabulary of biodiversity has recently been dramatically expanded, in order to keep pace with changing dimensions of research. It now includes such new terms as: "GMOs" (genetically modified organisms), "biodiplomacy," "unnatural natural products" (biocombinatorial secondary metabolites), "agrobiodiversity," "biosafety" (the transport of GMOs), and the "taxonomic impediment." To this may well be added a statement made by Kress during the symposium, that in the wake of the CBD, the Earth's biodiversity has become a commodity, and terms (concepts) such as commercial value, guardianship and ownership have become "the currency of Nature."

Smithsonian Botanical Symposium

To start the April 6 sessions, the attendees were welcomed by Ira Rubinoff, acting deputy director of the National Museum of Natural History. Rubinoff's remarks included recognition of the work of museum staff as providers of an important scientific foundation to support the Convention, while referring to multinational collaborative initiatives between the museum and host-country researchers in many nations including Mexico, Venezuela, China, Fiji and Myanmar (Burma).

Next, the José Cuatrecasas Medal for Excellence in Tropical Botany was presented to P. Barry Tomlinson of Harvard University (Cambridge, Massachusetts). Although Tomlinson was unable to attend due to his recent return from extensive sabbatical field studies in Hawaii, New Caledonia and New Zealand, the award was accepted on his behalf by Dennis Stevenson of the New York Botanical Garden (Bronx, New York), and a message of thanks was read. Tomlinson, a native of Leeds, England (b. 1932), is recognized for his multifaceted research on the architecture and morphology of tropical plants, including many monocotyledons (see related article, page 7).

The first speaker was Brian M. Boom, senior research scientist at the Center for Environmental Research and Conservation (Columbia University, New York), whose talk was entitled "Caught up in the Moment: Botanists and the CBD a Decade after Rio." Trends in activities at the New York Botanical Garden over the past 10 years were portrayed in order to assess the impact of the CBD on the Garden's affairs. Among the human impacts of the CBD, one element that Boom personally experienced while at New York was in regard to his work with a particular Yanomami Amerindian village in Venezuela; he was later denied an access permit to the village because the United States has not ratified, and is therefore not a Party to, the Convention. Boom discussed interesting recent ventures at the New York Botanical Garden, including major forays into bioprospecting for potential drugs in collaboration with the National Cancer Institute, prospecting for fragrances (perfumes), and work on plant genomics.

At the same time, the number of records of virtual images made of New York herbarium specimens has increased, while the number of specimens annually added to the herbarium has declined. This trend seems to point to the advent

Continued on page 11

Visitors

Hope Jahren, Johns Hopkins University; Bryophytes (2/1).

Pat Holmgren, New York Botanical Garden; Herbarium work, various families (2/5-2/8).

Noel Holmgren, New York Botanical Garden; Herbarium work, various families (2/5-2/8).

Alexander Krings, North Carolina State University; Herbarium work (2/11).

Yoshiyuki Nagahata, Private; Beech forests (*Fagus*) (2/13-2/14).

Carolyn Ferguson, Kansas State University; Polemoniaceae (*Phlox*) (2/20).

H. David Clarke, University of North Carolina, Asheville; Identification of Guyana collections (2/22-2/24).

Chiara Nepi, Herbarium Universitatas Florentinae; Cryptogams (2/22).

Steve Fuller, Mary Washington College; Class visit to U.S. National Herbarium (2/26-2/27).

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Web site: http://www.nmnh.si.edu/botany

Philomena Mariano Vieira, Museu Nacional - UFRJ; Moraceae (*Ficus*) (3/11-3/15).

Andre Amorim, Universidade de São Paulo; Malpighiaceae (*Heteropterys*) (3/12-3/13).

Cristina Bestetti Costa, Universidade de São Paulo; Rubiaceae (*Coccocypselum*) (3/12-3/13).

Harvey Ballard, Ohio University; Violaceae (3/21-3/22).

Duane Kolterman, University of Puerto Rico; Antillean endemics (3/21-3/22).

Judith McKay, Smithsonian Fellow; Queensland botanical contributions to 1876 Centennial Exhibit in Philadelphia (3/25).

Gerry Moore, Brooklyn Botanical Garden; Cyperaceae (3/26-3/28).

Robert Moye, Hawaii Pacific University; Fossil seed identification (3/27).

Teuvo Ahti, University of Helsinki, Finland; Lichens (Cladoniaceae) (3/31-4/30).

Claudia Hornung Leoni, Instituto de Ecologia; Bromeliaceae (*Puya*) (4/1-4/5).

Joaquim Neto, Jardin Botanico do Rio de Janeiro; Herbarium work (4/1).

Kathy Ahlensberger, Colville National Forest, USFS; Ferns (*Botrychium*) (4/2).

Chris Loggers, Colville National Forest, USFS; Ferns (*Botrychium*) (4/2).

Scott Heald, Cornell University; SBS: Euphorbiaceae (*Hevea*) (4/3-4/8).

Jim Luteyn, New York Botanical Garden; SBS: Paramo plants (4/4-4/8).

Geeta Bharathan, SUNY at Stony Brook; SBS: Symposium (4/5).

Stuart Lindsey, Harvard University Herbaria; SBS: Ferns (Vittariaceae of Pacific and New World) (4/5).

David Middleton, Harvard University Herbaria; SBS: Asian Apocynaceae (4/5).

Renata Mohriak, George Washington University; SBS: Environmental law (4/5).

Dick Olmstead, University of Washington; SBS: Asteraceae (4/5-4/6).

Janice Blake, Environmental Foundation of Jamaica; SBS: Meeting (4/6-4/7).

Tracy Commock, Institute of Jamaica; SBS: Meeting (4/6-4/7).

Travel

W. John Kress traveled to Sarasota, Florida (1/8-1/12) as a committee member on peer review at Selby Botanical Gardens; and with **Michael Bordelon** to Myanmar (2/15-3/8) to conduct field research.

Carol Kelloff (1/20-2/2) traveled to Georgetown, Guyana to meet with officials of the University of Guyana.

Warren Wagner (1/30-2/3) traveled to Panama City, Panama with the SI Science Commission for a site visit to STRI.

Robert Faden (2/9-3/16) traveled to London, England to study collections of Commelinaceae at the Royal Botanic Gardens, Kew in connection with work on the Flora of Tropical East Africa.

Deborah Bell and **Stephen Smith** (2/16-3/15) traveled to Gabon, Africa to participate in an assessment of vegetation at the Rabi Site for the SI/MAB Gabon Biodiversity project.

Vicki Funk (2/16-3/8) traveled to Australia to conduct research at the University of Queensland.

Paula DePriest (2/17-2/10) traveled to Baton Rouge, Louisiana to attend and participate in a panel discussion at the Deep Hyphae Meeting at Louisiana State University.

