

# BULLETIN

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# PLANT SCIENCE

The Botanical Society of America: The Society for ALL Plant Biologists

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THE BOTANICAL SOCIETY OF AMERICA

Leading Scientists  
and  
Educators  
since 1893



BOTANICAL SOCIETY OF AMERICA

This is the International year of biodiversity and it is more critical than ever that the Botanical Society be proactive in promoting the role of botany to decision makers attempting to address the critical needs of the 21<sup>st</sup> century. For instance, as will be reported by the Botanical Capacity Assessment Project at the annual meeting, that more than half of federally employed botanists in the various agencies will be retiring in the next 15 years and few colleges and universities continue to offer sufficient plant science coursework to meet the minimum qualifications for "Botanist" level positions.

For the past 50 years the Society has recognized that the stature of botany has slowly declined in the national science agenda and the *Plant Science Bulletin* has been a sounding board for concerns about this decline, especially concerning the teaching of botany in the curricula of U.S. colleges and universities (Greenfield, S.S, 1955, 1970; Stern, 1969; Eshbaugh, 1983; Sundberg, 2004). Partially in response to this, and in anticipation of the new millennium, the Society undertook a major assessment of the future of botany in the mid-1990's. *Botany for the Next Millennium* (1996) drew on input from Society membership to outline a framework for continued growth of the discipline and provided goals and actions to improve the status of botany and plant study. Since its publication, the Society has used *Botany for the Next Millennium* as a guide to program development and growth of the Society.

The Society, particularly through its officers, has actively engaged to follow the

recommendations of the report since it's publication, but we have not done a good job of communicating our activities to the membership as a whole. This year we are trying to remedy that situation by publishing some of the relevant Society correspondence in these pages. Thus, we lead this issue with two letters from President Holsinger on behalf of the Society. The first, to the Committee on Science and Technology of the U.S. House of Representative, highlights the Societies PlantingScience initiative to support K-12 STEM (Science, Technology, Engineering, and Mathematics) education and urges reauthorization of the America COMPETES Act. The second, to the Office of Science and Technology Policy in the White House, is in response to a request for information of the "Grand Challenges of the 21<sup>st</sup> Century." In a political environment where plants are not recognized as wildlife, it is important that the Society educate decision makers and make them aware that "Plant sciences will play a fundamental role in solving many of the challenges of the next century."

There was a time when we could be satisfied that botanists' only concern was to concentrate on our science. That is no longer the case and the BSA is moving to the forefront of engaging in public understanding of the role of science, and plant science in particular, in meeting the needs of this millennium.

There will be opportunities to learn more at the annual meeting, we hope you will attend and participate. And if you're driving to Providence (or renting a car there) you may want to take a side trip to the woods of Massachusetts. In this issue we feature another botanical treasure in

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the vicinity of our annual meetings - - Harvard Forest. While many of us know of the Forest, not many have actually visited the preserve. Hopefully this introduction will entice you to plan a side-trip on your way to or from Botany 2010.

-the Editor.

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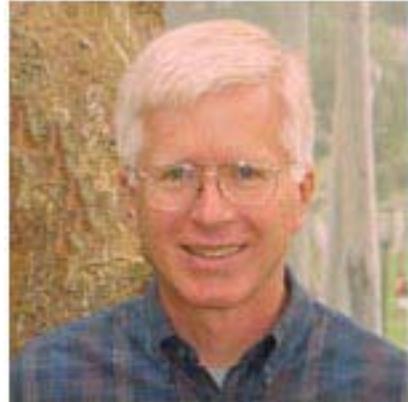
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## News from the Society

### Election Results

#### BSA President-elect- Steven Weller



**Personal Details:** Professor, Ecology and Evolutionary Biology, University of California, Irvine, CA 92697. B.S. University of Michigan; Ph.D. University of California, Berkeley.

**BSA Service:** Secretary, 2006-2009; Elections Committee, 2004-2006; Associate Editor; 2006-present.

**Leadership vision:** BSA vision: Plants have an integral role in our rapidly changing world. As scientists and educators, we must ensure that the students we train and the public at large understand the importance of plants in ecosystems around the world, and how the people who live in those ecosystems depend

### PLANT SCIENCE BULLETIN

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on plants. We investigate these problems at all levels, including molecular processes, organismal studies, population biology, community ecology, and ecosystem-level questions, and it is our obligation to explain the importance of our work to the scientific community as a whole, and also the public. As global change accelerates, we also need to consider how plants will respond in an evolutionary sense. The Botanical Society of America has a major role in outreach to the public, and must maintain this role, acting at all levels. We support research, we encourage young scientists entering the profession, we promote diversity within the Botanical Society, we foster interest in plants through the PlantingScience program, and we participate in efforts to influence policy at national and international levels. We must continue these efforts, be flexible and address new issues as they arise, and do our best to anticipate how the Botanical Society of America can meet future challenges.

### BSA Treasurer - Amy Litt



**Personal Details:** Director of Plant Genomics and Cullman Curator, The New York Botanical Garden. B.A., Brown University, M.Phil., Yale University, Ph.D. City University of New York/The New York Botanical Garden (S. Mori & D. W. Stevenson), Postdoctoral study, Yale University (V. F. Irish).

