

The Plant Press



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Botany Profile

Type Register Reaches 100,000 Records

By John Boggan, Rusty Russell and Warren L. Wagner

The Type Specimen Register of the United States National Herbarium reached a notable milestone on June 17, 2009, with the addition of the 100,000th type specimen record. Schäfer 5462 was collected in 1975 on Tahuata Island in the Marquesas Islands, French Polynesia and is the holotype of *Psychotria oliveri* Lorence & W.L. Wagner (Rubiaceae), published in *Allertonia* 9: 21 (2005). The specimen is apropos for a number of reasons: the species was co-authored by one of our own curators, Warren L. Wagner, and its name honors deceased staff member Royce Oliver. The specimen highlights our Pacific Islands collections, one of our herbarium's geographic strengths and an area of longtime and ongoing research by Smithsonian botanists. The species will be included in the Flora of the Marquesas Islands, co-authored by Wagner.

Smithsonian botanist Royce Oliver (1929–1997) collected in the Marquesas Islands in 1975 with Peter A. Schäfer and Marie-Hélène Sachet, and collaborated with Sachet and F. Raymond Fosberg on Marquesan plant studies and many other Pacific projects. Oliver worked at Washington University and Missouri Botanical Garden from 1964 until 1979 when he took a position in the Smithsonian Institution's Department of Botany to work with Fosberg and Sachet, where he stayed until his retirement in 1992.

The Marquesas Flora Project was originally a Smithsonian project organized by Sachet, Fosberg and Oliver, but in 1988 was re-organized as a collaboration with the National Tropical Botanical

Garden. It is being completed first as an online flora and then as a two volume publication. The flora and more information about the project are available at <http://botany.si.edu/pacificislandbiodiversity/marquesasflora/index.htm>.

Type specimens are of immense importance to systematists because they are the specimens upon which an author bases his or her description of a newly named taxon, and thus provide for all later researchers a direct link between that taxon as it exists in nature and its scientific name and description. Examination of type specimens is necessary to determine what natural populations to apply a particular name to, and whether a name is properly applied in the first place. Type specimens can show whether two different names have been applied to the same taxon, or whether a taxon is distinct from all known taxa and still undescribed. Particularly with many older names that have brief and frequently inadequate descriptions, examination of type specimens is often the only means to make such determinations with any certainty.

The U.S. National Herbarium (US) is one of the largest repositories of botanical type specimens in the world. Since 1966, records of the type specimens at US have been maintained in the Type Specimen Register. These data are now available online in an easily searchable form <<http://botany.si.edu/types/>>, making this an invaluable resource for researchers around the world. Since 2000, a project has been underway to photograph all type specimens. With the exception of some

cryptogamic collections and specimens that have been out on loan during this period, most of the photography is complete and each online record is now accompanied by an image of the specimen itself. Researchers anywhere in the world can now see type specimens without visiting US or requesting loans, and in many cases the loan of fragile and irreplaceable type specimens is made unnecessary.

In addition to existing resources within the National Museum of Natural History and the Department of Botany, the success of the digital imaging of the type collection is the result of significant financial support provided by the Smithsonian's Assistant Secretary for Science, the National Science Foundation, the Mellon Foundation, and the Comisión Nacional para el Conocimiento y la Biodiversidad (CONABIO).

The Type Specimen Register has grown steadily. During the 10 years from 1999 to 2008, 7,305 new type records were added to the Register, averaging about 730 per year. Far from slowing down, the number of new records added each year has increased greatly in the last few years since contractors funded by the Global Plant Initiative (formerly the Latin American Plants Initiative) program have begun to systematically search for types in the main herbarium. In 2008 alone, 1,437 new type records were added to the Register.

Although the Type Specimen Register has 100,000 records that does not mean there are 100,000 specimens filed

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Travel

Pedro Acevedo traveled to Salvador da Bahia, Brazil (6/19 – 7/20) to attend the Brazilian Botanical Congress, represent Botany at the Organization for Flora Neotropica meetings, and to study the collections of *Paullinia* and *Serjania* (Sapindaceae) at local herbaria.

Walter Adey traveled to Fayetteville, Arkansas, and Kalamazoo, Michigan (5/11 – 5/15) to attend meetings at the University of Arkansas and Western Michigan University; to Lancaster, Pennsylvania (6/11 – 6/12) to visit the Muddy Run ATS Energy Project; to Newport News, Virginia (4/22 – 4/24) to give a presentation on the ATS system; and to Steuben, Maine (6/22 – 9/15) to conduct field research in the eastern Gulf of Maine.

Laurence Dorr traveled to Cambridge, Massachusetts (5/4 – 5/9) to use the Oaks Ames Orchid Herbarium at Harvard University and the Botanical Libraries of Harvard to work on the Flora of Guaramacal and especially to refine geographic distributions of Guaramacal orchid species.

Robert Faden traveled to London, England (4/5 – 5/23) to conduct research on Commelinaceae of Tropical East Africa at the Royal Botanic Gardens Kew.

Maria Faust traveled to Belize (4/29 – 5/14) to conduct field research at Carrie

Bow Cay on ciguatera-associated dinoflagellates in the western Caribbean Sea, and to collect specimens of *Gambierdiscus*, *Ostreopsis* and *Prorocentrum* benthic species.