Maria Faust (2/18-3/2) traveled to Ft. Pierce, Florida to conduct field research at the SI Marine Station.

Paul Peterson (2/19-3/29) traveled to Lima, Peru to collect grasses in the remote areas of Apurimac, Arequipa, Ayacucho, and Cuzco.

Mark Littler traveled to Belize (2/20-3/6) to continue research on coral reefs at Carrie Bow Cay; and to Panama (3/6-3/20) to continue research in Bocas del Toro.

Gregory McKee (2/22-2/24) traveled to Aurora, North Carolina to the PCS phosphate mine, to prospect for and collect Miocene marine vertebrate fossils.

Dieter Wasshausen (2/24-3/13) traveled to São Paulo, Brazil for collaborative work with Harry Lorenzi in the Atlantic Coastal Forest, Parana and Espirito Santo.

The Convention on Biological Diversity: The Globalization of Natural History Science (Part II)

Biological collections housed in the great natural history museums and botanical gardens and their associated data on the distribution and diversity of plants and animals can be of great benefit to society and are essential in addressing the three objectives of the Convention on Biological Diversity: 1) the conservation of biodiversity, 2) the sustainable utilization of biodiversity, and 3) the equitable sharing of the benefits to humans arising from biodiversity. However, we are far from a complete or even adequate inventory of the natural world. Recently Prof. E. O. Wilson (*Science* 289: 2279. 2000.) has issued a call to arms for biodiversity research: "To describe and classify all of the surviving species of the world deserves to be one of the great scientific goals of the new century. In applied science, this completion of the Linnaean enterprise is needed for effective conservation practices, for bioprospecting, and for impact studies of environmental change."

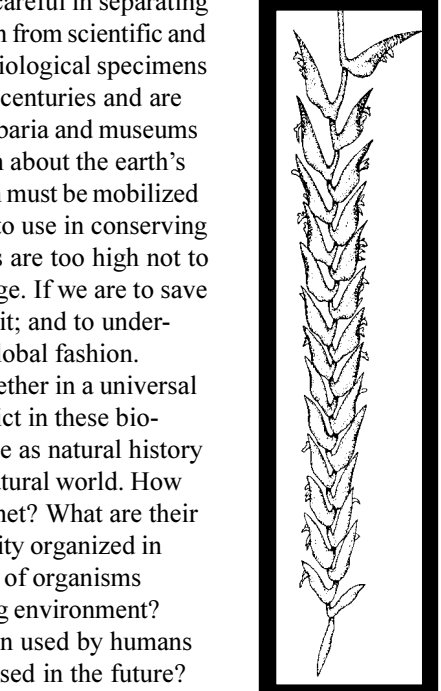
Taxonomists and systematists in all countries must cooperate in a concerted effort to pool our collections and data to complete this task. The problem we immediately face is to determine what we currently know about the extent and distribution of global biodiversity. We also recognize that most of the information and documentation about the world's plants and animals in both developed and developing countries reside primarily in developed countries. The challenge before us is to assemble this information in a usable form and to provide free and open access to this information for all of the world.

To move forward in this international effort we must first accept that a "taxonomic impediment" exists that must be overcome. This impediment can be summarized as 1) we don't yet know what the basic biodiversity elements are; 2) we don't yet have the ability to efficiently access the information we have; and 3) we don't have enough trained professionals to accomplish the task. To address this impediment as called for by the CBD we must increase and enhance our training programs and our reference collections, we must develop the infrastructure for housing these collections, scientists, and databases, and we must disseminate this biological information internationally so it can be incorporated into national and regional natural resource guides. To do this will require international collaboration among all countries.

Such international cooperation has already begun on a global scale with several major initiatives. One direct result of the CBD has been the establishment of the *Global Taxonomic Initiative* (GTI), which is a partnership for taxonomic capacity building between the natural history museums and botanical gardens in the developed world with similar institutions in developing countries (Cresswell and Bridgewater, *Biology International* 38: 12-16. 2000.). The *Species 2000* project is a second global program with the objective to compile a "catalog of life" with a worldwide list of species names using distributed networking on the Internet (Bisby, *Science* 289: 2309-2312. 2000.). Similarly the *Global Biodiversity Information Facility* (GBIF) aims to make biodiversity information universally available through a massive multilevel database of the world's three billion biological specimens housed in museums, herbaria and research institutes (Edwards, Lane and Nielsen, *Science* 289: 2312-2314. 2000.). These initiatives are a good start towards the completion of Wilson's "Linnaean enterprise."

The issue of international property rights is a many-sided coin and we must be careful in separating commercialization and exploitation from scientific and capacity building activities. The biological specimens that have been collected over the centuries and are now residing in a multitude of herbaria and museums are a treasure trove of information about the earth's biological riches. This information must be mobilized and made available for everyone to use in conserving and using biodiversity. The stakes are too high not to cooperate in sharing our knowledge. If we are to save biodiversity, we must understand it; and to understand it, we must cooperate in a global fashion.

To conclude, we must join together in a universal call for cooperation and not conflict in these biodiversity endeavors. Our challenge as natural history biologists is to find order in the natural world. How many species are there on the planet? What are their properties? How is organic diversity organized in space and time? How are lineages of organisms maintained over time in a changing environment? How have plants and animals been used by humans in the past and how can they be used in the future? What ecological information about species is necessary to effectively conserve them? The solutions to these biological problems will provide scientific answers for coping with the massive economic and social change occurring in the world today.



Chair With A View — W. John Kress

Staff Research

During March **Dan Nicolson** lectured twice on "The Forsters and the Botany of the 2nd Cook Expedition (1772-1775)," once to the Botanical Society of Washington and once to the Department. In the herbarium he continued searching out and data-basing information on the USNH holdings of Merrill's Species Blancoanae; being Merrill's first set, they are effectively neotypes of Blanco's names of new species. He also is collaborating with **Laurence Dorr** on an analysis of the editions and issues of Stansbury's 1852 "Exploration…Great Salt Lake," the treatment in TL-2 being fine, except for the date, title and abbreviation.

Paul Peterson visited Perú on 19 February - 27 March to collect grasses and present an invited seminar entitled "Filogenia de Muhlenbergiinae (Poaceae: Chloridoideae)," at the 84th anniversary celebration of the Museo de Historia Natural, San Marcos. With the help of Asuncion Cano, Maria Isabel La Torre, Angel Ramírez, Nancy Refulio, Dora Susanibar, and Oscar Tovar, Peterson traveled to remote locations in Departments Apurimac, Arequipa, Ayacucho, Cuzco, Huancavelica, and Ica. He collected 496 numbers of grasses with many interesting species of *Dissanthelium*, *Poa*, and *Festuca*. *Aphanelytrum procumbens* Hack., a monotypic genus of unknown affinities, was collected and noted as new for Peru (not included in O. Tovar's, Las Gramíneas (Poaceae) del Perú, *Ruizia* 131-480. 1993).

