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

The Plant Press

Smithsonian
National Museum of Natural History

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Botany Profile

The Herbarium: A "Case" Study

By Robert DeFilipps

It would almost seem that the instinct to understand our environment, by means of classifying the various things in it, arose in part as a basic survival mechanism. For example, the Yanomami Amerindians of Brazil, investigated by W. Milliken and B. Albert, are able to recognize at least 198 species of plants and fungi used for treating various disorders. In societies with less earth-bound and more westernized systems of culture, modern herbarium collections of dried plant material play a major role in classifying the organisms around us and understanding their interrelationships. Botanists are finding ways of assessing and responding to conditions caused by major extirpations in the world's flora, and examining the biodiversity and potential usefulness of plant germplasm.

Fortunately, an extensive national resource for addressing the biological concerns of the nation, and the world at large, is available for consultation. In addition to research aspects, it is also a cornucopia of readily accessible teaching materials for new generations of students. Since the 1800s it has been considerably built up from federally sponsored exploring expeditions, and therefore might be called "the people's herbarium." The United States National Herbarium occupies the 4th and 5th floors of the west wing of the National Museum of Natural History in Washington, D.C. It contains millions of specimens in several thousand metal cases, which are divided inside into shelf spaces called "pigeonholes."

Along the perimeter of the herbarium, and often provided with window views of the Smithsonian Castle, the Washington Monument, or the massive Internal Revenue Service building, are located the offices and research laboratories of advanced staff scientists, known as curators. "Curator" comes from the Latin word "*curare*" meaning "to take care of," a derivation unrelated to the other "*curare,*" an arrow poison used by some South American tribes, originating from the Carib word "kuriri."

The curators use the herbarium collections to perform research on the taxonomy, systematics, floristics, cladistics, and evolution of plants from around the world, and often work on projects having an impact on, or a facet pertaining to, the disciplines of plant conservation, ecology, or behavioral studies of animals in relation to plants. Verified, authentic specimens of rare and endangered species, required for determining their original geographical range and former habitat preferences, are found among the collections. The herbarium maintains approximately 90,000 "type" specimens, which are the irrevocable basis for the scientific names of species, subspecies and varieties, and are used for comparison in revisions and monographic work entailing highly critical identifications. Recourse to type specimens in daily work is not always necessary: many experienced botanists remember, over a period of decades, the scientific names of hundreds of species that they know on sight; seldom, however, does a routine identification session become a festival of total recall.

> **Plants from historic voyages and treks of discovery are housed with 4.6 million specimens**

The U.S. National Herbarium is an entity administered by the Section of Botany in the Department of Systematic Biology. The herbarium's current appellation was established in 1894 as the name for the joint plant collections of the U.S. National Museum and the U.S. Department of Agriculture. The real basis for the national herbarium, as reported in a comprehensive history by C.V. Morton and W.L. Stearn (*Plant Science Bulletin* 12(2):1-4.1966), was formed by the abundant collections of the 1838-1842 U.S. South Pacific Exploring Expedition, commanded by Lt. Charles Wilkes of the U.S. Navy. The character "Captain Ahab" in *Moby Dick*, by Herman Melville, is said to be modeled after Wilkes. Background information on the official botanist of the expedition, William Rich, is largely unobtainable, since he soon "dropped out" of botany and became a shell collector in Mexico. A total of 50,000 specimens of 10,000 plant species were accessioned into the national herbarium from the Wilkes Expedition.

The most notable plant discovered on the extended Wilkes voyage was the carnivorous California pitcher plant or

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Travel

Mark Littler (10/8-10/11) traveled to Fort Pierce, Florida for a meeting of the search committee for a new chief scientist at the Smithsonian Marine Station (SMS). Mark and **Diane Littler** (12/27-2/23) traveled to Fort Pierce to continue research at SMS and in the Florida Keys.

John Kress traveled to Durham, North Carolina (10/10-10/12) to lecture at Duke University and attend a graduate student committee meeting; to New York City (11/9–11/12) to participate in a morphobank workshop at the American Museum of Natural History; and to Miami, Florida (11/14-11/16) to chair a Coalition for Excellence in Tropical Biology (CETroB) meeting and to be guest speaker at a World Wildlife Fund reception.

Wagner Wagner traveled to St. Louis, Missouri (10/11-10/15) to attend the Missouri Botanical Garden Systematics Symposium, and to search the herbarium for additional Caryophyllaceae for his research on phylogeny of the family; and to Vienna, Austria (10/16-10/22) to attend the International Association for Plant Taxonomy Symposium.

Dan Nicolson traveled to Vienna, Austria (10/14-10/22) to attend, as president of the International Association for Plant Taxonomy, the IAPT Symposium.

Paula DePriest traveled to Vienna, Austria (10/21-10/27) to attend the International Association for Plant Taxonomy Symposium, and to Durham, North Carolina (12/10-12/11) to attend a graduate student committee meeting at Duke University.

Robert DeFilipps (11/30-12/8) traveled to Dominica. A discussion of the need for crop diversification in the island was held with former Prime Minister Dame Eugenia Charles and Dominican agricultural economist Bernard Yankey; they were presented with a copy of DeFilipps' "Useful Plants of the Commonwealth of Dominica, West Indies."

Laurence Skog (1/1-1/17) traveled to the United Kingdom to visit the herbaria in Edinburgh (E), Oxford (OXF), Manchester (MANCH), and Kew (K).

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

New Faces

Two new volunteers will be assisting with imaging projects and Web development. **Ingrid Pol-Yin Lin** is a graduate of the California Institute of the Arts and the University of Southern California. She is completing a master's project in film-making while helping with Habitat for Humanity. She is fluent in Mandarin. **Seth Bennett** graduated cum laude from St. Michael's College in northern Vermont with a degree in computer science and a minor in mathematics. He has previously worked for a minor league baseball team and a ski resort. Their assistance is much appreciated.

Depatures

John Pruski, former research assistant to **Laurence Dorr**, has accepted a position at the Missouri Botanical Garden as Assistant Curator. He can be reached by email at John.Pruski@mobot.org.

Visitors

Chris Lea, National Park Service, Assateague; *Carex* of Maryland (10/24).

Jun Wen, Field Museum of Natural History, Chicago; Apiaceae, *Panax* (10/26).