**BSA Service:** Secretary-Treasurer, Development and Structure Section (in second of three year term), Member, Karling Award

Committee (2003-2005), symposium organizer.

**Leadership vision:** I would welcome this opportunity to play a role in this society, which has been important to me since my early days as a graduate student. A priority for me is insuring that funds for graduate student travel and registration are adequate or more, as opportunities to make such connections and to give presentations as a graduate student are rare. I would also like to see the Society provide more varied opportunities for bringing botanical education to K-12 teachers and students (a priority of mine since my days as a junior high and high school teacher); the lack of botanical education in the US is something that alarms us all and it is up to use to take the initiative. I'd like to see the current trend of the Society and members working to influence policy – on research funding, publication-related issues, K-12 education, and environmental issues – stepped up. We can be a powerful force if we make this a priority.

### At-large Director for Publication - Carol Goodwillie



**Personal Details:** Associate Professor of Biology, East Carolina University, BMusic Oberlin College (1982), BS University of Massachusetts at Boston (1991), PhD University of Washington (1997)

**BSA Service:** Associate Editor of American Journal of Botany (since 2008)

**Leadership vision:** I would be honored to

contribute to the mission of BSA through its publications. I have enjoyed serving the society as an Associate Editor and, in this role, find myself considering both the strong record of AJB and the challenges that it faces. Building on the success of the journal will require creative strategies to maintain and improve the standard of our submissions and to ensure that the papers published reach a broad readership. Through AJB and other publications, the BSA must strive to communicate the relevance and excitement of plant biology to a wider community of scientists and citizens.

### **BSA Advisory Council Chair - Lucinda McDade**



**Personal Details:** Director of Research, Rancho Santa Ana Botanic Garden, Claremont CA; Professor, Claremont Graduate University  
**Research Interests:** Phylogenetics of Acanthaceae and Lamiales, plant reproductive biology with emphasis on hummingbird pollination, role of hybridization in evolution, impact of hybridization on phylogenetic methods

!  
**BSA Service:** Steering Committee, Botany for the Next Millennium Committee (1993-1995); reviewer of numerous manuscripts.

**Leadership vision:** As I understand it, the post of Advisory Council Chair is more referee than leader. I have decent meeting leading (controlling!) skills and feel that I could do a good job. I have been a member of BSA for a very long time but have mostly emphasized other (smaller) societies in my service work to

date. BSA is doing some great things (notably outreach, public affairs, efforts to involve younger and younger students). I would value learning more about BSA and holding this office would clearly be an efficient way to do that.

### **Student Representative to the BSA Board of Directors - Marian Chau**



**Personal Details:** Ph.D. Candidate - University of Hawai'i at Manoa (UHM), Department of Botany; B.A. - University of Houston, English & Honors College (2001)

**BSA Service:** PlantingScience Master Plant Science Team Mentor (2008-present)

**Leadership vision:** Students represent over a quarter of BSA membership, and we are the future researchers, educators, and advocates of the botanical sciences. In the present, we have much to contribute to BSA through our early career work and our ideas for improving the society in a rapidly changing world. I would like to build on what our past representatives have done to increase student membership and participation - both in annual meetings and online with our BSA student networking website. Another goal is to continue and increase student support, through grants and awards, job and academic networking, and resources for building collaborations and scientific skills. I would be honored to serve on the BSA Board as a strong advocate for students.

## Awards

### BSA Merit Awards



**Dr. Darleen DeMason** is recognized for her contributions in plant anatomy, which stress functional and structural aspects of stem thickening in monocotyledons, germination biology of palms, germination problems of the high sugar sweet corn genotypes, and leaf development in pea, elucidating auxin's integrating affect on developmental morphogenesis. A recognized scholar, teacher, academic leader and contributor to the botanical sciences, she has held various BSA posts, including Secretary of BSA and Council Representative and is noted for her volunteer work in improving the botanical environment of Riverside's Victoria Avenue Park.

of the developmental morphology of leaves, the evolution of plant anatomical patterns associated with C4 photosynthesis, and the role of the cell cycle and programmed cell death in plant developmental processes. Generous as a scientist, colleague and mentor, Nancy is recognized as an excellent plant anatomist with extensive career achievements, including leadership roles as President of the BSA during a time of great transition for the Society. She has encouraged and inspired young botanists on both sides of the border and is among the most prominent of current plant biologists studying leaves.



**Professor Judy Jernstedt** is recognized for her careful scholarship providing new insights into morphogenesis and other aspects of development in myriad vascular plant systems. Examining such diverse systems as rhizophores, to contractile root development, to cotton fiber production, she has developed techniques to integrate the role of the cytoskeleton in biomechanical patterning of cell expansion and microfibril orientation in cell walls. In her service to BSA, her role has been transformational for the Society and for the American Journal of Botany. Her influence on botanists through her research, instruction and service are incalculable.