Robert Soreng, research associate, traveled in Chile for four months (6 November - 8 March) to study and collect grasses, especially *Poa*. Nearly 400 numbers were gathered from 20°S to 54°S. *Poa* has been a "big black hole" in Chilean plant taxonomy, in part due to the loss (apparently after a loan to the USDA in 1905) of most of R.A. Philippi's type material for grasses. Working in Chile, principally in the latter half of the 19th century, Philippi coined some 328 grass names, ca. 60 applying to *Poa*. Because of that loss, and the tremendous complexity of the genus in the region, the majority of Chilean *Poa* specimens have remained undetermined. With his visit, Soreng was able to make some progress toward sorting this out.

Dieter Wasshausen visited Brazil on 24 February to 13 March to pursue collaborative research with colleagues at the Universidade de São Paulo and also with Gert Hatschbach of the Museu Botanico Municipal, Curitiba. He made field collections of Acanthaceae and Begoniaceae with author Harri Lorenzi of the Instituto Plantarum, Nova Odessa. The field work was conducted in the Mata Atlantica, a long mountain chain which parallels the Atlantic Ocean from Corupa, Santa Catarina to the Vale do Rio Doce Forest in Espirito Santo. Two principal areas that were visited were the montane rain forest between 800 and 1,700 meters and the so-called dry, semi-deciduous forests in the north at sea level elevation. The former was very rich in species of Begoniaceae where more than 30 species were collected. The later habitat was better for Acanthaceae and a similar number of taxa were collected. Another trip to the cerrado of Minas Gerais and Mato Grosso is planned for next year with the eventual realization of a collaborative treatment of both families for Brazil.

Staff Lecture Series Begins at NMNH

At the beginning of the year, a new lecture series began at the museum. Botany curators will be delivering research seminars each month. The past three months offered the following lectures:

- **W. John Kress** presented "The Evolution of the Zingiberales (Gingers, Bananas and Relatives): A Tropical Model Group for Studies in Ecology, Phylogeny and Classification" on 15 January;
- **Harold Robinson** presented "Some Basics of Chemotaxonomy" on 12 February;
- **Dan Nicolson** presented "The Forsters and Botany of the 2nd Cook Expedition (1772-1775)" on 12 March.

Grants & Awards

John Clark is the recipient of a Fulbright Fellowship. His research on "Sustaining Plant Biodiversity in Ecuador: Tropical Gesneriads" aims to determine the evolutionary relationships and the conservation status of the plant family Gesneriaceae in Ecuador, investigating its occurrence on the western and eastern slopes of the Andes.

Monocots III is Announced

The Third International Conference on the Comparative Biology of the Monocotyledons and *The Fourth International Symposium on Grass Systematics and Evolution* will be hosted by Rancho Santa Ana Botanic Garden (Claremont, California) on 30 March - 5 April 2003. Topics will include morphology, anatomy, development, reproductive biology, molecular biology, cytology, genomics, genetics, biochemistry, paleobotany, phylogenetics, classification, biogeography, ecology, and data integration. Sessions will be devoted to particular groups within monocots such as grasses and orchids. *Monocots III* will provide a rare opportunity for researchers in diverse fields to interact, share ideas, and form collaborations. The organizing committee is accepting proposals from those who wish to organize sessions. A call for contributed papers and posters will follow. The conference proceedings will be published. Springtime marks the flowering peak of the diverse California flora, and field trips are planned. Visit http://www.monocots3.org for conference details; or write Monocots III, Rancho Santa Ana Botanic Garden, 1500 North College Ave., Claremont, California 91711-3157 USA; E-mail: info@monocots3.org; Fax: 1-909-626-7670; Tel: 1-909-625-8767 ext. 333. Co-sponsors include the American Society of Plant Taxonomists, Botanical Society of America, and the International Association for Plant Taxonomy.

Gabon Biodiversity Is Assessed for Conservation Purposes

Deborah Bell and **Stephen Smith** collected plants in the Rabi Oil Field site in southwestern Gabon from mid-February to mid-March, as part of the cooperation with the Monitoring and Assessment of Biodiversity (MAB) Program of the National Zoological Park's Conservation and Research Center, Gamba Complex Biodiversity Project. This field assessment was in part co-sponsored by a grant from the Shell Foundation and Shell Gabon. Twenty-nine researchers assessed the birds, mammals, reptiles and amphibians, as well as the vegetation of the area. Henri Bourobou Bourobou, director of the Herbier National du Gabon, was the lead botanist for the vegetation team.

During this rainy period Steve and Debbie made 267 collections (plus duplicates), representing more than 60 vascular plant families. Rubiaceae was the dominant family comprising 25 percent of the species collected. Although the number of fertile species was not as high as hoped, the number of habitat types visited was very diverse. Swamps and stream sides proved particularly productive.

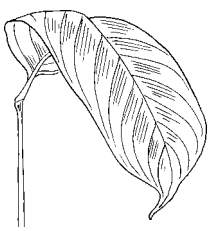
Dicranolepis **(Thymelaeaceae), one of the many plants recently collected in Gabon. (Photo by Deborah Bell)**

Dr. Henri Bourobou Bourobou, of the Herbier National du Gabon. (Photo by Deborah Bell)

Other expedition members set up biodiversity assessment plots, with Patrick Campbell from MAB as the vegetation project team leader. Twenty plots were set up and 1,800 trees marked. Bourobou Bourobou is currently working on final species determinations and he expects as many as 200 species of trees. He described the vegetation of Rabi as a forest "poor in species of commercial value but rich in overall biodiversity." In addition, Bourobou Bourobou stated, "It is one of the rare forests in Gabon where we find a high concentration of many species, especially species of *Diospyros*, in one small area. *Diospyros* species indicate old forests, and because we also find many large, old lianas such as *Strychnos aculeata*, we can conclude that it is a dynamic forest. In other words, the Rabi forest is old, but it experiences a lot of movement with natural disturbances."

Plans continue to expand the assessment of north of Rabi and future additional key geographic areas as priorities for conservation management: (1) Petit Loango, a unique coastal forest site believed to be rich in species diversity; and (2) Monts Doudou, the only highland area in the Gamba Complex, where initial species inventories have revealed unique diversity along an altitudinal gradient. MAB is putting together a multi-disciplinary team of national and international experts, technical personnel and students for these future expeditions.

Data from each field site is being reported in briefing papers outlining findings on the biological diversity of that location. A final report will be compiled after data from all assessments have been analyzed, and will outline the findings and future direction of the project.