Jasivia Gonzales, University of Goettingen; *Sticherus* (Gleicheniaceae) (11/7-11/14).

Rhoda Love, private; Collections and archives of L.F. Henderson (11/8-11/12).

Daniel Stancik, Charles University; *Festuca* (11/17-12/19).

Todd Willis, PlantGarden.com; Plant image resources (11/27).

Tom Frankovich, University of Virginia; Epiphytes of Florida seagrasses (12/4-12/7).

Florence Caplow, Washington Natural Heritage Program; Rare taxa of Washington State (12/07).

David Frodin, Royal Botanic Gardens, Kew; Araliaceae (12/13).

Susan Frisch, California State University - Fullerton; *Caulerpa* (Algae) (12/18-12/20).

Mingli Zhang, Academia Sinica/Harvard University; Papaveraceae of China (1/3-1/7).

Christopher Hardy, Research Associate, Institute for Systematic Botany; Research collaboration (1/4).

Ingrid Pol-Yin Lin, private; Botany Web projects (1/4).

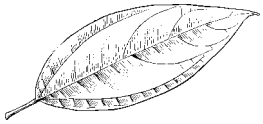
Gery Allan, Arcadia University; Fabaceae and Rutaceae (*Melicope*) (1/7-1/14).

Seth Bennett, private; Botany Web projects (1/7).

Alexander Krings, North Carolina State University; Asclepiadaceae (1/14).

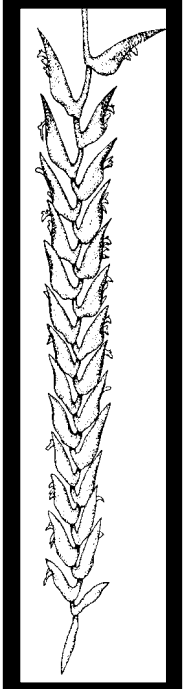
Raven Morris, private contractor; Plant images (1/22).

Sally Guy-Brown, private; Scientific illustrations (1/23).



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

Chair With A View — W. John Kress



The challenge and intellectual responsibility of natural history scientists working in museums, botanical gardens, and universities is to accurately and thoroughly discover, document, and describe the biological diversity of the Earth. Over the last three hundred years of botanical and zoological exploration, naturalists have traveled the world over in the quest for understanding the diversity and origin of life. These voyages of discovery have been local as well as global and have contributed to the documentation of over 1.4 million species of plants, animals and microorgansims. Yet much is left to be discovered and named. In the past, the majority of this work was conducted by western scientists, but today this effort has become truly international.

After centuries of exploration, we universally acknowledge that Nature in general does not recognize political frontiers and boundaries. For example, the distribution patterns of the rich flora and fauna of the Chocó region on the Pacific slopes of the northern Andes do not conform to the national borders of Ecuador, Colombia, and Panama. Similarly in the Indo-Burma biodiversity hotspot populations of plants and animals routinely cross the frontiers of Thailand, Myanmar, Bangladesh, China, and India. Most published checklists and inventories of plant species (e.g., Flora of Ecuador, Flora of Thailand) encompass areas defined by political boundaries, but in fact always include species found in adjacent countries. In many cases our understanding of the diversity and distribution of plants and animals has been significantly hindered by these national borders and boundaries.

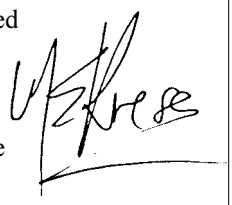
In the 21st century we clearly recognize that the biological resources of the Earth are besieged by an unprecedented level of social and economic development that threatens massive levels of species extinction and environmental change. In the midst of this global crisis one would expect that every attempt would be made to overcome the obstacles to understanding biodiversity resulting from national boundaries. Indeed, ten years ago in Rio de Janeiro representatives from many nations met to discuss just this problem. As a result of that meeting one of the most profound political responses to the environmental crisis emerged as the United Nations Convention on Biological Diversity (CBD).

The CBD was formulated as an affirmation that the world's biodiversity is a common concern of humankind. The three central objectives of the Convention are 1) the conservation of biodiversity, 2) the sustainable utilization of biodiversity, and 3) the equitable sharing of the benefits to humans arising from biodiversity; the 42 articles contained in the CBD outline how these objectives are to be met. To date over 170 nations worldwide have signed and ratified the CBD; the failure of the United States to ratify is a glaring omission.

As a response to the biodiversity crisis the near universal ratification of the CBD seemed to support a renewed and invigorated effort to document and describe the biological world. The "cause of biodiversity" was transformed from a local issue to an international concern: the globalization of biodiversity was achieved. And as part of this globalization, natural history researchers worldwide were poised to provide the scientific information necessary for understanding and conserving the plants and animals of the planet. Never before had museum scientists been faced with such a clear and immediate mandate to understand the natural world as was given by the CBD.

Unfortunately the political meaning of the CBD for biologists and natural product researchers is that access to nature for basic biodiversity investigations has become intensely regulated by local and national governments worldwide. The universal acceptance that nations and local communities have intellectual property rights to their biological diversity has changed the climate in which we conduct research as taxonomists and systematic biologists. Although taxonomists for centuries have been the recorders and historians of the uses of biodiversity by local and indigenous people, we are now also faced with rules and regulations that have been primarily set up to regulate activities that may exploit the environment, such as biodiversity prospecting, and not scientific research. It is alarming that since the Rio meeting the respected and scientifically sound investigations of biodiversity researchers have even been equated with biopiracy in some instances. This misunderstanding necessitates a major education campaign on the value of a basic understanding of nature to society.

Natural history scientists in both developed and developing countries in addition to their efforts to document biodiversity now must also legitimately address such issues as: How do we best share with the entire world our taxonomic data on species identification and distribution? How do we protect the intellectual property rights of the holders of the specimens as well as the countries of origins of those species? How do we best provide universal access to specimen data? How do we treat sensitive data on rare and endangered species?



Finding answers to these questions as well as recognizing how our science and research activities have changed in the ten years since Rio is a challenge that we all must now tackle. To address this issue the National Museum of Natural History has assembled a roster of internationally recognized speakers and

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Staff Research

Stanwyn Shetler recently finished reading the page proofs of the final volume (Vol. 30, 700 pp.) of the English translation of the "Flora of the USSR." This concludes his work, begun in 1994, of editing the last eight volumes of the translation. Only the general index is yet to follow.