Vicki Funk traveled to Chicago, Illinois (4/2 – 4/7) to give a talk at the Chicago Botanic Garden and to conduct herbarium research at the Field Museum; and to Salvador da Bahia, Brazil (6/27 – 7/10) to present an invited talk, attend the Brazilian Botanical Congress, and to conduct field research with her colleague, Nadia Roque.

Linda Hollenberg traveled to Leiden, Netherlands (6/28 – 7/12) to attend the annual meeting of the Society for the Preservation of Natural History Collections (SPNHC).

W. John Kress traveled to New York, New York (5/12) to attend a graduate student defense for Marina Costes at Columbia University; with **Vinita Gowda** to the West Indies (5/17 – 5/30) to conduct field work on ecological interactions between *Heliconia* and hummingbirds in Guadeloupe, Martinique, and Dominica; and to Hong Kong, China (6/26 – 7/18) to conduct research on DNA barcoding and attend a conference on ginger biology.

Diane and Mark Littler traveled to Ft Pierce, Florida (6/1 – 7/20) to conduct on-going field research on the functional form, biosystematics and comparative ecology of south Florida marine algae and seagrasses.

Alain Touwaide and Emanuela Appetiti traveled to New York, New York (4/24) to meet with the Director of The New York University's Institute for the Study of the Ancient World; to Kos and Patmos, Greece (4/27 – 5/11) to attend the second international meeting of the Hippocratic Foundation and to conduct research at the Library of St. John's Monastery; and

to Woods Hole, Massachusetts (6/8 – 6/10) to meet with scientists of the Marine Biological Laboratory about the Biodiversity Heritage Library (BHL) and the Encyclopedia of Life (EOL).

Anna Weitzman traveled to London, England (6/1 – 6/3) to present a poster at the e-Biosphere 09 International Conference on Biodiversity Informatics.

Jun Wen traveled to Hanoi, Vietnam (5/2 – 5/24) to conduct field work on *Prunus* (Rosaceae); and with Sue Lutz to Kunming, China (6/6 – 7/22) to collect plants in northwest China and Tibet.

Jamie Whitacre traveled to London, England (6/1 – 6/3) to attend the e-Biosphere 09 International Conference on Biodiversity Informatics.

Kenneth Wurdack traveled to Georgetown, Guyana (4/27 – 5/31) with **Karen Redden** to conduct a research expedition along the Upper Mazaruni River; and to St Louis, Missouri (6/9 – 6/16) to conduct research at the Missouri Botanical Garden.



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Visitors

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

Michael Martin, Johns Hopkins University; *Ambrosia* (Compositae) (1/1/09-6/30/10).

Yong Jiang Zhang, Institute of Animal and Plant Quarantine, Chinese Academy of Inspection and Quarantine, Beijing; Plant DNA barcoding (1/21-4/24).

Laura Lagomarsino, University of California, Berkeley; *Heliconia* (Heliconiaceae) (1/21-5/15).

Associating with Botany

In this issue of the *Plant Press*, we begin a new series which profiles our Research Associates. There are currently 455 scientists holding a professional academic appointment at Smithsonian's National Museum of Natural History. There are three different appointment types including Research Collaborator (162), Research Associate (251) and Adjunct Scientist (42). The term "Research Associate" is sometimes used collectively for all individuals awarded a professional academic appointment and who are part of the NMNH scientific community. Although active members of the scientific community, Research Associates are not employees of the Museum, but individuals who hold a formal scholarly affiliation with the Institution. The Department of Botany is currently hosting 41 academic appointments.

Research Associates play an integral part in the Department of Botany. They have an active role in furthering the mission of the Department: to discover the diversity of plant life in marine and terrestrial environments, to describe this diversity, to interpret the evolutionary origin of this diversity, to explain the processes responsible for this diversity, and to understand how humans are affected by and have altered plant diversity on the planet. Research Associates are those professionals who may be working independently within the National Museum of Natural History research and collection facilities or they may have formed formal and active collaborations with NMNH scientific staff through proposal submission, collaborative projects, and co-authored publications, and regularly use the NMNH research and collection facilities. Research Associates have attained a degree, usually a doctorate, and are generally affiliated with a recognized academic institution as active or retired staff. They may also significantly contribute to the intellectual life of the

Editor's Note

Museum through their in-residence participation in the care and curation of the collections; active research and publication; service on NMNH and/or SI panels and committees; and mentoring of students working with NMNH scientific staff.

Some Research Associates have been in-residence for a few years while others have been here for a decade or two (or four!). Others may carry the title of Research Associate while being part of a research team in the field and may never have set foot in the Museum at all.

Our resident Research Associates have been very productive over the years. Within the past 3 years, they have either authored or co-authored approximately one-fifth of all scientific publications produced by the Department (2007: 28 of 117; 2006: 23 of 112; 2005: 19 of 112).

We kick off this series with an interview with Christian Feuillet, a Research Collaborator and Associate with the Department for over 20 years (page 6). His knowledge of Gesneriaceae and Passifloraceae has led to significant contributions to checklists and floras of the Neotropics, especially the Guiana Shield and the West Indies. The Department is fortunate to have Research Associates such as Feuillet participate and contribute so completely in our scientific endeavors.