New Genus, *Smithatris*, is a Natural History Highlight

The discovery of a new plant genus by **W. John Kress** and his colleague Kai Larsen, University of Aarhus, Denmark, is featured as a "Natural History Highlight" on the National Museum of Natural History's Web page <http://www.mnh.si.edu/feature.html>. Kress and Larsen named a new genus of ginger after first noticing the unusual plant in a flower display in Singapore, and then collecting it in the wild in 1998 in the limestone hills of the Saraburi Province north of Bangkok, Thailand. The new genus *Smithatris* joins 50 other genera and over 1,200 species in the plant family Zingiberaceae.

The Web site features a description and illustration of *Smithatris supraneeana*, a photograph of the flower, and maps of Thailand where it was discovered. In addition, the site describes how species are named and how frequently new species and genera are discovered.

The article and supplementary images will be available for another few weeks, after which it will be archived in the "Past Highlights" section of the site.

DC Flora Web Site Adds Localities

The Flora of the Washington-Baltimore Area Web site now has a new feature. The DC Herbarium is now on-line, and the specimen database can be queried for collection information and distribution maps. Most specimen collection localities are linked to general map locations using TopoZone <http://www.topozone.com>. You can access the Web site at http://persoon.si.edu/dcflora/dcspecimens/query.cfm.

Botanical Type Collection on the Web

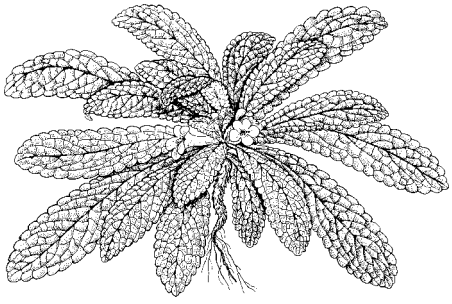
The 10,000th type specimen has recently been imaged in an effort to generate digital images of the Type Collection in the U.S. National Herbarium. This is great progress considering the limited resources. To date, there are only 84,000 specimens remaining to be digitized.

Beginning just over two years ago, and with seed money from the Provost's Office, the types were digitized family by family. The results can now be seen on the Botanical Type Specimen Register Web site at http://rathbun.si.edu/botany/types/.

Currently, **Ingrid Pol-yin Lin**, a volunteer in the Herbarium, has been doing much of the digitizing. Another volunteer, **Thomas Bingel**, and the graciousness of the Office of Imaging, Printing and Photographic Services (NMNH) have also contributed to the progress.

Between 70-90 percent of the specific requests received by the Herbarium for type specimens can be satisfied with a good, high-quality digital image. The number of such requests has increased considerably in the last year and these requests have been fulfilled while saving the type specimens from the stress of handling, shipping and potential damage or loss. The 15MB images are excellent documentation of the specimens in the event of loss. In addition to the family-by-family approach to selecting which types are digitized, all type specimens requested as a loan have been digitized prior to sending.

"This is an extremely worthwhile project," says **Vicki Funk**, curator of the Asteraceae. With sufficient support, the Botany Digital Lab can be made into a full-time operation and almost triple the current production levels, while simultaneously documenting and preserving the critical type specimens.



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Smithsonian
Botanical Symposium

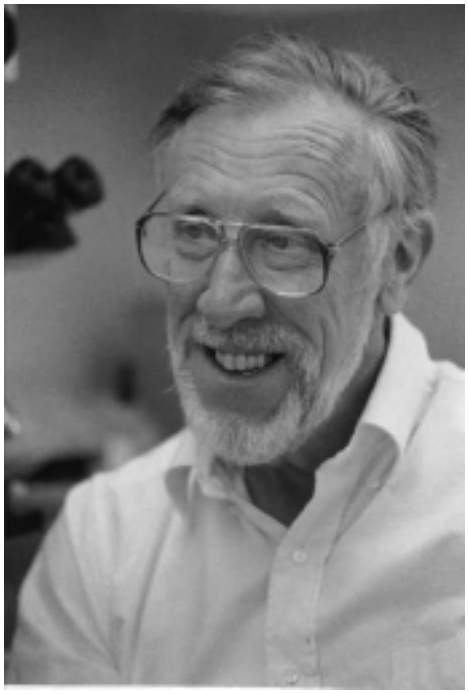
P. Barry Tomlinson Receives Second Cuatrecasas Medal

P. Barry Tomlinson of Harvard University received the Cuatrecasas Medal at the 2nd Annual Smithsonian Botanical Symposium. The medal is in honor of José Cuatrecasas, a pioneering botanist and taxonomist who spent nearly a half-century working in Botany at the Smithsonian Institution. Cuatrecasas' research, especially in the flowering plant family Asteraceae, was devoted to the classification, biogeography, exploration, and ecology of plants of the paramo and subparamo regions of Andean South America. Out of enduring respect and admiration, the José Cuatrecasas Medal for Excellence in Tropical Botany was established. This medal is presented annually to a botanist and scholar of international stature who has contributed significantly to advancing the field of tropical botany. The award serves to keep vibrant the accomplishments and memory of this outstanding scientist.

The recipient of the Cuatrecasas Medal is selected by a committee made up of botanists on the staff at the National Museum of Natural History, in consultation with other local plant scientists in the Washington area. This year the Committee was composed of **Laurence Dorr** (Chair), **Pedro Acevedo**, Alan Wittemore, and Pat Herendeen. Nominations for the Medal are accepted from all scientists in Botany at the Museum. The award consists of a bronze medal bearing an image of José Cuatrecasas on the front with the recipient's name and date of presentation on the back.

The selection committee was impressed by the many important contributions that Tomlinson has made to tropical botany over his long and distinguished career. Tomlinson was born in 1932 in Leeds, England where he received both his undergraduate and graduate training at the university there in conjunction with work at the Royal Botanical Gardens at Kew. He has held positions since that time at the University of Malaya, Singapore Botanic Gardens, the University of the Gold Coast in Ghana, West Africa and at Fairchild Tropical Garden in Miami. Currently he is the E. C. Jeffrey Professor of Biology at Harvard University.

The publication of his wonderful books on the biology of tropical trees, the anatomy of monocotyledons, and the botany of mangroves, and his numerous papers on anatomy, morphology, and tropical botany are among the many achievements that led the committee to unanimously conclude that Tomlinson is the scientist most deserving of receiving this year's Cuatrecasas Medal. Perhaps most important is his commitment to teaching students about the tropics. Many attendees at the Botanical Symposium had been trained by Barry Tomlinson in his courses at Fairchild Garden and in Costa Rica. "The real pleasure of my professional development," said Tomlinson in a written statement, "has been the regular opportunity to show students that botanical conundrums are best elucidated if one learns to 'ask the plant.'" He added, "In this sense I believe I pass on a message well understood by botanists of the stature of José Cuatrecasas and it is in this spirit that I perceive the great honor you bestow on me."



P. Barry Tomlinson, recipient of the José Cuatrecasas Medal for Excellence in Tropical Botany. (Photo by Harvard University)

Unfortunately Tomlinson was not able to be present at the Botanical Symposium to receive the medal. Dennis Stevenson from the New York Botanical Garden accepted the medal on Tomlinson's behalf.