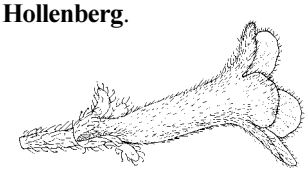
Staff Activities

On 18-21 October, **Dan Nicolson**, **Paula DePriest** and **Warren Wagner** attended the International Association for Plant Taxonomy (IAPT) Deep Morphology Symposium at the University Botanical Gardens in Vienna, Austria. The overriding idea of the symposium was how structural (morphological) data can be coordinated with the burgeoning macromolecular data, particularly if presumed to have arisen deep in evolution.

Nicolson also worked on Engler's *Araceae Exsiccatae et Illustratae* in the University herbarium, and submitted the finished Nicolson and Fosberg manuscript "The Forsters and the Botany of the Second Cook Expedition (1772-1775)" for publication in IAPT's *Regnum Vegetabile* series. He and Wagner also attended the 2nd annual open meeting of the IAPT officers and councilors. DePriest also worked with students and colleagues at the University of Graz.

In connection with the symposium there was a trip to the National Library led by Walter Lack, who had mounted a major exhibit of botany books there, ranging from the Anician Codex (an illustrated herbal, ca. 512 A.D.) to the typed doctoral thesis of Walter Gams on an organism that he subsequently (1971) published as a new unispecific genus *Tolypocladium inflatum.* This species is the source of cyclosporin, a drug that prevents rejection in human organ transplants, including Gams' own heart implant.

Robert Faden chaired the Eastern Winter Study Weekend for the North American Rock Garden Society that was hosted by the Potomac Valley Chapter and held at the Fairview Park Marriott Hotel in Falls Church, Virginia, 25-27 January. Attendance was approximately 220 guests. Other Botany attendees were **Aaron Goldberg**, **Mike Bordelon**, **Leslie Brothers** and **Linda Hollenberg**.



Talks Presented

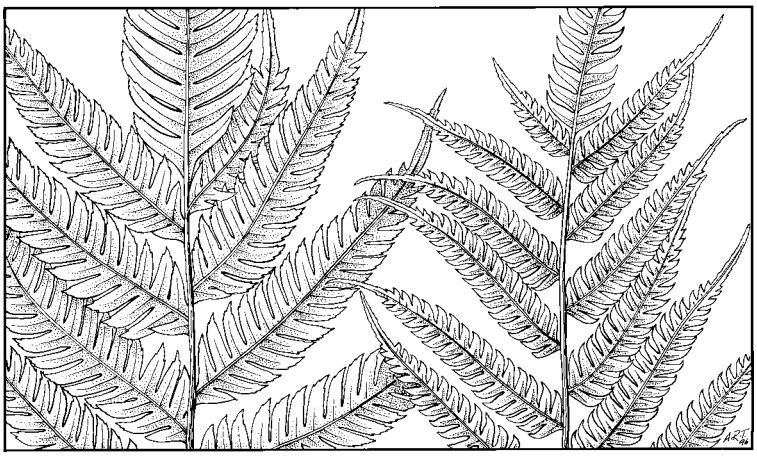
W. John Kress presented an illustrated Botany Seminar Series lecture on "The Evolution of the Zingiberales (Gingers, Bananas and Relatives): A Tropical Model Group for Studies in Ecology, Phylogeny and Classification" on 15 January. Results of cladistic analyses, and recent botanical exploration for gingers in Myanmar, were shown. Animal pollinators of various members of the order include South African sunbirds visiting *Strelitzia*, West Indian hummingbirds for *Heliconia*, South American bats on *Phenakospermum*, and Madagascan lemurs on *Ravenala* (see related "Art by Alice Tangerini," page 12).

Susan Louise Richardson (1947 – 2001)

Susan Louise Richardson, who served the Department for more than 20 years, passed away on 18 November. After a period of employment with the National Gallery of Art, she enrolled in George Washington University and studied botany under the late Kittie Parker, a former Emeritus Curator of the U.S. National Herbarium. Upon graduation, Richardson was hired into the Herbarium Services Unit of the Department with primary responsibility for the former greenhouse in the east court, a position she held for over 13 years. When the new greenhouses were constructed in Silver Hill, Maryland, Susan returned to the herbarium full-time where, among other things, she was responsible for the Integrated Pest Management (IPM) Program in Botany. One product of this work is an internal Web site <http://linnaeus.si.edu/insects> that provides details of four years of trapping data.

Retirement of Pteridologist David Lellinger

On 3 March, **David Lellinger**, who arrived at the Smithsonian Institution in August 1963, retires as Curator of Ferns and Fern Allies in the U.S. National Herbarium. Details of his attainments in research, herbarium management, and curation of ferns were reported in "Pinnae for Your Thoughts," *The Plant Press* n.s. 4(3): 1, 7 (July-September 2001). During his tenure the fern collections at US became the largest and most diverse in the Western Hemisphere. The Department is *sori* that he is leaving the daily routine, but pleased that he intends to continue research in the herbarium on weekends.



Botany Gets a New Address as Mail Gets Irradiated

Following the discovery of a letter containing anthrax spores mailed to the United States Senate on 15 October, disruptions of United States Postal Service (USPS) mail delivery occurred at many federal agencies, including the Smithsonian Institution. Interruptions of service began in early October, and this soon led to the complete curtailment of mail delivery as of 19 October, when all incoming mail was diverted for irradiation to outlying facilities. Mail service did not begin to be restored until 26 November, when the first few irradiated envelopes began to arrive. The flow of backlogged mail has been thin and sporadic ever since.

The central mail services branch of the Smithsonian has opened a new PO Box, effective 22 January. This PO Box is good for all first-, third-, and fourth-class mail envelopes and packages, including specimen shipments. Mail delivered to this PO Box will not be irradiated. Please use the following new address immediately:

Correspondence and non-specimen packages:
(Name of Recipient)
Department of Systematic Biology - Botany
Smithsonian Institution
PO Box 37012
NMNH, MRC-166
Washington, DC 20013-7012
USA

All specimen packages:
Collections Manager
Department of Systematic Biology - Botany
Smithsonian Institution
PO Box 37012
NMNH, MRC-166
Washington, DC 20013-7012
USA

The U.S. National Herbarium will gladly accept e-mail for loan requests and other transaction-related communications. Loan requests should be sent to russell.rusty@nmnh.si.edu.