Gary Krupnick, Editor

Zhumei Ren, Shanxi University, China; Coevolution of gallnut aphids and host plant based on DNA sequences (2/1/09-1/31/10).

Tingshuang Yi, Kunming Institute of Botany, China; *Osmorhiza* (Umbelliferae) (2/2-5/2).

Carmen Amalia Diaz-Pena, Humboldt Institute, Bogota, Colombia; Colombian Eriocaulaceae (3/1-4/1).

Tieyao Tu, Chinese Academy of Sciences; *Bauhinia* (Leguminosae-Caesalpinioideae) and *Typha* (Typhaceae) (3/1-7/31).

Pingting Chen, Central China Agricultural University, China; Vitaceae (3/1/09-2/28/10).

William and Margaret Dix, Universidad del Valle de Guatemala, Guatemala City; Central American Orchidaceae and Bromeliaceae (3/19-4/7).

German Muttoni, Herbario Bernardo Rosengurtt, Montivideo, Uruguay; Asteraceae (3/23-4/5).

Bertil Nordenstam, Swedish Museum of Natural History, Stockholm; *Nordenstamia* and Tribe Senecioneae (Compositae) (3/31-4/1).

Barbara Boeck and Ignacio Marquez Rowe, Consejo Superior de Investigaciones Científicas, Madrid, Spain; *Historia Plantarum* collection (4/1).

Shirley Sherwood, National Museum of Natural History board member; *Historia Plantarum* collection (4/3).

Humberto Mendoza, Universidad Nacional de Colombia, Herbario Nacional Colombiano Instituto de Ciencias Naturales, Bogotá; *Centronia*, *Meriania*, and *Graffenrieda* (Melastomataceae) (4/7-4/15).

Jeffery Saarela, Canadian Museum of Nature, Ottawa; Mexican *Bromus* (Poaceae) and *Eleocharis* (Cyperaceae) (4/13-4/23).

Joan Freely and Michael Rayburn, United States National Arboretum; *Shortia* (Diapensiaceae) (4/14).

Virginia Valcarcel, Universidad Pablo de Olavide, Spain; *Hedera* (Araliaceae) (4/19-10/20).

Martin McGann and Vickie Ziegler, Pennsylvania State University; *Historia Plantarum* collection (4/22).

Tatyana Livshultz, Academy of Natural Sciences, Philadelphia; Herbarium management (4/28).

Andrew Clarke, University of Auckland, New Zealand; *Brousonettia papyrifera* (Moraceae) (5/1).

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Staff Research & Activities

Robert Faden spent seven weeks in April and May, 2009, at the Royal Botanic Gardens, Kew, continuing his work on Commelinaceae for the Flora of Tropical East Africa. His focus was on some widespread, variable species of *Commelina*. For example, *C. eckloniana*, as broadly defined, ranges from South Africa to southern Ethiopia, with an isolated collection from Cameroon. Variation within the species can sometimes be accounted for by geographic isolation and sometimes by differences in ecology. Like all such complexes, only field work and follow-up studies can fully resolve the significance of this variation.

In May, **Maria Faust** and National Oceanic and Atmospheric Administration (NOAA) colleagues Michael Dowgiallo, Mark Vandersea, Steve Kibler, Chris Holland, Amy Nau and Roger Mays traveled to Carrie Bow Cay to conduct field research on their SMN-funded project “Comparative Distribution and Abundance of Ciguatera-Associated Dinoflagellates” based at the Smithsonian Field Laboratory, Belize. They took advantage of the diverse array of coral-reef habitats in proximity to the field station.

First, SCUBA divers were employed to collect cells from depths greater than 3–4 meters. The research team then characterized the abundance of toxins-producing dinoflagellates in deep versus shallow and eutrophied and non-eutrophied habitats in Belizean coral-reef mangroves causing ciguatera fish poisoning (CFP). Because CFP-associated dinoflagellate genera are comprised of multiple species that are largely indistinguishable by light microscopy, molecular methods and high resolution SEM were utilized to elucidate the morphology, diversity, distribution, and abundance of these dinoflagellates.

The phylogenetic and SEM analyses indicated the presence of two new *Gambierdiscus* species in addition to the four others they recently described from Belize (Litaker et al., *in press*). The analyses also showed *G. caribaeus* and *G. carpenteri* the most prevalent in the molecular sam-

ples taken this year. Interestingly, the two new *Gambierdiscus*, species 1 and 2, have only been collected from subtidal fore-reef habitats. *Gambierdiscus carolinianus*, a species discovered in North Carolina and later found in the northern Caribbean, was also found in samples collected by divers near Carrie Bow Cay. This represents a significant widening of the range of these species.

To celebrate National Pollinator Week, **Gary Krupnick**, along with Seán Brady (Entomology), Nate Erwin (Insect Zoo), and Michael Ruggiero (Integrated Taxonomic Information System), organized a series of events at the National Museum of Natural History. On 22 June, a public symposium, “Plight of the Bumblebees,” moderated by Ruggiero, featured five speakers discussing bumblebee biology and conservation, which was followed by a 3-day expert workshop, “Assessing the Status of North American Bumblebees.” On 24 June, three visiting scientists from the workshop participated in a 2-hour “meet the bumblebee scientist” event in the Insect Zoo and Coevolution Halls. Finally, on 27 June, in cooperation with SI Horticulture and the North American



Gary Krupnick gets into the spirit of National Pollinator Week as a larva of a pollinator during an event in the NMNH Butterfly Garden. (Photo by David Goodman)

Pollinator Protection Campaign (NAPPC), NMNH staged an afternoon event in the Butterfly Garden east of the Museum reaching over 500 visitors. Erwin, Krupnick, five Insect Zoo volunteers, and staff from SI Horticulture and NAPPC engaged visitors, providing them with information on the importance of pollinators, the current problems these animals face, and what visitors can do around their homes and neighborhoods to encourage and sustain pollinator populations. Free posters, magnets, and flyers were provided.