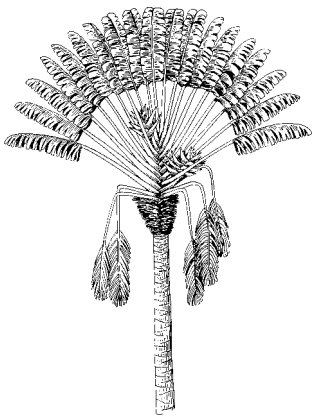
Abstracts from the Speakers of the Smithsonian Botanical Symposium

The second annual Smithsonian Botanical Symposium was held 5-6 April 2002. The symposium, "The Convention on Biological Diversity: The Globalization of Natural History Science," addressed the impact of the CDB on scientists and its ramifications for understanding the natural world. Below are the speakers' abstracts from the papers that were presented.

The speakers at the Smithsonian Botanical Symposium. From left, Ira Rubinoff, Brian Boom, Scott Miller, Tom Lovejoy, Gerald Bills, Stella Simiyu, Braulio Ferreira de Souza Dias, Paula DePriest, Cristian Samper K., and W. John Kress (Head of Botany). (Photo by Leslie Brothers)

Gerald Bills
Merck Research Laboratories
Access and Discovery of Pharmacologically Active Metabolites from Fungi and Other Microorganisms

The unknown dimensions of microbial diversity, hypotheses about chemically mediated interspecific relationships, and historical success are the most often cited reasons for use of microorganisms as a drug discovery resource. Despite increased awareness of the potential for metabolite discovery from microorganisms and advancements in drug discovery technology over the last 10 years, rates of discoveries of commercially significant products from microbial species have at best remained constant. Several obstacles impede the use of natural products as a drug discovery resource, and new technologies are competing with traditional natural products research, and may partially explain the disappointing yields. Experiences with microbial metabolite discovery in a modern high-throughput screening environment are illustrated with examples of fungal metabolites. Examples of important lead structures from fungi include flutamide, apicidin, nodulisporic acid, demethyl-asterriquinone B-1, and several antifungal metabolites.



Advances in molecular genetics of secondary metabolite biosynthesis have led to a new concept of drug discovery known as biocombinatorial production of synthetic natural products. The promise of this genetic engineering/chemistry hybrid approach for developing novel drugs and recent progress in the combinatorial biosynthesis of novel bacterial polyketides have motivated scientists to explore the potential of novel biocombinatorial secondary metabolites. Pursuit of genetic diversity by creating biocombinatorial diversity, increases the likelihood of discovering novel secondary metabolites, because the recipient strains are fast-growing, industrially adapted organisms. Once novel drug-producing transformants are identified, scale-up fermentation for commercial production can be quickly implemented. These approaches, though promising, have yet to be practically implemented.

Finally I will discuss the way the Convention on Biological Diversity has redirected our approaches and policies for microbial screening. Recommendations are made on how to ensure that microorganisms continue to contribute to the discovery of pharmaceuticals and agrochemicals.

Brian M. Boom
Center for Environmental Research and Conservation
Caught Up in the Moment: Botanists and the CBD a Decade after Rio

Many botanists have long dreamed of, and even labored for, the day that world leaders would understand the value of biodiversity and take the needed bold measures to ensure its conservation and sustainable management. That dream started to unfold in 1992 at the United Nations Conference on Environment and Development (UNCED), popularly known as the Earth Summit. One of the outcomes of this momentous meeting in Rio de Janeiro was the Convention on Biological Diversity (CBD), and the pursuit of botany has not been the same since. Euphoria among botanists over the high level attention finally being accorded to biodiversity quickly morphed to pessimism in some quarters of the profession as the realities of implementing the CBD came into clearer focus. Each country, and even different agencies within a single country, interpreted the details differently. In some places the study of biodiversity slowed and in others it essentially ceased. Of course, it only made the situation worse that a key nation, the United States, has not yet ratified the CBD. Yet, despite difficulties, progress has been possible with a balanced combination of thoughtful planning, the development of new proto-

cols, and much patience.

Using examples from an institution with a very active international research program, The New York Botanical Garden (NYBG), this paper explores the effect of the CBD on botanical research during the past ten years. Trends of professional productivity at the NYBG will be examined, and a range of case studies will be described including projects that involved floristics, monographic studies, repatriation of data, building capacity, establishing parks and extractive reserves, initiation of molecular systematics and genomics initiatives, and bioprospecting. Botanists, and life scientists generally, are caught up in a transitional, often frustratingly ambiguous moment as society finally seriously reassesses its relationship with the biosphere. Yet, the CBD has the most potential of any international agreement for providing the underpinnings for a sustainable relationship between humans other components of the biosphere, and for that reason the implementation of the CBD deserves the active engagement of the botanical community.

Braulio Ferreira de Souza Dias
Biodiversidade e Recursos Geneticos
The Convention on Biological Diversity: Challenges and Opportunities in Mainstreaming Biodiversity into Society and Economy

If we want to save the world's rich biodiversity we must recognize that conservation is a matter of individual and society choice based on differing values and availability of options. Both the destruction and the conservation of biodiversity are a result of value judgments within a framework of differing concepts of nature and livelihoods expectancies. The Convention on Biological Diversity was established in recognition of the global implications of biodiversity loss and change and the need to balance the huge asymmetries in appropriation of benefits and costs of biodiversity use and conservation. The real challenge is the mainstreaming of biodiversity in society and economy. Given the asymmetric distribution of wealth and biodiversity at the global level, a much enhanced and balanced effective international cooperation is needed. The reversal of the current trend of biodiversity loss depends to a large extent on the implementation of integrated approaches to landscape management based on new and genuine win-win partnerships between different sectors and stakeholders.

As a framework convention, the Convention on Biological Diversity faces huge challenges to become effective. The CBD has succeeded so far in 1) becoming a global convention, with the outstanding and unjustified exception of the United States of America; 2) providing a forum to merge environmental, social and economic concerns; 3) mapping the issues of common concern to all nations and establishing a series of ecosystem-based work programs and complementary cross-cutting initiatives; 4) establishing an international protocol on biosafety for the transboundary movement of genetically-modified-organisms; and 5) establishing an international treaty on plant genetic resources for food and agriculture. The CBD has failed so far in 1) establishing stable rules for access and benefit sharing; 2) establishing legal mechanisms for the protection of traditional knowledge associated with biodiversity; 3) enhancing international cooperation; 4) reducing the scientific uncertainties associated with biodiversity; 5) establishing agreed global targets; and 6) reversing the current trend of biodiversity loss.