**Dr. Nancy G. Dengler** is recognized for her significant scientific contributions in the areas

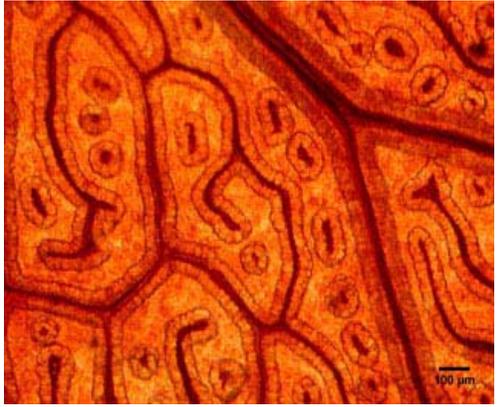


**Drs. Douglas E. and Pamela S. Soltis** are recognized for their far-reaching influence on many different sub-disciplines within the botanical sciences. Deeply involved with the field of molecular systematics since its infancy, they paved the way for such ambitious projects such as the National Science Foundation's Deep Time and Tree of Life projects contributing greatly to the understanding of floral evolutionary development, particularly in the basal angiosperms. Their prodigious research productivity has not limited their service activities, however, as both Doug and Pam have served in leadership positions and as Presidents of BSA. Either would be outstanding in their own right, but together as frequent co-authors and collaborators, they continue to mentor and influence a generation of evolutionary scientists in resolving longstanding questions of angiosperm phylogeny.

**Dr. Dennis Stevenson** is recognized for distinguished contributions in the organization and phylogenetic relationships of cycads and cycad-like plants and is recognized for his breadth of publication which has included lycopods and ferns, bryophytes and gymnosperms, and monocots and dicots. Guiding the work of doctoral students and post-doctoral researchers, In the evolution of his own career, he has continued to set standards for studies of land plant anatomy and morphology, while increasingly serving as a strong public advocate for our discipline to the public. His long and productive affiliation with the New York Botanical Garden has communicated the importance of fundamental studies of plants to the community at large.

## Triarch "Botanical Images" Student Travel Awards

This award provides acknowledgement and travel support to BSA meetings for outstanding student work coupling digital images (botanical) with scientific explanations/ descriptions designed for the general public.



**Margaret Sporck, *Disjunct Veins of Euphorbia rockii***, University of Hawai'i, Manoa, HI - Advisor, Dr. Lawren Sack - Second Place - \$250 Botany 2010 Student Travel Award



**Lachezar Nikolov, *Jabberwacky***, Harvard University, Cambridge, MA - Advisor, Dr. Charles C. Davis - First Place - \$500 Botany 2010 Student Travel Award



**Wenchi Jin, *Heater in the snow***, University of Michigan, Ann Arbor, MI - Advisor, Dr. Paul Berry - Third Place - \$150 Botany 2010 Student Travel Award

See all 2010 TRIARCH "Botanical Images"  
Student Travel Award entries at:

[http://www.botany.org/plantimages/  
ConantSTA2010.php#3](http://www.botany.org/plantimages/ConantSTA2010.php#3)

## The BSA Undergraduate Student Research Awards

The BSA Undergraduate Student Research Awards support undergraduate student research and are made on the basis of research proposals and letters of recommendations. The 2010 award recipients are:

**Amanda Bieber**, Old Dominion University, Norfolk, VA, - Advisor, Dr. Lytton Musselman, *Molecular identification of potentially invasive Cuscuta in Brunei Darussalam*

**Sasha Dow-Kitson**, SUNY Plattsburgh, Plattsburgh, NY, - Advisor, Dr. Chris Martine, *Reproductive biology of Hydrocharis morsusranae in Lake Champlain, a likely source population for the next region-wide aquatic plant invasion*

**Elizabeth Lavoie**, SUNY Plattsburgh, Plattsburgh, NY, - Advisor, Dr. Chris Martine, *A new species of wild eggplant, with implications for the evolution of a rare breeding system*

**Alexander R. Scharf**, SUNY Plattsburgh, Plattsburgh, NY, - Advisor, Dr. Chris Martine, *Chromosome number in Solanum sejunctum: The potential role of polyploidy in the origin of an Australian dioecious species*

**Paige Swanson**, Colorado State University, City, ST, - Advisor, Dr. Pam Diggle, *The Role of Branching Control Genes in Mimulus guttatus*

**Wes Testo**, Colgate University, Hamilton, NY, - Advisor, Dr. James E. Watkins, Jr., *Desiccation tolerance and calcium requirements of gametophytes of American Hart's-Tongue Fern, Phyllitis scolopendrium var. americana*



## Charles Edwin Bessey Award

(BSA in association with the Teaching Section and Education Committee)

**Dr. Geoff Burrows**, Charles Sturt University, Wagga Wagga NSW, Australia.



Dr. Burrows, Senior Lecturer in Plant Sciences, has produced a number of online teaching applications to introduce students to botany including the most recent, plant family recognition. They are available at: <http://www.csu.edu.au/herbarium/>

**Dr. Chris Martine**, State University of New York at Plattsburgh.

Dr. Martine is exploring YouTube video as a means of introducing plants to students (see BSA website). He also advises the active BSA Student Chapter at SUNY Plattsburgh -- check them out!