Awards & Grants

Pedro Acevedo-Rodríguez was honored by having a new species named after him, *Psittacanthus acevedoi* Kuijt (*Syst. Bot. Monographs* 86: 1-361; 2009). With only two known collections, both by Acevedo, Job Kuijt named the species to recognize Acevedo as a collector. This species of Loranthaceae is only known from Amazonas, Brazil.

In the same monograph, the late **John J. Wurdack** (1921 – 1998) was honored with the species *Psittacanthus wurdackii* (Rizzini) Kuijt. Previously recognized as a variety, this species from northern Venezuela is elevated to species rank, and recognizes Wurdack as the senior collector of the type species.

Emanuela Appetiti has been appointed to the Scientific Committee of the forthcoming international meeting “Darwin, Darwinisms and Evolution (1859-2009),”

to be held at the University of Coimbra, Portugal, on 22-23 September 2009.

In celebration of the 10th anniversary of the Council on Botanical and Horticultural Libraries (CBHL) Annual Literature Award, a Special Recognition Award was presented to *TL-2*, more formally known as *Taxonomic Literature: a Selective Guide to Botanical Publications and Collections with Dates, Commentaries and Types*, 2nd edition. This monumental work is one of the most important resources in taxonomic literature. Originally created by Frans Antonie Stafleu and Richard S. Cowan, this resource was continued by Erik A. Mennega, and then most recently by **Laurence J. Dorr** and **Dan H. Nicolson** and honored by CBHL for significant contributions to the literature of botany and the study of plants. The judges described the series as “an indispensable and essential resource in supporting the research of systematic botanists.” The award was announced at the CBHL annual meeting in St. Louis, Missouri, on May 12-16.

At the 41st annual meeting of CBHL, **Robin Everly** was elected to its Board of Directors. In a four year term, Everly will serve as Board President in the third year. Currently her position is as second Vice-President. One of her goals is to increase CBHL’s visibility among the library community and botanical gardens. She would also like to see the organization’s members do more outreach within the botanical and horticultural communities.



Robin Everly



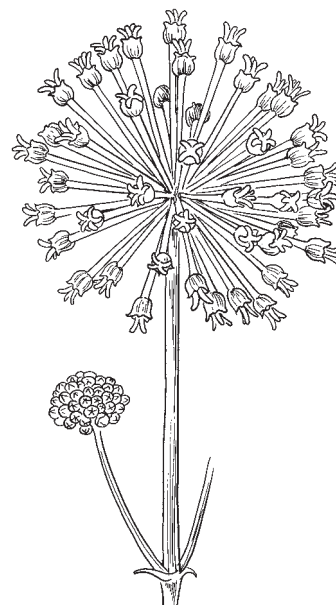
German Muttoni (left) and J. Mauricio Bonifacino.

Paul Peterson and **Jun Wen** each received a \$5,000 grant from the National Museum of Natural History’s Office of the Associate Director for Research and Collections. Proposals for the competitive Small Grants process for 2009 were rated and ranked by an internal committee of scientific staff members. Peterson’s project is titled “A molecular phylogeny of the grass subfamily Chloridoideae, tribe Cynodonteae and subtribe Muhlenbergiinae,” and Wen’s is “Biogeographic diversification of the ginseng plant family in the Indonesian archipelago - testing the Wallace’s Line.”

genus and is ready to file. He also worked with **Sara Alexander** to update the online information on herbarium specimens collected from the Guiana Shield of South America. Muttoni reports that he enjoyed being a part of the Smithsonian Institution because he thinks “...the increase and diffusion of knowledge...” is a great mission. Funk says that Muttoni did about 300 hours of volunteer work and made a big contribution to all three projects. He has returned to his home in Montevideo, Uruguay, but will be back in the U.S. soon to start graduate school at the University of Wisconsin.

New Faces

From March through April 2009, **German Muttoni** worked as a volunteer in the Botany Department with **Vicki Funk**’s research group. He began by helping **Mauricio Bonifacino** on the data review and entry for the “Virtual key to the Compositae species of the USA” effort, a project sponsored by the U.S. Department of Agriculture. When Bonifacino returned to Uruguay, Muttoni switched to organizing mounted specimens of Compositae sent from the herbarium at the National Botanical Research Institute, Windhoek, Namibia. This large gift of mounted specimens is now in order by tribe and



Focus on Research Associates

The Passion of Christian Feuillet

By Vicki A. Funk

Christian Feuillet has been a Research Collaborator and Associate in the U.S. National Herbarium and Department of Botany for over 20 years. How did this French tropical botanist wind up in Washington D.C., spending hours on curating the herbarium and participating in research projects around the world? Well, it is an interesting story.