The author comments on his experience with the following CBD initiatives: 1) Program of Work on Agricultural Biological Diversity; 2) The International Pollinators Initiative; 3) The Global Taxonomy Initiative - The Flora Neotropica effort; 4) The Global Strategy for Plant Conservation; 5) the development of indicators for biodiversity. The author concludes with some perspectives and challenges facing the knowledge, conservation and sustainable use of biodiversity in Brazil.

Scott Miller
Smithsonian Institution
Impact of the Convention on Biological Diversity on Taxonomy and Biodiversity Information

The Convention on Biological Diversity (CBD) and related activities has raised awareness about a series of biodiversity-related issues over the last ten years. This presentation will evaluate how much progress has been made in issues related to taxonomy and biodiversity information through a series of examples.

Controls on research, and the flow of both specimens and information, are a major issue. Controls should be set appropriate to the risks and rewards, as shown by examples in pest identification, taxonomic (systematics) research, and bioprospecting. Costa Rica and Kenya are models for research and export permit systems that work, as contrasted with countries that heavily restrict permits

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The Symposium panel (including, from left, Tom Lovejoy, Scott Miller, Braulio Ferreira de Souza Dias, and Stella Simiyu). (Photo by Leslie Brothers)

Abstracts

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without facilitating in-country collaborations.

Secondary processors and distributors of biodiversity information have multiplied, but funding for primary production of quality biodiversity data, especially the taxonomic foundation of understanding biodiversity, remains problematic. The Global Taxonomy Initiative (GTI), BioNet International and SABONET are different approaches to building taxonomic capacity. Despite the endorsement of the GTI, funding for taxonomic activities by the Global Environment Facility (GEF) and other international donors has been slow.

ERIN, CONABIO and Species Analyst have demonstrated what can be done through analyses of large quantities of biodiversity data, but the basic problem remains availability of high quality data in electronic form.

Related to funding, ownership of biodiversity information remains a challenge. The CABI Crop Pest Compendium, ECOPORT and the Global Biodiversity Information Facility (GBIF) provide examples of different approaches.

While the CBD focuses on activities at the country level, most taxonomic issues span regions and continents. The Global Taxonomy Initiative (GTI), BioNet International and SABONET are used as examples of activities at regional and global scale.

Communication among sectors remains spotty. The CBD and FAO joint work program in agricultural biodiversity is an opportunity to bring the environment and agriculture sectors together. Bringing technical and policy issues together remains challenging. The Global Invasive Species Programme (GISP) is a model for science informing policy.

Very few countries can say that activities related to the CBD have greatly enhanced the ability of end users to access greater quality and quantity of biodiversity information that is useful in conserving and managing biodiversity. We need to use the GTI, GBIF, and similar initiatives to bridge these gaps.

Cristian Samper K.
Smithsonian Tropical Research Institute

Linking Science and Policy: The Case of the United Nations Convention on Biological Diversity

The United Nations Convention on Biological Diversity (CBD) is the Convention for Life on Earth. It provides a global framework for the conservation and sustainable use of biodiversity, and the equitable sharing of the benefits derived from the use of genetic resources. Since its adoption in 1992, it has provided a forum that brings nations, NGOs and industry together for a common goal. But the text of the CBD is so broad that it needs to be developed through a set of decisions that are implemented primarily at the national level. The capacity of many developing countries to be active players in the CBD is limited, as is their capacity to implement the provisions and decisions. I will provide examples of steps taken to link science and policy at the global and national level, and their impact on the development and implementation of the CBD.

One of the main challenges of the CBD is to strengthen the scientific inputs into the decision-making process, as good decisions require good science. This was the purpose behind the establishment of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA). This mechanism attempts to bring together experts from around the world, and provide recommendations on priority issues. Examples of issues that were driven by science are the adoption of the global taxonomy initiative, the pollinators initiative, and the proposed strategy for plant conservation. However, we find that the process has not always involved the best of science, and that science is often not providing the best advice for the implementation of the CBD. I will mention steps that can be taken to bridge this gap.

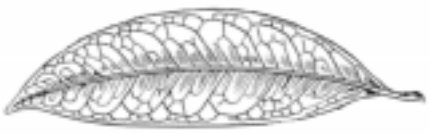
The CBD has had a profound impact at the national level in some countries. One example is provided by the work done in Colombia, where a major restructuring of the environmental sector took place as a response to the CBD. This included the creation of the Ministry of the Environment, decentralization of environmental management, and the establishment of research institutes to support policy. This process has resulted in a stronger environmental sector, and increased support for science. Examples include the adoption of a national biodiversity policy, a national agenda for research in systematics, and the adoption of the national strategy for plant conservation. The combination of the CBD as a legal instrument, the institutional transformation that took place after 1992, the adoption of sound policies with the involvement of the scientific community, and increased national capacity and cooperation, have all resulted in a major improvement for science and conservation at the national level.

The Symposium panel (including, from left, Cristian Samper K., Gerald Bills, and Brian Boom). (Photo by Leslie Brothers)

Stella Simiyu
National Museums of Kenya
The CBD Challenge in Botany: Emerging Responsibilities, Priorities and Practices

The Convention on Biological Diversity translates its guiding objectives of conservation, sustainable use and equitable sharing of benefits into binding commitments in its substantive provisions contained in articles 6-20. In accordance to these commitments, Parties have refined their national and institutional priorities and practices in line with the specific decisions and actions recommended by the Conference of Parties (COP) to the Convention, with varying stringency and success. In addition, most countries have revised their national policies and sectoral responsibilities in order to strategically incorporate and implement the various CBD work programs and principles adopted. The resultant changes have had both positive and negative impacts on botanical research and conservation.

On a positive note, the CBD has provided an umbrella for concerted effort at international, national and regional levels to tackle the taxonomic impediment; enhance regional and international co-operation, facilitate targeted capacity building and technology transfer and highlight the role of indigenous knowledge, innovations and practices amongst others. In some cases though, national initiatives to strengthen capacities and capabilities for biodiversity conservation and sustainable use, as well as secure sovereignty over the biodiversity within their boundaries, have resulted in temporary setbacks to ongoing international research initiatives and collaborations, confounding many scientists. The main benefit of the CBD however has been the mainstreaming of biological conservation issues into national policy frameworks and putting biodiversity into the global political agenda by linking conservation to sustainable use, poverty alleviation and economic development especially in developing countries.



Participants of the Smithsonian Botanical Symposium gathering at the United States Botanic Garden Conservatory for the opening reception. (Photo by Leslie Brothers)

Symposium

Continued from page 1

of a heavier reliance on computer scanning of digital images of specimens, versus less field collecting due to permit issuance difficulties or irregularities in desirable countries as a result of strict compliance with terms of the CBD.

The next speaker, Stella Simiyu from the National Museums of Kenya, Nairobi, spoke on the topic of "The CBD Challenge in Botany: Emerging Responsibilities, Priorities and Practices." Simiyu related the current thematic work programs of the CBD, such as biodiversity of forests, dry lands and subhumid lands, and apprised that the Convention uses an *ecosystem* approach as a framework for analysis and implementation of its work.