### **Darbaker Prize**

The Darbaker Prize in Phycology is given each year in memory of **Dr. Leasure K. Darbaker**. It is presented to a resident of North America for meritorious work in the study of microscopic algae based on papers published in English by the nominee during the last two full calendar years. This year The Darbaker Award for meritorious work on microscopic algae is presented to:

**Dr. Brian Palenik**, Scripps Institution of Oceanography, University of California, San Diego, CA. Dr. Palenik is a leader in the field of oceanographic phytoplankton genomics. He has focused mostly on cyanobacterial organisms, but he was also first author on a seminal paper on *Ostreococcus*, the smallest eukaryotic phytoplankton whose genome was sequenced in its entirety. Palenik was the lead scientist in that effort, published in *PNAS*. In addition to his research, Dr. Palenik is active in communicating the science of genomics and oceanography to the general public. He was also instrumental in designing and implementing an exhibit in a public aquarium on DNA sequencing and genomics of marine organisms.

### **The BSA Graduate Student Research Award including the J. S. Karling Award**

The BSA Graduate Student Research Awards support graduate student research and are made on the basis of research proposals and letters of recommendations. Withing the award group is the Karling Graduate Student Research Award. This award was instituted by the Society in 1997 with funds derived through a generous gift from the estate of the eminent mycologist, John Sidney Karling (1897-1994), and supports and promotes graduate student research in the botanical sciences. The 2008 award recipients are:

#### **J. S. Karling Graduate Student Research Award**

**Michael Gruenstaedl**, University of Texas at Austin, Austin, TX - Advisor, Dr. Robert K. Jansen, *Correlated Diversification of Vascular Plants*

*and Associated Arbuscular Mycorrhizal Fungi – A Case Study*

#### **BSA Graduate Student Research Awards**

**Tanya Cheeke**, Portland State University, Portland, OR - Advisor, Dr. Mitchell B. Cruzan, *Effects of genetically modified Bt maize on symbiotic fungi in the soil ecosystem*

**Megan DeMarche**, Colorado State University, Fort Collins, CO - Advisor, Dr. Amy L. Angert, *EThe Evolution of Reproductive Isolation through Divergent Adaptation*

**Jessica Forrest**, University of Toronto, Toronto, ON, Canada - Advisor, Dr. James D. Thomson, *Testing adaptive explanations for floral variation in Mertensia fusiformis (Boraginaceae)*

**Caitlin E. Lee**, Portland State University, Portland, OR, - Advisor, Dr. Mitchell B. Cruzan, *Effects of Invasive Plants on Native Symbiotic Soil Fungi in Oregon Forests*

**Lucas C. Majure**, University of Florida, Gainesville, FL - Advisors. Dr. Douglas E. Soltis, Dr. Pamela S. Soltis and Dr. Walter Judd, *The systematics and evolution of the Opuntia humifusa complex (Opuntioideae: Cactaceae)*

**George A. Meindl**, University of Pittsburgh, Pittsburgh, PA - Advisor, Dr. Tia-Lynn Ashman, *Assessing the potential for cascading effects of soil heavy metals: plants and pollinators*

**Kristin I. Powell**, Washington University, St. Louis, MO - Advisors, Dr. Tiffany M. Knight, *Understanding scale-dependent effects of plant invaders on native biodiversity through differential effects on common and rare species*

**Emily B. Sessa**, University of Wisconsin, Madison, WI - Advisor, Dr. Thomas J. Givnish, *Phylogeny, Reticulate Evolution, and Recurrent Polyploid Speciation in North American Dryopteris (Dryopteridaceae)*

**Seema N. Sheth**, Colorado State University, Fort Collins, CO, - Advisor, Dr. Amy L. Angert, *Role of evolutionary potential in limiting species' distributions*

**Ecology Section Student Travel Awards**

**Tanya Cheeke**, Portland State University, Portland, OR - Advisor, Dr. Mitchell B. Cruzan - Botany 2010 presentation: "*Transgenic Bt maize: An evaluation of nine different Bt maize isolines on arbuscular mycorrhizal fungi.*"

**Keith Bowman**, SUNY College of Environmental Science and Forestry, Syracuse, NY - Advisor, Dr. Dr. Robin Kimmerer - Botany 2010 presentation: "*The influence of the diaspore (propagule) bank and diaspore rain on bryophyte (moss) community composition in northern white cedar swamps*" and "*Bringing mosses into the K-12 classroom.*"

**Southeastern Section - Association of Southeastern Biologists, Asheville, North Carolina, April 9, 2010 Poster/Paper Awards**  
Best Paper Award \$300 - **Chris Stoehrel**, Western Carolina University, Cullowhee, NC - presentation: "*Phylogeny of the Trillium erectum complex.*"

Best Poster Award \$300 - **Mae Kile**, University of Tennessee at Chattanooga, TN - presentation: "*Scutellaria Montana (Lamiaceae) 2009 Monitoring at the Volunteer Training Site, Tennessee Army National Guard, Catoosa Co., Georgia.*"

**The BSA Young Botanist Awards**

The purpose of these awards are to offer individual recognition to outstanding graduating seniors in the plant sciences and to encourage their participation in the Botanical Society of America.