He was born in Normandy, France, in the town of Rouen in 1948 and from his earliest memories his family always had a garden around their home, sometimes up to an acre. Every weekend he would garden with his father while his brother played with cars or built a radio receiver. He believes that is when he was infected with “a virus for nature;” he even kept plants in his bedroom. When he was 14, during a family vacation on the French Riviera, he saw his first *Passiflora caerulea*, and obtained a cutting from the owner. It grew happily on his windowsill for years until he took it to the university (it did not survive the journey).

While at college and university he followed a winding path that lead through pharmacy and biology in Rouen in Normandy and biology and animal physiology in Montpellier in the south. This was followed by obligatory military service



Passiflora kawensis Feuillet from Montagnes de Kaw, French Guiana. (Photo by Christian Feuillet)

and then back to zoology in Paris. In 1975, he visited French Guiana where the forest felt like home. Then, still back in Paris, he studied plant physiology, oceanography, and tropical botany, and in July 1981 in Paris was awarded a Ph.D. in Tropical

Botany with a memoir on the plant architecture in the family Gesneriaceae.

Feuillet started his scientific career in November 1981 with the Office de Recherche Scientifique et Technique Outre-mer (Orstom), now Institut de Recherche pour le Développement (IRD), in Paris for six months and Cayenne (French Guiana) for six years. He would have stayed happily in the neotropics but fate had other plans. In 1986 Amy Rossman (mycologist) participated in a field trip in French Guiana that was sponsored by the Orstom and the Biological Diversity of the Guianas Program (Smithsonian Institution). Feuillet and Rossman were married and he came to the Smithsonian in August 1988. During his career he has published almost 100 mostly systematic and floristic papers and described or combined ~100 taxa.

His main interests are in the Passifloraceae, the Neotropical Gesneriaceae, and to a lesser degree the Aristolochiaceae and Boraginaceae of the Guiana Shield. He is very interested in plant architecture and follows that literature when possible. Recently he discovered that although he has problems finding errors in the drafts



Christian Feuillet on one of his many collecting trips.

of his own manuscripts, he can find them easily in the text of others! And on the weekends he does Latin diagnoses, mostly for mycologists.

His goal is to increase and make available the scientific knowledge of Gesneriaceae and Passifloraceae. He looks for new species and describes them, trying to have a more complete picture of the diversity in those groups. He has worked on a number of Floras and checklists and he continues to take on new responsibilities in those areas:

- Catalogue of the vascular plants of Guaramacal National Park, Portuguesa and Trujillo states, Venezuela
- Checklist of the plants of the Guiana Shield
- Checklist of the plants of the Guianas
- Flora of the Venezuelan Guayana
- Flora of the West Indies
- Flowering plants of the Neotropics
- Guide to the vascular plants of Central French Guiana
- Liste des espèces de Phanérogames et de Ptéridophytes de Guyane française d'après l'herbier du centre Orstom de Cayenne

For his work in the Gesneriaceae he has a long term association with **Laurence Skog** (beginning in 1985) and with the members of the international group that has worked with Skog over the years,



Episcia sphalera Leeuwenb. along the Arataye River in French Guiana. (Photo by Christian Feuillet)

including John Clark, Lars Kvist, and Zaoran Xu.

In the U.S. National Herbarium, he curates the collections of Aristolochiaceae, Boraginaceae and Passifloraceae, and works on integrating new collections in about 20 families. He has used his knowledge of French to proofread early scans of old versions of the Code trans-

ferred to word processor software for **Dan Nicolson**, check with a French eye “Plant collectors in Madagascar and the Comoro Islands” for **Laurence Dorr**, and write or translate the French part of “A Modern Multilingual Glossary for Taxonomic Pteridology” for **David Lellinger** (before he retired). He has also proofread the “Checklist of the Plants of the Guiana Shield” and edited two books on Compositae.

Outside of his work he is an avid reader, mostly in French, he loves gardening and has a greenhouse at his home, and he is interested in the sciences (zoology, history of science, astronomy, and physics of particles), genealogy, and plant photography. (He has more than 2,000 pictures at <http://www.flickr.com/photos/68587888@N00/>.) Feuillet reports that his anchor is his family. He enjoys trips to Oregon and France with his wife, Amy Rossman (a mycologist with the U.S. Department of Agriculture in Beltsville, Maryland) and their daughter Diane, who just finished her second year in college where she is majoring in astronomy and physics.

The Smithsonian botanical community is truly fortunate to have Feuillet work so tirelessly with the collections and participate so fully in our departmental activities. We anticipate 20 more years of collaboration!



Christian Feuillet, with daughter Diane Feuillet and wife Amy Rossman.