Mail that has been irradiated includes all first-class letters and flats postmarked since 12 October and addressed to federal offices in Washington, D.C. with ZIP codes 20200 to 20599. Approximately ten truck trailer-loads of mail goes out daily from the Brentwood mail facility in Washington, D.C. to Lima, Ohio, but only two loads' worth comes back to the district daily. Full delivery has thus not resumed.

The impoundment of all materials at Brentwood occurred on 21 October. The mailings trapped in the closure of the Brentwood facility consists of mail to and from the Smithsonian dating from 14-21 October. All letters, flats, and packages at the facility will be irradiated. At this time, two-thirds of these items remain to be processed.

The USPS is irradiating selected mail to sterilize it from possible anthrax contaminations using high energy electron irradiation technology. At this time, only letters and flats postmarked after 21 October are being irradiated. Boxes (greater than 3 cm in thickness), third- and fourth-class mail, including bulk mail, are not being irradiated. Outgoing Smithsonian mail will not be irradiated at this time, and will be delivered normally.

Botany has already received mailed items that have been damaged by the irradiation process. Because electronic beam irradiation can affect research specimens and museum collection items, the Smithsonian Center for Materials Research and Education (SCMRE) prepared the following message as a service to the professional community:

> The irradiation equipment produces electrons with such a high energy that they have a relatively high penetrating power. Summarizing the information as it pertains to typical collection specimens exchanged by museums and research laboratories and transported by mail, the following concerns emerge:
>
> - Living specimens (seeds, cuttings, etc.) will be killed by this irradiation.
> - Cellulosic materials will be seriously affected, with the risk of embrittlement, discoloration and oxidation. This affects paper (including labels) and other plant-based materials as well as botanical specimens.
> - DNA is particularly at risk. Materials sent out for genetic analysis will be severely compromised, with the risk of both recombination and outright destruction.
> - Discoloration and fading will occur in a wide range of materials, from textiles to specimens to photographs.
> - Glass can undergo blue/purple discolorations; this may affect the research value of microscopic slide specimens.
> - In the case of specimens under alcohol, there is the potential for some radiolysis of the preservation solution, leading to the formation of various ions and free radicals in the solution.
> - Rubber and plastic stoppers of bottles and vials may become somewhat embrittled, but not to an extent of losing the closure of the containers.
> - Magnetic media (floppy disks, zip disks, audio and video tape) will probably lose significant information content. Undeveloped photographic film will be exposed.
> - Some heating of materials may result, which can cause problems with preservative solutions and with adhesives.
> - There is no apparent risk to the recipient from residual radiation, however. The principal risks are to the integrity and stability of the materials being shipped and irradiated.

In view of these statements, it is urgent that all Botany mailings should be addressed to the new PO Box given above.

Chair

Continued from page 3

participants for the up-coming Smithsonian Botanical Symposium in early April. We hope and expect that the results of this meeting will insure that the globalization of biodiversity will not be an impediment to science, but rather a great benefit to society and humankind. (Look for "Part II" in the April-June issue of *The Plant Press*).

The Conservation Column

By Gary A. Krupnick

In February, **Deborah Bell** and **Steve Smith** will be traveling to Africa with the Smithsonian Institution Monitoring and Assessment of Biodiversity Program (MAB), to assess and monitor the biodiversity of Gabon. They will join mammalogists, ornithologists, herpetologists, and entomologists in the tropical country to assess biodiversity within the context of sustainable development and conservation. Their destination is the Gamba Complex, valuable for its high level of biodiversity, yet with little previous biological work. Baseline biodiversity information will help lay the foundation for future environmental conservation of the area. Initial support comes from Shell Foundation's Sustainable Energy Programme, and Shell Gabon.

Bell and Smith have a history of working with the MAB Program. They joined MAB in 1996 in the Lower Urubamba region of Peru, where they conducted biodiversity assessments at a biologically sensitive area of the Amazon. Results from that study were used to link conservation and development, thus minimizing the operational impact on biodiversity.

Gabon is unique because of its high potential for the conservation of biodiversity. Over 85 percent of the country remains forested with the rest being savanna and coastal plain. Preliminary research has found the forests to be floristically diverse and rich in endemic species (>22 percent). Most of the forested areas have been subjected to some level of use or degradation. The primary commercial species, okoumé (*Aucoumea klaineana,* Burseraceae), accounts for 90 percent of the timber exports. A by-product of the timber industry has been the construction of roads, which inevitably affects forest communities by habitat fragmentation. The primary source of income comes from the exploitation of oil reserves. It has ensured a higher standard of living than in surrounding countries and less of a dependence on forest biodiversity to sustain the population. Like forestry, one potential impact has been forest fragmentation through the construction of a network of roads.

Over the course of the year, MAB plans to assess three key geographic areas as priorities for conservation management: (1) Rabi Oil Field site, to characterize species diversity and consider some ecological aspects related to the operational footprint; (2) Petite Loango, a unique coastal forest site believed to be rich in species diversity; and (3) Monts Doudou, the only highland area in the Gamba Complex, where initial species inventories have revealed unique diversity along an altitudinal gradient. Bell and Smith will be joining a multi-disciplinary team of national and international experts, technical personnel and students at the Rabi Oil Field site for a 4-week expedition. Other researchers from the Department may join future MAB expeditions to the other two sites.

Data from each field site will be reported in briefing papers outlining preliminary 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.

The Alarming Lecture of Dr. Pimm

By Robert DeFilipps

Stuart L. Pimm, noted environmental conservationist and author of the recent book "*The World According to Pimm: A Scientist Audits the Earth*" (2001, McGraw-Hill), presented a Systematic Biology Seminar on 1 November in Baird Auditorium. Pimm, Professor of Conservation Biology at the Center for Environmental Research and Conservation, Columbia University, New York, was introduced by **W.J. Kress**, Head of Botany. To audit is to examine and verify, and in this case the subject involves auditing the environmental state of the globe. His assessment and measurements of biodiversity have revealed an often startling state of affairs; Pimm's cup runneth over.