The 2010 "**Certificate of Special Achievement**" award recipients are:

**Elizabeth Archer**, Connecticut College, New London, CT - Advisor, Dr. T. Page Owen, Jr.

**Asha Bertsch**, University of Florida, Gainesville, FL - Advisor, Dr. Pam Soltis

**Paul CaraDonna**, Humboldt College, Arcata, CA - Advisor, Dr. Erik S. Jules

**Bradley Daugherty**, Eastern Illinois University, Charleston, IL - Advisor, Dr. Nancy Coutant

**William Davis**, University of Akron, Akron, OH - Advisor, Dr. Jean Pan

**Ryan Folk**, University of Akron, Akron, OH - Advisor, Dr. Randall Mitchell

**Benjamin Gahagen**, James Madison University, Harrisonburg, VA - Advisor, Dr. Conley K. McMullen

**Paul Galewski**, University of Wisconsin, Milwaukee, WI - Advisor, Dr. Sara Hoot

**Liahna Gonda-King**, St. Mary's College of Maryland, St. Mary's City, MD - Advisor, Dr. Chris Tanner

**Sam Isham**, Colorado College, Colorado Springs, CO - Advisor, Dr. Tass Kelso

**Daniel Koenemann**, University of Vermont, Burlington, VT - Advisor, Dr. David S. Barrington

**Elizabeth Lavoie**, SUNY Plattsburgh, Plattsburgh, NY - Advisor, Dr. Christopher T. Martine

**Natalie Ma**, University of California, Los Angeles, CA - Advisor, Dr. Ann M. Hirsch

**Lindsey McLemore**, University of Florida, Gainesville, FL - Advisor, Dr. Pam Soltis

**Lydia Meador**, Oklahoma State University, Stillwater, OK - Advisor, Dr. Janette Sheets

**Jacqueline Nguyen**, University of California, Los Angeles, CA - Advisor, Dr. Ann M. Hirsch

**Anthony Porreca**, Eastern Illinois University, Charleston, IL - Advisor, Dr. Janice M. Coons

**Jillian Post**, SUNY Plattsburgh, Plattsburgh, NY - Advisor, Dr. Christopher T. Martine

**Zak Ratajczak**, Vassar College, Poughkeepsie, NY - Advisor, Dr. David P. Gillikin

**Sadie Todd**, Chicago Botanic Garden, Glencoe, IL - Advisor, Dr. Krissa Skogen

**Dragana Trninic**, Miami University, Oxford, OH - Advisor, Dr. John Z. Kiss

**Alexia Vandeventer**, University of Florida, Gainesville, FL - Advisor, Dr. Pam Soltis

**Hannah Vietmeier**, Willamette University, Salem, OR - Advisor, Dr. Susan R. Kephart

**Margaret Vincent**, Miami University, Oxford, OH - Advisor, Dr. John Z. Kiss

**Rebecca Williams**, Miami University, Oxford, OH - Advisor, Dr. John Z. Kiss





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April 1, 2010

Ms. Bess Caughran  
Committee on Science and Technology  
U.S. House of Representatives  
Washington, DC 20515

Via e-mail: [Bess.Caughran@mail.house.gov](mailto:Bess.Caughran@mail.house.gov)

Dear Ms. Caughran:

Thank you for inviting input on science, technology, engineering, and mathematics (STEM) education in federal research and development (R&D) agencies as you prepare for reauthorization of the America COMPETES Act. Solving the great challenges facing us in the 21<sup>st</sup> requires deep scientific and technical expertise.

The questions you ask can be grouped into three broad categories: (1) identifying the mission of the National Science Foundation (NSF) and other federal R&D agencies in K-12 STEM education, (2) identifying strategies to enhance K-12 STEM education and dissemination of STEM education materials to schools and the general public, and (3) suggesting strategies to ensure sustainability of programs receiving federal support and interagency coordination of STEM education efforts. My comments will reflect those broad categories.

*The mission of federal agencies in K-12 STEM education*

Federal agencies, especially NSF, provide critical support to the development of novel, exciting, and scientifically accurate materials for K-12 STEM education. They also provide vital opportunities for students to become involved in scientific research and for teachers to receive advanced training in science and science pedagogy, enhancing their ability to translate the latest scientific advances into terms their students can understand.

But Congress created NSF "to promote the progress of science; to advance the national health, prosperity, and welfare; [and] to secure the national defense..." Its programs focus on support of fundamental research in all areas of science and in areas supporting excellence in STEM education. Mission agencies, like the National Institutes of Health, the Environmental Protection Agency, the U.S. Forest Service, or the National Oceanic and Atmospheric Association, support mission-focused scientific research and STEM education initiatives that train scientists and engineers with the skills those agencies need. The synergy between fundamental research and educational excellence evident in NSF programs is unique and should be encouraged in other federal agencies

In doing so, NSF and other federal science agencies should remain true to their core missions – promoting the progress of fundamental science and translating that science into technologies and policies that advance our health and prosperity. Investments in training teachers, in developing new classroom materials, or in public education should not detract from these core missions, and it may be that such programs would find a more appropriate home within the Department of Education. However, these activities should be informed by the research into new technologies and the social interactions affecting the delivery of materials and

*The Botanical Society of America is a scientific and educational organization devoted to the fundamental study of the form, function, diversity, evolution and uses of plants and their interactions within the biosphere.*

the training of teachers—research that is most likely the result of the activities of the other federal agencies. Therefore, we encourage open exchange of information among the various agencies and the Department of Education to eliminate duplication of efforts and to harden new scientifically proven methods across the educational system.