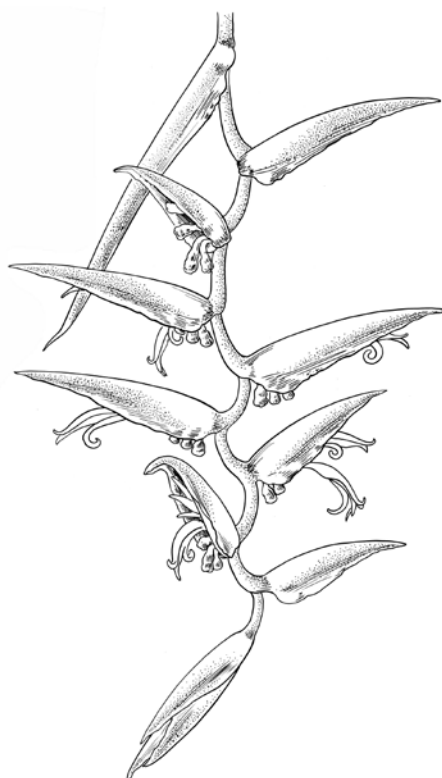
Specimens Aid in Conservation Assessment of Endangered Plant Species

Many plant species are in danger of extinction because they are threatened by the loss, degradation and fragmentation of natural habitat, by competition with invasive species, by over-exploitation and pollution, and by global climate change. Of the estimated 380,000 plant species that inhabit the planet, it is not known how many are threatened with extinction. To date only 3.2% of the world's flora is fully assessed for their conservation status and listed on the IUCN Red List of Threatened Species. Unfortunately time is running out to assess the remaining species as pristine habitats, such as old-growth forests, are lost to degradation and destruction around the world. With limited funds and capacity, it will not be possible to complete an assessment of every known plant species before additional species are lost, and certainly not before 2010 as called for by the *Global Strategy for Plant Conservation*.

Researchers at various universities, botanic gardens, and herbaria are devising ways to conduct preliminary conservation assessments to serve as a first cut in identifying which plant species may be endangered. One proposed method is to use data from herbarium specimens maintained as scientific resources in botanic gardens, museums, and universities to identify rare and endangered species. **Gary Krupnick, W. John Kress, and Warren Wagner** have recently published a paper in *Biodiversity and Conservation* (18: 1459-1474; 2009) that includes a model that they developed for assessing preliminary conservation status that uses data obtained from herbarium records (for example, the number of records, the number of localities, and the dates of collection).

Using data of the Hawaiian flora from specimens in the United States National Herbarium, they were able to set the parameters of the model. They then applied the model to four different plant families: the Palm family (Arecaceae), the Day Flower family (Commelinaceae), the African Violet family (Gesneriaceae), and the Heliconia family (Heliconiaceae).

Their results indicate that 72% of the Hawaiian taxa, 73% of the species of Arecaceae, 55% of the species of Commelinaceae, 68% of the species of Gesneriaceae, and 65% of the species of Heliconiaceae are potentially threatened with extinction, but will need further evaluation using additional herbarium material and other assessment strategies (for example, field work and taxonomic expert assessment). Conversely, 28%, 27%, 45%, 32%, and 35% of the species in the same families are clearly not threatened and will not require any additional evaluations for full assessment. This methodology provides a rapid means of determining preliminary conservation assessment of a large number of species in a short period of time and greatly decreases the number of species requiring full and labor intensive assessments.



Visitors

Continued from page 3

Cary Pirone, Florida International University; Strelitziaceae (5/4-5/25).

Ashley Sullivan, American University; Plant conservation internship (5/11-8/21).

Raymund Chan, Universiti Teknologi Malaysia, Singapore; Compositae (5/12-6/5).

Paul Berry, University of Michigan; *Croton* and *Euphorbia* (Euphorbiaceae) (5/13-5/20).

Dmitri Geltman, Komarov Institute, St. Petersburg, Russia; *Euphorbia* (Euphorbiaceae) (5/13-5/20).

Andrew Gardner, University of Wisconsin; *Oxalis* (Oxalidaceae) (5/14).

Nicholas Smith-Herman and Evan Swarth, Carnegie Institute of Washington; San Jacinto Mountains collections (5/14).

Marshall Melissa, Smith College; Plant conservation internship (5/18-8/21).

Suman Neupane, Old Dominion University; Nepal collections (5/18-5/19).

Lara Mittereder, George Mason University; Plant DNA isolations (5/19-8/31).

Alina Freire-Fierro, Academy of Natural Sciences, Philadelphia; Colombian *Monnina* (Polygalaceae) (5/21-5/23).

Kevin Funderburk, University of Pennsylvania; *Historia Plantarum* collection (5/22).

Paulo Labiak, Instituto de Botanica, São Paulo, Brazil; Brazilian *Grammitis* (Grammitidaceae) (5/27).

Terry Lott, Florida Museum of Natural History; Ceratophyllaceae (5/27).

Michael Martin, Johns Hopkins University; *Ambrosia* (Compositae) (5/27).

Hongshan Wang, Florida Museum of Natural History; Ceratophyllaceae (5/27).

Whitney Adams, Monsanto, Mystic, Connecticut; *Fargesia* (Poaceae) (5/29).

Ikuo Nakamura, New York University; Nuclear gene markers (5/29).

Julie Barcelona and Pieter Pelser, Oklahoma State University; Compositae (5/30-6/5).

Kelsey Brooks, Princeton University; Plant conservation internship (6/1-8/7).

Amanda Saville, North Carolina State University; Bamboo library and *Dichanthelium* = *Panicum* (Poaceae) (6/3-6/5).

Maria Camila Gomez, Universidad de los Andes, Bogota, Colombia; Poaceae (6/6-6/15).

Valerie and Will McClatchey, and **David Reedy**, University of Hawaii; Institute for the Preservation of Medical Traditions and *Historia Plantarum* collection (6/8).