We, the 6 billion people of the world, utilize or destroy 40 percent of the land's annual production of plant growth; we use 50 percent of the available annual supply of freshwater; and our fisheries consume 33 percent of the ocean's productivity. These trends could be at least partially reversed by more careful use of resources, although the extinct species we have previously decimated cannot be replaced. In fact, current species extinction rates caused by people are accelerating through 1,000 times the geological background rate. The background rate is one natural extinction per million species per year.

Despite these disturbing facts, he pinpointed a unique opportunity for collaboration between scientists and conservationists. We need more taxonomic and systematic studies in order to determine the details of precisely where the world's biodiversity is concentrated. Armed with such information, the areas could be knowledgeably acquired by purchase for preservation. It is Pimm's observation that it would require an outlay of only US$10 per hectare to buy out logging rights in parts of Brazil. By generalized extrapolations, according to Pimm all the world's remaining tropical forests could be bought out for the sum of US$5 billion. Once that is accomplished, we could then devote ourselves to continued study and conservation of the rainforests in a more secure atmosphere. Efforts to keep forests intact at this juncture in world history may remind us of the words of the Sicilian author Giuseppe Tomasi: "If we want things to stay as they are, things will have to change."

Honorable Bruce Babbitt to Deliver Keynote Address at Botanical Symposium in April

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 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, to be held 5-6 April 2002 at the National Museum of Natural History in Washington, D.C., will address the impact of the CBD on scientists and its ramifications for understanding the natural world.

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 U.S. Botanic Garden, and the International Association for Plant Taxonomy. An opening reception will be held Friday evening, 5 April, in the Conservatory of the reopened U.S. Botanic Garden. The speakers are:

- **Gerald Bills**, Senior Research Fellow, Merck Research Laboratories, Spain;
- **Brian M. Boom**, Senior Research Scientist, Center for Environmental Research and Conservation, USA;
- **Braulio Ferreira de Souza Dias**, Diretor de Biodiversidade e Recursos Geneticos, Brasil;
- **Scott Miller**, Chair, Department of Systematic Biology, National Museum of Natural History, USA;
- **Cristian Samper K.**, Deputy Director, Smithsonian Tropical Research Institute, Panama;
- **Stella Simiyu**, National Museums of Kenya, Nairobi.

The keynote address will be given by The Honorable Bruce Babbitt, Secretary, U.S. Department of the Interior (1992-2000).

The second José Cuatrecasas Medal in Tropical Botany will also 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 José Cuatrecasas, a pioneering botanist who spent many years working in Botany and devoted his career to plant exploration in tropical South America.

To register, visit the symposium Web site <http://persoon.si.edu/sbs/> by 1 March. For more information contact W. John Kress, Head of Botany, Department of Systematic Biology, Smithsonian Institution, PO Box 37012, NMNH MRC-166, Washington, D.C. 20013-7012; Tel: 202-357-2534; E-mail: kress.john@nmnh.si.edu.

Ethnobotanical Quest in Haiti

Robert DeFilipps visited the Caribbean nation of Haiti on 5-12 January, accompanying Beverly Wolpert, a graduate student of Elizabeth Wells at George Washington University. DeFilipps is a mentor and member of Wolpert's graduate committee. Her research focus is on plants used in Haiti as anthelmintics (a.k.a. vermifuges), since various intestinal worm parasites are a major health problem there.

For nearly two weeks, Wolpert collected information and specimens of medicinal plants as indicated by priests (*houngans*) and priestesses (*mambos*) while staying at the voodoo temple "Le Peristyle de Mariani," on the coast near Port-au-Prince. The folk religion of Vodou (more familiar spelling: Voodoo) is widespread in Haiti, and its practitioners play a significant role as herbalists for many people who must rely on botanical treatments in lieu of the more expensive pharmaceuticals of Western medicine. Chemical analyses of the active compounds in some of the specimens are being planned.

Wolpert's host at the temple was Max G. Beauvoir, senior author (with R. DeFilipps and B. Wolpert, assisted by J. Crepin) of the recent manual on "*Selected Medicinal Plants of Haitian Vodou*" (2001, Dept. Syst. Biol. – Botany). Plant life itself is considered sacred in many Haitian communities, due to the function of plants as habitations of the various voodoo spirits or divinities, known as loa (lwa), who number exactly 401. In addition, trees are considered to be a link between earth and sky, and some sacred species such as *Ceiba pentandra* (Bombacaceae) are the dwelling place of powerful spirits: offerings are hung in small sacks on their branches, including on the ceiba at the Beauvoir temple.

Voodoo is a derivative of cosmic spiritual belief systems brought to the New World hundreds of years ago by enslaved Africans from tribes in the Mandingo, Ashante, Dahomey, Benin, Yoruba and other empires. It was sometimes syncretized with elements of the Catholic Church such as saints whose characteristics resembled those of the powerful voodoo spirits. Voodoo is thus a "cousin" to other groups which evolved from an origin in African beliefs, and in which medicinal plants have a traditional role. These systems are known as Hoodoo (Conjure) in the deep southern United States; Shango in Venezuela, Santeria in Cuba, Obeah in Jamaica, and Candomblé, Macumba and Umbanda in Brazil.

Wolpert and DeFilipps attended a voodoo service in honor of the loa Ayizan, during which a carefully linen-wrapped leaf of the sacred royal palm (*Roystonea*) was brought in, and the pinnate leaflets were each slowly shredded into long ribbons by the devotees, who danced counterclockwise around a central altar for several hours. All visitors were obliged to kiss the leaf as a gesture of respect.

The office of ethnobotanist Marilisse Neptune-Rouzier, who works for an non-governmental organization known as the Service Oecuménique d'Entraide (SOE) involved with public health information

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Flora of the Hawaiian Islands Web Site Launched

In the October-December 2001 issue of *The Plant Press*, the impending release of the Hawaiian Flora Web site was announced. Near the end of December, the site was finally made available to the public. It is one of the most complete online resources for vascular plants of the Hawaiian Islands.

The Web site <http://rathbun.si.edu/botany/pacificislandbiodiversity/hawaiianflora/>has been modeled on the *Manual of the Flowering Plants of Hawai'i* by W.L. Wagner, D.R. Herbst and S.H. Sohmer (revised edition, 1999) to provide easy access to currently accepted names, distributions, conservation status, and synonyms (species descriptions will be added at a later date). The site also includes an electronic version of the *Manual Supplement*, which has been updated on a regular basis since the publication of the *Manual*. At this time, the Web site provides synonyms for names that are based on Hawaiian collections, additionally giving publication and type information for these names. The synonym list will be expanded to eventually include all naturalized taxa and native species based on non-Hawaiian types. The Web site is also accessible under the Botany Research Web page <http://www.nmnh.si.edu/botany/projects.htm>.