*Strategies to enhance dissemination of K-12 STEM education materials*

Printed textbooks, laboratory manuals, and teachers' guides have been the materials traditionally used to support STEM education. In the Internet age, many other options are available. The **PlantingScience** project, in started by the Botanical Society of America (BSA) and in which BSA plays a leading role, provides one example of how modern technologies can be used to enhance STEM education.

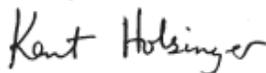
Initiated in 2005, **PlantingScience** uses Internet resources and technologies to link research scientists at major universities with students in K-12 classrooms. Via computer-aided communication, these scientists guide students who are conducting inquiry-based research projects to think creatively about their experiments and to interpret their results. **PlantingScience** seeks to improve the understanding of science through research using plants. Specifically, **PlantingScience** aims to (1) provide students and teachers with resources to deepen their conceptual understanding of science and plant biology, (2) enhance the quality of their experiences with scientific inquiry, (3) strengthen partnerships between research and education, and (4) increase interest in science careers. There are currently about a dozen scientific society partners contributing to the **PlantingScience** program. To date, **PlantingScience** has supported more than 7500 student projects, in nearly 90 schools across 32 states. More information about this project can be obtained at: <http://www.botany.org/PlantingScience/>.

*Sustainability of STEM education programs*

Federal support will often be necessary to develop, test, and refine new approaches to STEM education, and it may take a decade or more for a rigorous assessment to determine which new approaches are the most successful. As American corporations recognize that a well-trained scientific and technical workforce is vital to their future, they will increasingly recognize the benefit of collaborating with schools, colleges, and universities to encourage the adoption of these approaches. For example, Monsanto has been an important supporter of our **PlantingScience** project, and as the program expands we expect to attract additional support from corporations whose livelihood depends on an increasing supply of highly trained scientists, engineers, and technicians.

Thank you for the opportunity to provide input to the Committee as it considers reauthorization of the America COMPETES Act. If the Botanical Society of America (BSA) can provide any additional information to you on this or any other matter, please do not hesitate to contact me ([kent.holsinger@uconn.edu](mailto:kent.holsinger@uconn.edu), 860-486-4059) or our Executive Director, Bill Dahl ([wdahl@botany.org](mailto:wdahl@botany.org), 314-577-9566).

Sincerely,



Kent E. Holsinger, President  
Botanical Society of America



Botanical Society of America  
P.O. Box 299  
St. Louis, MO 63168-0299  
[www.botany.org](http://www.botany.org)

April 13, 2010

Mr. M. David Hodge, Operations Manager  
Office of Science and Technology Policy  
[challenge@ostp.gov](mailto:challenge@ostp.gov)

Dear Mr. Hodge:

I write as President of the Botanical Society of America, a non-profit scientific society with nearly 3300 members worldwide, in response to your Request for Information on Grand Challenges of the 21<sup>st</sup> Century as published in the Federal Register on February 3, 2010

On behalf of the Society, I will (1) provide comments on the first grand challenge, invest in the building blocks of American innovation, and (2) suggest additional grand challenges for the Administration to consider.

### **Grand Challenge number 1. Invest in the Building Blocks of American Innovation**

#### **A. Restore American leadership in fundamental research**

The Botanical Society of America (BSA) endorses the Administration's emphasis on scientific research as the foundation of American innovation. Basic and applied research operate synergistically to provide innovations that have far reaching consequences for society. We are especially pleased at the support for basic research included in the Recovery Act, and we urge the administration to increase support for agencies, like the National Science Foundation, that fund individual investigator and interdisciplinary basic research.

Plant sciences will play a fundamental role in solving many of the challenges of the next century. The urgency of climate change, expanding and changing energy needs, increased demand for water, food and other plant related resources, biodiversity conservation, and habitat restoration are all forcing action, requiring solid science and modern infrastructure for effective and efficient implementation of solutions.

Professional societies, like the Botanical Society of America, are a critical resource and look forward to working with you to address grand challenges in research and education. Members of the BSA study and teach plant biology from multiple levels and perspectives, from the level of genes and organelles through the level of cells and tissues through whole organisms into entire ecosystems. We investigate fundamental biochemical and physiological processes that occur in microseconds to evolutionary and ecological processes that span hundreds of millions of years. We urge the administration to take full advantage of the diversity of expertise and

*The Botanical Society of America is a scientific and educational organization devoted to the fundamental study of the form, function, diversity, evolution and uses of plants and their interactions within the biosphere.*

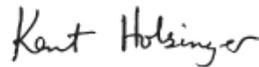
experience found among the membership of professional societies, and BSA stands ready to help the administration find experts in every area of plant biology.