Concerning the Global Taxonomy Initiative (GTI), one of the CBD components, Simiyu observed that 900,000 names already exist for the world's 270,000 known species of flowering plants. The excesses of this situation unfortunately constitute, as plainly stated by parties to the Convention, a "taxonomic impediment" to implementation of the goals of the CBD. Scott Miller later confirmed that the "impediment" is the difficulty of getting good taxonomic information and distributing it widely. More studies to clarify various taxonomic entanglements are directly needed. One target is the compilation of an accessible working list of known species, in hopes that the exercise will stimulate the preparation of a world flora. There seems to be no time to lose on that enterprise, for as noted by Sir Ghillean Prance et al., an average of about 2,350 new species of flowering plants are being described each year (*Ann. Missouri Bot. Gard.* 87: 67-71. 2000). Simiyu also called for an increased harmonization of research work at the national and international levels, with broader participation in the CBD process by scientists. For this emerging priority, she stated: "The onus is on us to pick up

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Symposium

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the challenge."

The next speaker was Cristian Samper K., the director of the Smithsonian Tropical Research Institute (STRI) in Panama City, Panama, who delivered an authoritative presentation on "Linking Science and Policy: The Case of the United Nations CBD." He discussed how the CBD became an important part of the environmental legislation of the South American nation of Colombia. The Convention is an integral part of Colombia's national environmental system, and the national biodiversity policy of the country includes provisions for conservation, acquisition of biological knowledge, and utilization of resources. Research institutes and botanical gardens have been inaugurated, and presently 36 percent of the endangered plants of Colombia are being grown in Colombian botanical gardens as a result of CBD action plans.

The afternoon session began with Scott Miller, chairman of the Department of Systematic Biology, National Museum of Natural History, who spoke on the "Impact of the CBD on Taxonomy and Biodiversity Information." Miller, a strong proponent of using museum resources for the provision of biodiversity information, observed that the basic problem remains the availability of high quality data from museum specimens in electronic form. He described how biodiversity data from the natural range of the Asian long-horned beetle, a pest that arrived in wooden packing crates at Midwestern U.S. airports, has been fed into a parallel-climate model, and is helping the development of a policy for control of the beetle (see Web site http://www .speciesanalyst.net).

The Hon. Bruce Babbitt, Secretary, U.S. Department of the Interior (1992-2000), delivering his keynote address, "A Retrospective View of the Rio Convention" at the Smithsonian Botanical Symposium. (Photo by Leslie Brothers)

In the course of his talk, Miller recalled an instance of how taxonomy has prevented biopiracy. In the past, a patent had been granted for a bark infusion from the Amazonian hallucinogenic vine *Banisteriopsis caapi* (Grisebach) Morton (Malpighiaceae), known by its Peruvian name "ayahuasca." Taxonomists later proved that the curious properties of this plant were known long ago by the Amerindians, and thus not unique to the people who held the patent, and the patent application was rejected. On a different track, Miller also noted that molecular systematics involves routine screening for minor variations of known compounds, and thus is not a search for new compounds; therefore, molecular screening is not bioprospecting.

The next speaker was Gerald Bills, senior research fellow at Merck Research Laboratories in Madrid, Spain. He presented a talk on "Access and Discovery of Pharmacologically Active Metabolites from Fungi and Other Microorganisms." Fungal biology is so diversified that 30 metabolic pathways were recently found in filamentous fungi alone. Cancidas®, a new Merck Company antifungal drug, is a caspofungin acetate obtained from material collected along the Lozoya River in Madrid; its effectivity is based on a pathway uninvestigated until recently. And, a small, non-peptide molecule with *insulin*-mimetic properties has been isolated from a species of the African fungus *Pseudomassaria*. Using methodologies described by Bills, it has been calculated that there are an incredible 78,732,000 possible chemical combinations (i.e., metabolic products) in fungal combinatorial genes. This has led scientists to the creation of unusual and valuable "unnatural natural products."

The final invited lecturer was Braulio Ferreira de Souza Dias from Brasilia, who holds the governmental position of director of biodiversity conservation in the Brazilian Ministry of the Environment. His topic was "The CBD: Challenges and

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- International Association for Plant Taxonomy
- Offices of the Director and the Associate Director for Research & Collections - NMNH

Opportunities in Mainstreaming Biodiversity into Society and Economy." Representing the nation in which the Convention was born, Souza Dias pointed out that the CBD is an umbrella framework, and as such there have been some difficulties in implementing it. Seemingly, it is largely a matter of cultural values, those of individuals, groups and societies. In fact, he noted that "Nature" itself is a societal concept. From this comes the conundrum, as he remarked, where "scientists don't understand how societies (values) work, and government doesn't understand how scientists work." Indeed, the existence of very disparate attitudes between ordinary people and the scientific community in Asia has recently been elaborated by F.S.P. Ng in an article entitled "Taxonomy, biodiversity and management of knowledge in Asia" (*Flora Malesiana Bulletin* 13(1): 48-50. 2002).

> *"The onus is on us to pick up the challenge."*
>
> *- Stella Simiyu*

The Global Taxonomic Initiative, which, as Souza Dias explained, bridges the gap between the "bias and isolation" of taxonomists and the users of taxonomic information, may be exemplified by the Flora Neotropica Initiative. Support from the governments of Brazil, Colombia and Mexico is expected to effectuate the completion of the flora in a projected 15 years. At the rate that work on the flora proceeded in the past, it would have taken 300 years. Many taxonomists have volunteered to support it with treatments of various plant groups.

As pointed out by Souza Dias, many questions arise during attempts to implement the Convention, such as: How many species are there on the planet?; What determines high versus low biodiversity?; How much biodiversity can we afford to lose (the threshold)?; and, Is biodiversity a representation of co-evolved, or opportunistic assemblages, of plants? Statistics indicate, for example, that only 350 species are known of the estimated 55,000 species of virus in Brazil; and only 400 species of Brazilian bacteria have been described out of the 130,000 species estimated to exist in that country. All these, and the higher clades of plants and animals, are part of what is called the National Genetic Patrimony of Brazil. Another issue is the protection of the rights of traditional knowledge in a very racially mixed country. In Brazil, for example, there still exist 500 *quilombos*, communities of descendants of escaped slaves. Indigenous knowledge ownership can become hard to decipher if it needs to be assigned to a distinct group of persons.

A symposium discussion between panelists and audience was moderated by Paula DePriest, co-convenor of the symposium and curator in the Department of Systematic Biology – Botany. Among the questioners was Terry Erwin, Smithsonian specialist in insect biodiversity, who asked the panel to imagine what would be the situation today if the United States government had ratified the Convention. Although still awaiting ratification by the U.S. Congress, many American biological specialists serve on large delegations of observers and persons of special assistance at Conferences of the Parties (COP) to the Convention, which are held around the world to tackle the hard issues that arise.