Query forms have been designed to allow users flexibility when accessing information from databases and to display the retrieved data in several ways. A page for querying a list of accepted generic names only allows the user the option to display the results simply as a list of currently accepted names, or the list can include distributional status (endemic, indigenous, naturalized, Polynesian introduction), geographic distribution (by island or more specific for narrowly distributed endemics), and conservation status (endangered, threatened, vulnerable, rare).

A separate all-names query page, which looks quite similar to the first, allows the user to select from a list of accepted generic names and synonyms. The results from this query will provide checklist information as above, and it will also obtain publication and type information for any name that is based on a Hawaiian collection. Other features that can be found on the Web site are a partial list of U.S. specimens from the Hawaiian Islands (currently about 1,600 database records) and images for some taxa. A complete set of U.S. specimen records (approximately 26,000 in total) and the number of images will increase periodically as the records and images are processed. Other additions in the future will include maps with distributions and links to bibliographic information.

Plans are underway to increase the scope of the Pacific Flora Web site to encompass other island groups. A flora of the Marquesan Islands is currently in progress and a checklist with images will soon be completed. Also, a checklist of the vascular flora of Micronesia based on an updating of F.R. Fosberg's published checklist will be included.

The Hawaiian flora Web site was conceptualized by the joint efforts of **Warren Wagner**, **Sylvia Stone Orli**, **Denise Mix**, and **Ellen Farr**, with Stone Orli as the Web site developer. The research program of Wagner in collaboration with the Hawaiian research programs of Derral R. Herbst and Daniel D. Palmer supply the data for this site. Database management is overseen by Mix. Jessica Braun prepares photographic images for Web presentation and assists with maintenance of the image database. Robynn Shannon contributed to the initial database development and maintenance of checklist and nomenclature information.

Ethnobotany

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and cooperation, was visited in Port-au-Prince. She gave much valuable advice to Wolpert and DeFilipps, while showing important publications, largely unknown to northern botanists, describing the results of Rouzier's intensive plant inventories in various ecoregions of Haiti. From a series of pamphlets produced by Rouzier on natural medicines, Wolpert chose a reprint on anthelmintics, and DeFilipps one on the prostate.

In Port-au-Prince, DeFilipps and Wolpert met with Jean A. Constant, curator of the Ekman Herbarium (EHH) of the State University of Haiti (located at Damien), and Vice-Dean of the University, Philippe Mathieu. Constant's current projects include restoration and databasing of the E.L. Ekman Herbarium, which is the national herbarium of Haiti. The Swedish botanist Erik L. Ekman (1883-1931) collected in Haiti from 1924-1930, when the vegetation was quite different from its current depleted condition. Ekman's field notebooks are in the Smithsonian's Botany Branch Library; his 1917 collections were published by I. Urban as "*Plantae Haitenses Novae vel Rariores*" (1921). Constant has observed that the Ekman specimens at EHH are largely unannotated by modern researchers, yet they were certainly used by Barker and Dardeau (1930) during preparation of the *Flore d'Haïti*, today the only published work specifically dedicated to the Haitian flora as a whole.

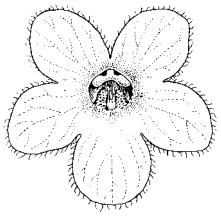
Another major project of Constant is a study of Haitian biodiversity, with an emphasis on threatened and endangered plant species. A detailed inventory of the status of Haitian plants is currently needed, for purposes of planning the strategies for conservation of endemic and imperiled species and habitats. This will extend to evaluation of the origin and structure of populations and ecosystems; determination of status and impact on the environment of synanthropics (plants associated with human activity, such as exotics and weeds); and attention to the conservation of materially useful components of biodiversity such as medicinal plants. Both Rouzier and Constant mentioned that they would welcome cooperative studies with Smithsonian botanists on the Haitian flora.

Centennial of the Botanical Society of Washington

On 8 December the Centennial of the Botanical Society of Washington (BSW) was celebrated with a symposium "A Capital View of Botany: Our Changing D.C. Flora" at the U.S. National Arboretum in Washington, D.C. The symposium organizing committee included **Dan Nicolson**, **Gene Rosenberg**, **Robert Soreng** and **Alice Tangerini**. Speakers included **Stanwyn Shetler** and **Paul Peterson**.

Shetler addressed the changes in the local vascular plant flora, emphasizing that some species are increasingly rare, such as native *Celastrus scandens*, and may be lost while other species, such as Chinese *Celastrus orbiculatus*, have exploded in the last 50 years. Peterson discussed how flowering time records document a north temperate warming trend over the last 50 years, resulting in a week longer growing season. The keynote speaker was paleobotanist Leo Hickey (formerly of Botany, now at Yale) who spoke on "Time's Green Arrow: The Evolution of Washington's Flora," a review of the documentation of early angiosperm evolution in the Cretaceous Potomac Formation.

Former presidents of BSW include past and current members of Botany: Fredrick A. Coville (1902), Alfred S. Hitchcock (1916), Egbert H. Walker (1950), Albert C. Smith (1962), William L. Stern (1972), Richard H. Eyde (1973), Robert W. Read (1975), Laurence E. Skog (1977), Richard S. Cowan (1979), Stanwyn G. Shetler (1983), Robert B. Faden (1985), Dan H. Nicolson (1990), Deborah A. Bell (1992), Dieter C. Wasshausen (1997), Gene Rosenberg (1998), Harold E. Robinson (1999), and Paul M. Peterson (2000).



Herbarium

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cobra lily, *Darlingtonia californica* (Sarraceniaceae), which was eventually named by John Torrey in *Smithsonian Contributions to Knowledge* (1854). It was discovered by the horticulturist William D. Brackenridge on the Pacific Coast leg of the voyage. A specimen of another carnivorous pitcher plant from the expedition, the vine *Nepenthes rafflesiana* (originally identified as *N. ampullaria*), is filed in the U.S. Herbarium.