**Additional grand challenges for the Administration to consider.**

Maintaining of the global environment is an important grand challenge not explicitly addressed in the "Strategy for American Innovation", but it is implicit in all eight of the grand challenges identified by the National Academy of Sciences in *Grand Challenges in Environmental Sciences* (2001). Furthermore, addressing three of the challenges identified in that report (biological diversity and ecosystem functioning, infectious diseases and the environment, land-use dynamics) will require a deep understanding of biological systems, from genes through cells and whole organisms to the ecosystems they compose. That understanding is critical to meeting/solving the complex environmental issues facing humankind as we attempt a more sustainable relationship with the earth and its natural resources.

The National Academies of Science have produced several reports over the past decade identifying grand challenges for the 21<sup>st</sup> century. In addition to the report just cited these include *Research at the Intersection of the Physical and Life Sciences* (2010); *A New Biology for the 21st Century* (2009); and *Inspired by Biology: From Molecules to Materials to Machines* (2008). All of these reports emphasize the pressing need for basic research in the biological sciences. They also highlight the synergism between "basic" and "applied" research; basic research informs the applied sciences by creating a new knowledge base and by providing unique insights into the challenges faced by applied fields. We encourage you to consider the recommendations in these reports and to ensure that as we seek to enhance the competitiveness of America's economy we remember that its strength is built on a foundation of outstanding science education and adventurous basic research.

Sincerely,



Kent E. Holsinger, President  
Botanical Society of America  
[Kent.holsinger@uconn.edu](mailto:Kent.holsinger@uconn.edu)

## BSA Science Education News and Notes

BSA Science Education News and Notes is a quarterly update about the BSA's education efforts and the broader education scene. We invite you to submit news items or ideas for future features. Contact: Claire Hemingway, BSA Education Director, at [chemingway@botany.org](mailto:chemingway@botany.org) or Marshall Sundberg, PSB Editor, at [psb@botany.org](mailto:psb@botany.org).

### ***PlantingScience—BSA-led student research and science mentoring program***

Thanks to your volunteer time this Fall 2009 and Spring 2010 sessions, over 650 student teams in 56 classes had the opportunity to communicate online with scientists while conducting plant investigations in their classrooms. Your contributions make this program possible. Thank you for joining your efforts with 430 scientists from 13 scientific societies to make a difference in botanical education.

Students tell us that, as online mentors, you help open up new possibilities for how they experience science and understand plants.

*"... the exchange in communication with the mentor having a good mentor is key to your projects success."* — Springfield High School student

*"...liked that we didn't know what was going to happen before we did the experiment. Instead of being taught something and then just doing an experiment to prove it, we made an attempt to find out what would happen ourselves."* — Fallston High School student

*"I actually understand photosynthesis much better."* — C.H. Yoe School High student

*"Something that I liked most and was one of my favorite parts about this project was how we could take care of one thing by ourselves and we could also record data. We could also find and discover new information that we couldn't get anywhere else."* — St. Bridget Assumption Middle School student

*"I found it to be very informative, and it helped me to use the scientific method. Along with realizing how much every day life involves the scientific method."* — David Hinson Middle School student

During this academic year, we continued field-testing of genetics (*Brassica* and *Arabidopsis* strands) and pollination modules, and this spring saw the first classroom tests of new Celery Challenge and C-Fern® modules.

This spring also included two pilots of new collaborations and extensions of PlantingScience:

- Science clubs in the 4-H SET

- A Dutch version of the program led by Edith Jonker as a collaboration between Wageningen University and Dutch pre-college students [http://www.wur.nl/UK/newsagenda/news/Dutch\\_preuniversity\\_VWO\\_students\\_work\\_with\\_Wageningen\\_University\\_scientists\\_online\\_.htm](http://www.wur.nl/UK/newsagenda/news/Dutch_preuniversity_VWO_students_work_with_Wageningen_University_scientists_online_.htm)

Over the summer, we will be busy offering workshops, recruiting new teachers and mentors for the fall session, and making project improvements. Please send any suggestions

Summer workshop offerings are scattered across the country. Texas A&M University continues its fine hosting job for the PlantingScience and Plant IT workshops, thanks to the tremendous contributions of co-PI Carol Stuessy and her graduate students handling site coordination and education research.

PlantingScience Summer Institute for Teachers (June 21-29):

Wonder how to actively engage your students in explorations of cell structure and alternation of generations? Botanists Marshall Sundberg and Renee Lopez-Smith will guide 16 teachers in explorations the new Celery Challenge and C-Fern modules. Following 5 days immersed in the inquiries and working in teams on the platform, teachers will focus on tailoring a PlantingScience inquiry for their class.

PlantIT Summer Institute for Teachers (July 12-23):

Bioinformatics and natural fiber textiles will be the focus of investigative cases led by botanist Ethel Stanley and master teacher Toni Lafferty. This summer will be the final two-week teacher professional development workshop, open to teachers from across the country, and a one-week student career camp, especially for Texas high school students. If you visit [www.myPlantIT.org](http://www.myPlantIT.org) this July, you'll find new cases, resources, datasets and tools for using plant investigative cases.

PlantingScience Brassica Genetics Workshop (July 9-10):

Wisconsin Fast Plant Developer Paul Williams and plant geneticist Amber R. Smith are developing the PlantingScience Brassica module, a guided inquiry into phenotypic variation in a population and patterns of inheritance. They will lead a special 2-day Brassica Genetics workshop this July 9-10 in Madison, Wisconsin. This free workshop is open to both high school teachers and scientists.