Sarah Miller, St. John's College; U.S. Exploring Expedition collections (6/8-6/26).

Shannon Peters, Michigan State University; DNA barcoding internship (6/8-7/10).

Charles Umbanhowar Jr., St. Olaf College; Charles Geyer specimens from Nicollet Expedition and Smithsonian Archives (6/11-6/13).

Kathryn Mauz, University of Arizona; Arizona historical collections and C.G. Pringle collections (6/15-6/16).

Melanie Schori, Ohio University; Philippine, New Guinea, and Madagascar Icacinaceae (6/16-6/17).

John McPartland, University of Vermont; Moraceae (6/17).

Angela Turner, Virginia Polytechnic Institute; Plant DNA internship (6/22-9/4).

Nancy Rybicki, United States Geological Survey; Hydrocharitaceae (6/23).

Marisol Amaya-Marquez, Institute of Natural Sciences, Universidad Nacional de Colombia, Bogota; Gesneriaceae (6/23-7/15).

Michael Sundue, Independent researcher, New York; Ferns (6/27).

Gilberto Morillo Pacheco, Universidad de Los Andes, Edo, Merida, Venezuela; Herbarium collection (6/28-7/26).

Ana Claudia Araujo, Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil; *Scleria* (Cyperaceae) (6/29-7/1).

Alain Chautems, Conservatoire et Jardin Botaniques, Geneva, Switzerland; Gesneriaceae (6/29-7/1).

Melissa Smith, Washington State University; Subfamily Bambusoideae (Poaceae) (6/30-7/2).



Psychotria oliveri Lorence & W.L. Wagner

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in the Type Herbarium. The actual number of specimens is slightly less than 100,000 because numerous specimens correspond to more than one record. For example, when a specimen is the type of both a later homonym (i.e., an illegitimate name) and a nomen novum (the replacement for that illegitimate name), it is recorded under both names. In some unusual cases, a single specimen is the type of three or more different names!

On the other hand, the true number of type specimens at US is probably closer to 120,000 because many types remain unidentified as such in the main herbarium. In addition to types of newly published names received or otherwise identified every year, many types of older names are discovered in our herbarium as staff members, visitors, and researchers requesting loans work with our collec-

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tion. Many of these are additional material (e.g., isotypes or syntypes) of names already in the Type Herbarium—such specimens account for about 80% of all new type records—but a large number of previously unrecognized types of older names, never recorded by us, turn up every year. Return loans routinely include newly annotated types.

All US types are verified to the greatest extent possible, time and resources permitting. Of the 100,000 records, only 258 do not have a publication citation and represent apparently unpublished names. The precise status of some older specimens is unclear; such specimens may be syntypes, isotypes, or occasionally even holotypes. Some of the major kinds of types are:

- Isotypes: 53,275
- Holotypes: 18,527
- Type, type material, type collection, possible type: 8,788
- Syntypes, isosyntypes: 8,619
- Isolectotypes: 1,887
- Lectotypes: 1,029
- Isonetypes: 307
- Neotypes: 186

Vascular plants, particularly angiosperms, account for the greatest number of records, but US also has strong collections of algae, lichens, mosses, and ferns.

- Non-vascular plants (9,992)
 - Algae: 4,577
 - Lichens: 2,971
 - Mosses and hepatics: 2,106
 - Diatoms: 338
- Vascular plants (90,008)
 - Angiosperms: 84,756
 - Ferns and “fern allies”: 5,040
 - Gymnosperms: 213

The flowering plant families with the greatest representation of types at US correspond roughly to the families with the greatest numbers of species. One exception is Orchidaceae, the second or third largest plant family but with only 1,205 records in the Type Register. Other large families that are relatively poorly represented are the Lamiaceae and Cyperaceae. Some smaller families, such as Bromeliaceae, Acanthaceae, and Gesneriaceae, are unusually well-represented because Smithsonian botanists have specialized in these families. (The number for Bromeliaceae is also high because the specimens are often mounted on multiple sheets.) Families

Kinds of Types

- **Holotype:** The one specimen or illustration used or designated by an author as the nomenclatural type.
- **Isotype:** Any duplicate specimen (part of single gathering made by collector at one time) of the holotype.
- **Syntype:** Any one of two or more specimens cited in the protologue when no [holo-]type was designated.
- **Isoisotype:** Duplicate of the syntypes.
- **Lectotype:** Specimen or illustration selected from original material when no type was indicated or is missing.
- **Isolectotype:** Duplicate of the lectotype.
- **Neotype:** Designated to serve as nomenclatural type if original material missing.
- **Isonetype:** Duplicate of the neotype.