Living plants of all kinds were brought back from the expedition, to become foundation display material for the fledgling U.S. Botanic Garden in southwest Washington, D.C. Karen D. Solit, author of "*History of the United States Botanic Garden*" (1993), relates that "Today, there are still two plants in the United States Botanic Garden collection that are considered to have been part of the Wilkes Expedition bounty…These are the *Angiopteris evecta*, the Vessel Fern; and the *Zizyphus jujuba*, the Chinese jujube." The Botanic Garden, newly opened after remodeling, is a co-sponsor of the upcoming Second Smithsonian Botanical Symposium (see related notice, page 7). The Symposium is one of many joint activities undertaken with Botany under a Memorandum of Understanding signed between the National Museum and the Garden (see *The Plant Press* n.s. 3(3): 5 (July-Sept. 2000). One can learn more about the fascinating Wilkes expedition in *Magnificent Voyagers* (H.J. Viola and C. Margolis, eds., 1985, SI Press).

Currently the U.S. National Herbarium contains approximately 4.6 million specimens, and is one of the ten largest herbaria in the world, representing as well about 8 percent of the plant collection resources of the United States. The number of species it contains, and thus the percentage of the world's flora represented in it, will not be known until the herbarium is fully inventoried, a process now underway. Worldwide in scope, there are especially heavy concentrations of specimens from the neotropics (i.e., the New World, or Western Hemisphere, tropics), North America, Pacific Ocean islands, the Philippines, and the Indian subcontinent. Plants from historic voyages and treks of discovery, in addition to the Wilkes, are also housed in the herbarium, including the La Plata Expedition of 1853-1856; the Mexican Boundary Survey of 1854-1855; the International Boundary Commission for U.S. and Mexico (1892-1894); and various Colombian *Cinchona* missions (1940-1945). Regarding the latter missions, intensive fieldwork to find alternative quinine-yielding *Cinchona* germplasm was necessitated by the early Axis takeover of major Southeast Asian cinchona plantations in World War II, leaving the Allies without a source of quinine to treat malaria.

Many of the largest plant groups represented in the U.S. National Herbarium have benefited from a long history of in-house augmentation, research and study as well as current curatorial support. These groups include 250,000 ferns (curated by D. Lellinger); Acanthaceae (shrimp-plant family, formerly studied by E.C. Leonard and C.V. Morton, currently by D.C. Wasshausen); Asteraceae (sunflower family, attaining its huge size through the work of B.L. Robinson (Harvard), and in Washington by S.F. Blake, A.C. Smith, K. Parker and J. Cuatrecasas (*Espeletia*), while currently co-curated by V. Funk and H. Robinson); Bromeliaceae (pineapple and Spanish moss family, developed into an immense collection by L.B. Smith); Gesneriaceae (investigated by C.V. Morton, now by L.E. Skog); Melastomataceae (*Rhexia* family, domain of J.J. Wurdack); and Poaceae (grass family). The grass collection is significant for its early associations with Albert S. Hitchcock, Mary Agnes Chase, Jason R. Swallen, and bamboo-men Floyd A. McClure and Tom Soderstrom, and is currently curated by agrostologist Paul Peterson.

Also notable for their large size are collections of various other families, which maintain their significance due to personnel of previous decades, such as the Cactaceae (built up from specimens collected by Britton and Rose); the diatoms of P. Conger; Solanaceae investigated by curator C.V. Morton; and Leguminosae representing a lifetime of interest by curators V. Rudd and R.S. Cowan.

In addition to the enormous holdings of families mentioned above, other flowering groups that today enjoy the active support of U.S. Herbarium curators,

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and are enriched by their field trip collections and specimen exchange programs, are those of the Pacific Islands and Onagraceae (evening primrose family, W. Wagner); Africa and the Commelinaceae (dayflower family, R.B. Faden); Araceae (philodendron family, D.H. Nicolson); Sapindaceae (soapberry family, P. Acevedo); Malvaceae (hibiscus family) and Sterculiaceae (the chocolate-tree family, L.E. Dorr); and the order Zingiberales (source of gingers, bird-of-paradise (*Strelitzia*), heliconias, and bananas, curated by W.J. Kress). There are over 120,000 specimens and 4,500 type specimens of algae (curated by J. Norris and M. Littler); 230,000 lichen collections (in the charge of curator P. DePriest); 7,500 microslides of pollen and spores; and 43,000 specimens of wood in a special Wood Collection, the latter maintained at the Museum Support Center in Silver Hill, Maryland.

The herbarium is newly developing a number of geographically oriented collections as a result of intensive fieldwork, particularly from the Caribbean region by P. Acevedo; the Guianas (Guyana, Suriname, French Guiana) by V. Funk and colleagues of the Biological Diversity of the Guianas Project; Myanmar (Burma) by W.J. Kress collecting with M. Bordelon; Venezuela by L. Dorr; and South American grasses by P. Peterson.

The Herbarium (through the Botany Section) maintains very active loan and exchange programs. As noted on the herbarium Web site <http://www.nmnh.si.edu/botany/colls/collover.html>, approximately 50,000 specimens are annually loaned for study to other institutions worldwide, and an additional 20,000 specimens are exchanged. It requires four "core" people to provide oversight for the daily requirements of running a herbarium of this magnitude, and responsibility for the operation is structured into four constituent parts of a "Core Collections Management Unit." A recently revised program-concept to permit more intensified curatorial participation and maximum efficiency in the daily workings of the herbarium, Core Collections Management is executed under the leadership of Head of Botany, W.J. Kress, in response to various needs such as budgeting, space management, specimen processing (i.e., mounting), transactions management (involving loans, acquisition, borrowing, disposal), and the updating of computer software.

Collections Manager George "Rusty" Russell supervises the Core Collections team composed of Deborah Bell, Linda Hollenberg, and Katherine Rankin. Their collective responsibilities include oversight of the day-to-day activities of the U.S. National Herbarium and the Botany areas at the Museum Support Center, physical curation of the collection, management of more that 1,000 specimen transactions per year with institutions around the world, and responding to hundreds of requests for information that arrive from both their scientific colleagues as well as the general public.

In addition, they have primary responsibility for visitors to the herbarium, specimen conservation and new materials testing, transaction information management, integrated pest management, collections space and facilities coordination, an active specimen exchange program, and processing tens of thousands of acquisitions on an annual basis. Property management, collections outreach activities, and fundraising for collections needs are also included.