Last speaker of the session was Tom Lovejoy (World Bank, Washington, DC), who provided a summarizing commentary. Lovejoy's trademark bowtie, upturned at one end like a propeller blade in mid-revolution, imparted to him the correct aura: of a veteran habitué of scientific academia blended with experiences in the fragmented Brazilian forests and innumerable consultative sessions on biodiversity. He noted several major changes wrought by the CBD, including that combinatorial chemistry is now competitive with research to discover natural compounds, and that numerous advances have been made in fostering biological conservation. International collaboration remains absolutely fundamental.

Lovejoy's remarks included one relating to Scott Miller's (see above) concerning molecular systematics, and he cautioned the audience to avoid being caught up in "bioparanoia" (T.L.'s new term) over alleged instances of biopiracy, and instead to realize the salient difference between molecular systematics and bioprospecting. To Lovejoy, the real "biopiracy" is the destruction of biodiversity around the world, still a widespread concern of the conservation imperative implicit in the CBD.

After the evening dinner, the keynote speaker was The Hon. Bruce Babbitt, Secretary of the Interior (1992-2000), who

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George Schatz (left) and Dennis Stevenson enjoying the reception at the United States Botanic Garden. (Photo by Leslie Brothers)

Symposium

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gave the reassembled audience "A Retrospective View of the Rio Convention." Babbitt fleshed out a context of the three important environmental concerns that face us today: population, climate change, and biodiversity. How these sensitive issues will resonate to those concerned with the sovereignty and economic well being of nations, will be an integral part of future debates and administrative policies.

Supplementary Symposium Links and Documents on the Web

The Web site to the 2nd Annual Smithsonian Botanical Symposium <http://persoon.si.edu/sbs/> has many links and documents related to the conference. Documents include the full text of the Convention on Biological Diversity (CBD) and a link to the CBD Web site. Scott Miller has provided "The Intellectual Property Policy 2000 of the International Center of Insect Physiology and Ecology (ICIPE)" as a supplement to his presentation, where the policy, preface, introduction, and main document exist in pdf format. Additional items related to the CBD and the symposium can be added to the list of links and documents by sending an e-mail to sbs@nmnh.si.edu.

Ira Rubinoff (left) and Stanwyn Shetler participating at the Smithsonian Botanical Symposium. (Photo by Leslie Brothers)

John Kress (left) and Brian Boom giving the symposium a thumbs-up. (Photo by Deborah Bell)

Acknowledgments

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

Organizers

- Paula DePriest, Co-Convener
- Laurence Dorr
- Ellen Farr
- Gary Krupnick
- Ida Lopez
- Sue Lutz

Core Collections Management Staff

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- Deborah Bell
- Leslie Brothers

Plant material

- Nancy Bechtol and the Horticulture Services Division at the Smithsonian Institution

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

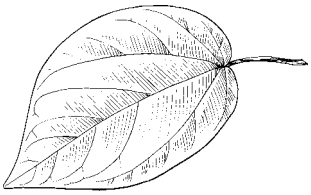
Additional Scenes from the Smithsonian Botanical Symposium

Joshua Rosenthal asking a question from the audience during the Panel Discussion Session. (Photo by Leslie Brothers)

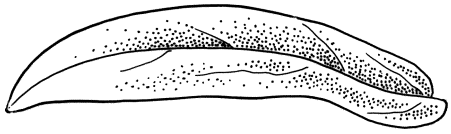
Enjoying a discussion are, from left, Patrick Herendeen, Elizabeth Zimmer, and Richard Olmstead. (Photo by Deborah Bell)

Deep in conversation are, from left, Michael Bordelon, Dieter Wasshausen, and Paul Peterson. (Photo by Deborah Bell)

From left, Terry Erwin, Cristian Samper K., Ira Rubinoff, and Anna Weitzman having a discussion during the opening reception. (Photo by Deborah Bell)



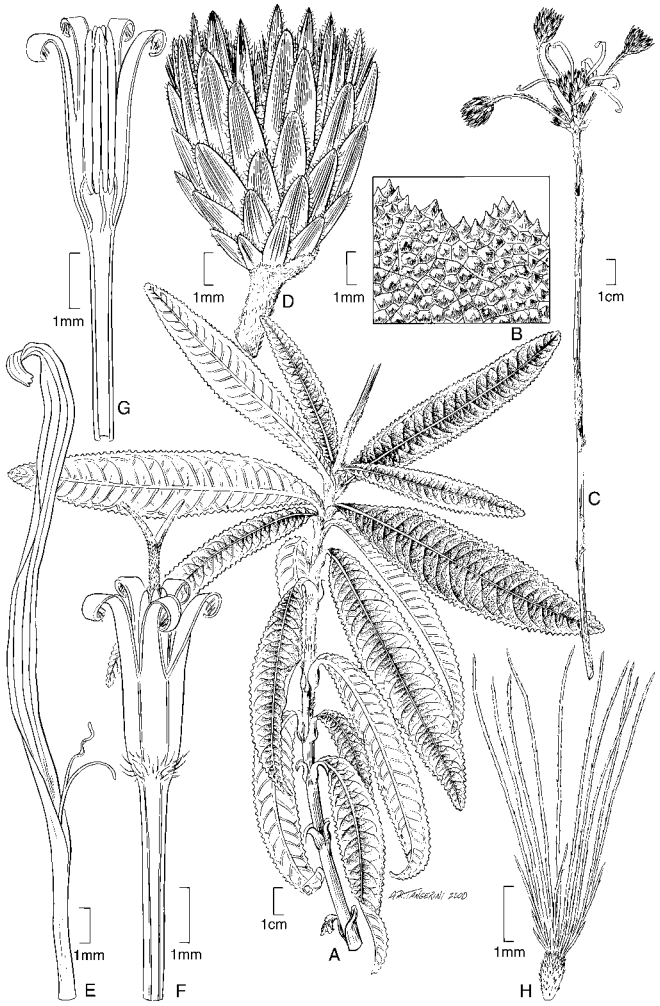
The Coolidge Quartet performing for the participants of the Smithsonian Botanical Symposium. (Photo by Deborah Bell)



Art by Alice Tangerini

Dillandia subumbellata V.A. Funk and H. Robinson

The discovery of a new genus by W. John Kress (see article, page 6) wasn't the only new genus described recently in Botany. Vicki Funk and Harold Robinson have discovered a new genus of Compositae. Phylogenetic and morphological analysis suggests that three species of Compositae, including *Dillandia subumbellata*, form a monophyletic group. *Dillandia* is defined by the possession of bullate leaf surfaces and pale anther thecae. This study is an example of how molecular and morphological data, when used together, can lead to a better classification. (*Systematic Botany* 26: 216-225. 2001.)



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