- Adapted from Dan Nicolson's
*Lecture on Botanical Nomenclature,
Types and Standard Reference Works*
<<http://botany.si.edu/references/botlinks/dhntyp.htm>>



Vinita Gowda has been sorting and filing types for the past two years. (Photo by Gary Krupnick)

marked with an asterisk in the following list have had a long history of study by one or more botanists at US:

- Poaceae*: 10,758
- Asteraceae*: 8,937
- Fabaceae*: 6,412
- Rubiaceae: 3,135
- Piperaceae: 2,142
- Euphorbiaceae: 2,128
- Melastomataceae*: 2,080
- Rosaceae: 1,631
- Bromeliaceae*: 1,528
- Scrophulariaceae (s.l.): 1,271
- Acanthaceae*: 1,257
- Solanaceae: 1,221
- Orchidaceae: 1,205
- Gesneriaceae*: 1,107
- Myrtaceae: 1,096
- Lamiaceae: 1,063

Political boundaries are largely arbitrary in a biogeographical sense, but give

some idea of the parts of the world that are best represented in our herbarium. To a certain extent the numbers are correlated with country size, but some countries that cover a relatively small geographic area are especially well-represented in the Type Register, e.g., Costa Rica, Guatemala, and Panama. This is because we have a large number of collections from these countries and/or they are very species-rich. The countries accounting for the largest numbers of types are:

- USA (continental): 14,867
 - Alaska: 329
 - Hawaiian Islands: 1,164
- Mexico: 12,729
- Brazil: 8,352
- Colombia: 6,545
- Philippines: 6,059
- Peru: 4,338
- Venezuela: 4,033
- Costa Rica: 3,276
- China (excl. Taiwan): 3,242
 - Taiwan: 162
- Bolivia: 3,145
- Guatemala: 2,318
- Ecuador (excl. Galapagos Islands): 2,238
 - Galapagos Islands: 163
- Panama: 1,848
- Cuba: 1,700

The Type Specimen Register continues to grow, and our ultimate goal is to identify, record, and photograph every type specimen in the U.S. National Herbarium, including the remaining cryptogams. The ongoing Global Plant Initiative is expected to add a very large number of types to our records. High resolution imaging of herbarium specimens continues to be an important element of our long range digitization plans. In addition to our focus on imaging types, we have produced more than 100,000 digital images of non-type specimens in the National Herbarium covering such diverse subject areas as Mexico, Liberia, Zingiberales, Myrtaceae, Pacific ethnobotany, vine species, and Federally-listed endangered and threatened plants, among others. Future plans call for continuing such project-related specimen imaging, producing layered digital images of microscopic organisms, generating more diagnostic close-up images of selected specimens, and committing larger bulky specimens to a 3-dimensional format.

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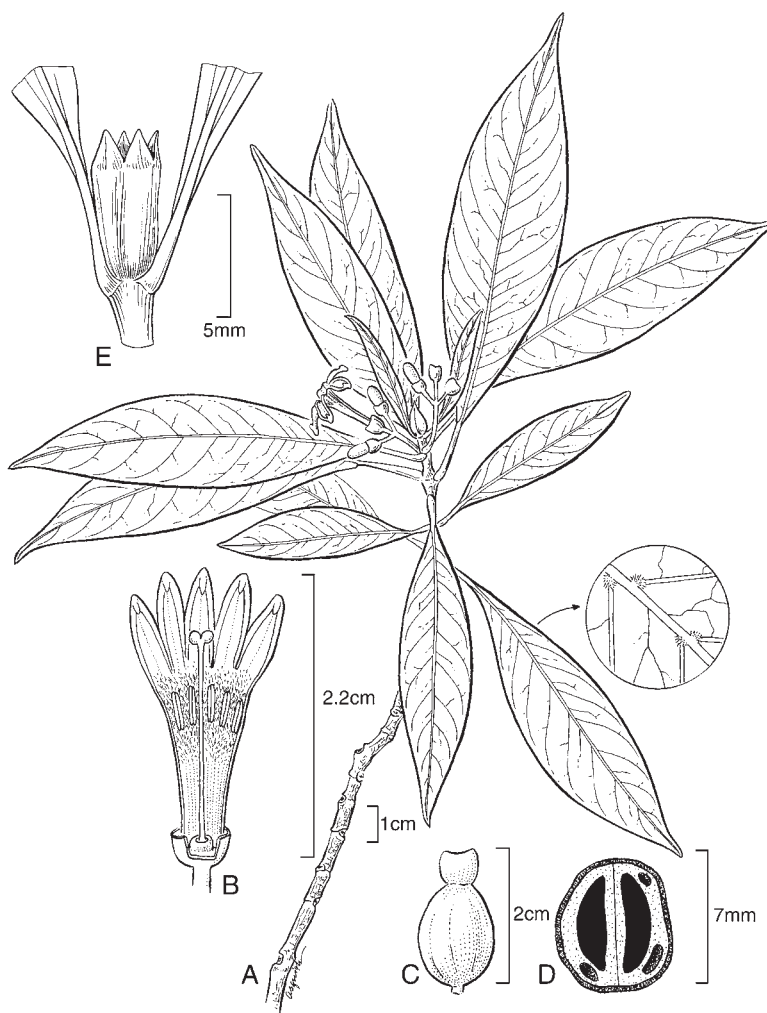
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Art by Alice Tangerini

***Psychotria oliveri* Lorence & W.L. Wagner**

Psychotria oliveri (Rubiaceae) is a species endemic to Tahuata, the smallest of the inhabited Marquesas Islands, in French Polynesia. Named for Smithsonian botanist Royce Oliver (1929–1997) who collected in the Marquesas in 1975 with Peter A. Schäfer and Marie-Helène Sachet, *P. oliveri* is restricted to 680–823 m in humid montane shrubland and wet forest with *Freycinetia* and *Weinmannia* dominant.



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