Recent major improvements to collections management instituted by the Core Collections unit include the installation of a major compactor storage system in part of the herbarium, and developing a program to create high resolution digital images of the National Herbarium's critically important Type Collections and make them available on the Web.

A large program for inventorying the herbarium was begun decades ago by curator Stanwyn Shetler under chairman Mason Hale. First to be inventoried were the type specimens. All type specimens are kept together, and they have now been inventoried (databased) in a *Type Register*, as to collection locality, bibliographic citation, and relevant field data, as well as bar coded for efficient, digitized record-keeping.

Recently, a revitalized series of *Contributions from the United States National Herbarium*, emanating from Botany Section, has been developed as an outlet for the publication of staff research. Earlier series of the *Contributions* have included major floristic studies relying in large part on the national herbarium collections, for regions such as Mexico by P.C. Standley; Guam by W.E. Safford; New Mexico by E.O. Wooton and P.C. Standley; and Alabama by C. Mohr. More recent floras published elsewhere, such as of Fiji and Sri Lanka, have also been based to an appreciable degree on the U.S. collections.

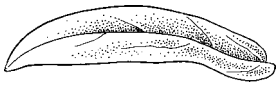
Index Nominum Genericorum (ING), a significant aid to herbarium work that is now available online <http://rathbun.si.edu/botany/ing/ingForm.cfm>, is currently co-edited by Botany supervisory museum specialist Ellen Farr for the fungi, algae and ferns, and Gea Zijlstra of Utrecht University (The Netherlands) for the phanerogams, bryophytes and fossils.

Any specimen arriving at the herbarium is first subjected to cryofumigation. Selected specimens are mounted on a sheet bearing a number, which is the citable catalogue number. A bar code may be affixed to the sheet, as a frame of reference for accessing or updating information on an inventoried specimen. An electronic record, of course, exists for any specimen that is bar coded, and to date over 700,000 specimens of the U.S. Herbarium are bar coded.

A Collections Advisory Committee, composed of curators Wagner (chair), Acevedo, Lellinger, and Robinson, with Russell (ex officio) and Botany Greenhouse manager M. Bordelon, consults with the Botany Head and the Core Collections Management Unit, on the general well being and utilization of the herbarium. During their term, which is decided by the Head of Botany, the members consider topics such as herbarium policy changes; decisions on geographical rearrangements, and altering the generic composition of families to reflect recent taxonomic studies; granting permission to requests for destructive sampling for DNA, pollen studies or anatomical work; acquisition of private herbaria offered as gifts, and their impact on current space requirements; compactorization; and more recently, issues of coping with shipping and receiving due to the anthrax-terrorism situation that resulted in irradiation of incoming packages (see related article, page 5).

Considering all the ramifications involved with the collections of the U.S. National Herbarium, it is not surprising

that the herbarium is said to be a "bureau of standards," via the type collections and other important holdings, for plant nomenclature and identification, and to constitute an overall historical record of the three dimensions of biodiversity: the presence of certain *species* in certain *localities* over *time*.



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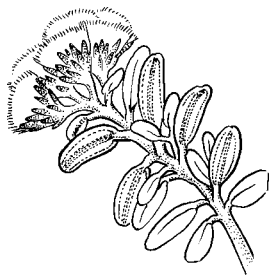
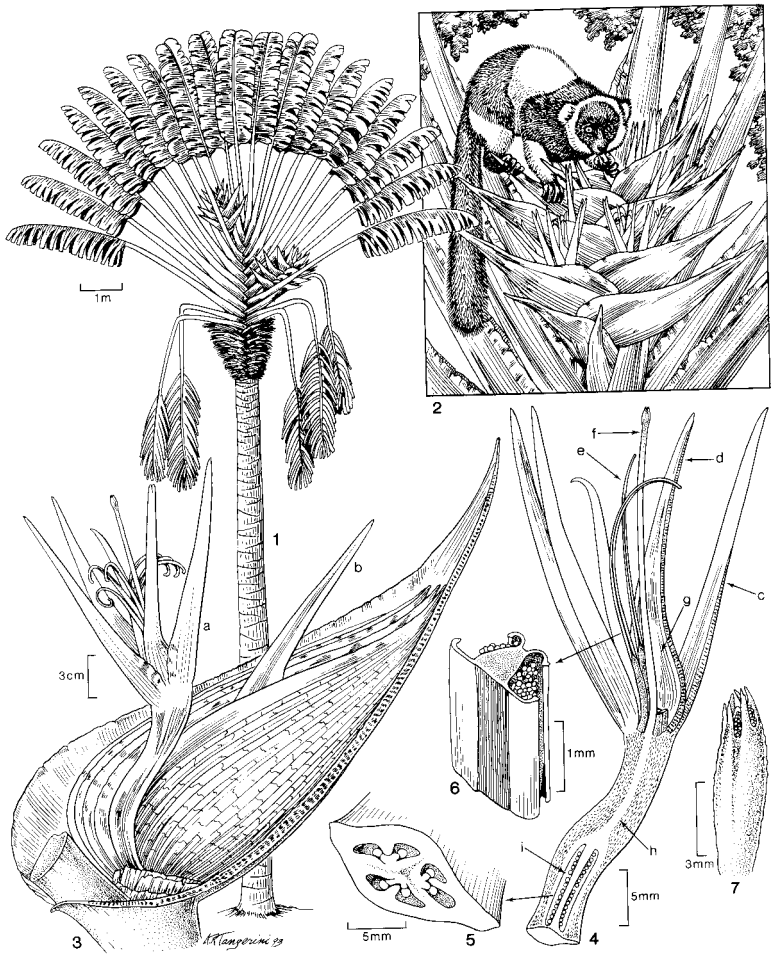


Art by Alice Tangerini

***Ravenala madagascariensis* Sonn.**

The U.S. National Herbarium is a repository of voucher specimens for all kinds of fieldwork, including plant-animal interactions. Endemic to the island of Madagascar, *Ravenala madagascariensis* (Strelitziaceae) and the ruffed lemur *Varecia variegata* share a tight plant-pollinator relationship. Lemurs carry pollen on their fur between flowers, carefully obtaining nectar without destroying the flowers. The plant is dependent upon the lemurs as a pollinating vector while lemurs depend upon the nectar as a food source during specific times of the year (*American Journal of Botany* 81:542-551. 1994).



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