Fostering Student Thinking Through Mentoring Workshop (Aug. 1):

Attending Botany 2010? Don't miss the chance to share ideas in an interactive session Sunday morning, Fostering Student Scientific Thinking

through Mentoring. Join PlantingScience mentors Eric Jones, Laura Super, Laura Lagomarsino, and Lindsey Tuominen to focus on means for engaging students in formulating scientific research questions, honing critical thinking skills, guiding students through testing hypotheses, challenges and benefits of mentoring online.

Register for this free ticketed event on the Botany 2010 web site

#### '09-'10 Master Plant Science Team Thanks

Members of the Master Plant Science Team are a special group of primarily graduate students who receive a few perks for their commitment to serve for an academic year and mentor ~4 teams in both the fall and spring session.

Our deep thanks to the 2009-2010 Master Plant Science Team. We are grateful for your extra mentoring efforts and extend additional thanks to those contributing to field-testing new inquiries, working with the materials and/or the student teams.

The Botanical Society of America sponsored: **Tatiana Arias, Kevin Badik, Alona Banai, Michelle Brower, Asha Brunings, Tamrya d'Artenay, Nick DeBoer, Charlotte Germain-Aubrey, Kate Hertweck, Sean Hoban, Bridget Jacobs, Eric Jones, Laura Lagomarsino, Dr. Jason Lando, Kathryn Marsh, Dr. David Matlaga, Taina Price, Patricia Ryberg, Maggie Sporck, Laura Super, Lindsey Tuominen, Genevieve Walden, and Nicole Ward.**

The American Society of Plant Biologists sponsored: **Rob Baker, Brunie Burgos, Kelly Gillespie, Lisa Kanizay, William Perez, Josh Rosnow, and Amber Robertson Smith.**

**Call for 2010-2011 Applications** *Would you like to join the 2010-2011 Master Plant Science Team?* Graduate students and post-doctoral researchers are particularly invited to apply. Members commit to mentoring in both the Fall and Spring sessions of the 2010-2011 academic year. For information on perks (including free membership for the year) and requirements, see the Scientist page on [www.plantingscience.org](http://www.plantingscience.org). An application is available online:

<http://www.plantingscience.org/MPSTApplication/html>

Science Education Bits and Bobs

*Where are the women scientists and engineers?*

— In *Why so Few?* (2010), the AAUW comprehensively reviews long-term data on gender differences at key phases in the pipeline: high school preparation, advanced placement tests, first-year students' intent, bachelor's degrees, doctorates, and workforce representation. There is good news in the report, such as substantial increases in the percentage of women earning doctorates in the biological and agricultural sciences (48% in 2006 vs. 12% in 1966). The report also examines barriers and bases that influence the number of women students and faculty members.

<http://www.aauw.org/learn/research/whysofew.cfm>

*How many students are earning online?* —

Findings from over 200 colleges and universities are summarized in the Babson Survey Research Group's *7<sup>th</sup> Annual Report Online Learning in US Higher Education*. Over 4.6 million students took at least one online course in the fall 2008 term. Demand for online learning opportunities continues to grow, and growth in online enrollments exceeds the growth of the overall higher education student population. Has faculty acceptance of online teaching and learning grown? Do they receive training for online teaching? What is impact of the economy on online education? These are a few of the questions addressed in this survey.

<http://www.sloanconsortium.org/publications/survey/index>

*Point and counter-point on garden-based education in the popular press* —

School and community gardens used as learning environments are on the rise in the U.S. With their increase in popularity comes attention to outcomes. Articles published earlier this year in the Atlantic Monthly and Salon air differences in opinion on the value of gardens as educational environments.

<http://www.theatlantic.com/doc/201001/school-yard-garden>

[http://salon.com/life/education/index.html?story=/food/2010/01/15/school\\_gardens\\_strike\\_back\\_at\\_flanagan](http://salon.com/life/education/index.html?story=/food/2010/01/15/school_gardens_strike_back_at_flanagan)

## Editor's Choice

### **Charles Darwin's Botanical Investigations.**

Harley, Suzanne M. *The American Biology Teacher* 72: 77-81.

This is a good brief introduction for undergraduate and school students to three of Darwin's botanical works: *On the Various Contrivances by Which British and Foreign Orchids are Fertilized by Insects*; *The Different Forms of Flowers on Plants of the Same Species*; and *Insectivorous Plants*. My only disappointment is that while *The Movements and Habits of Climbing Plants* and *The Power of Movement of Plants* are mentioned in a table, they are not also covered in the text, and *Animals and Plants under Domestication* is not mentioned at all.

### **Plants in Your Ants: Using Ant Mounds to Test Basic Ecological Principles.**

Zettler, Jennifer A., Alexander Collier, Bill Leidersdorf, and Missa Patrick Sanou. *The American Biology Teacher* 72: 172-175.

For those of you in the south, here is an inquiry that will put those ubiquitous fire ant hills to good use. The initial activity is a basic "Fast Plants" growth study using soil from active and abandoned fire ant mounds as the variables. This opens up to a variety of ecological questions that small student groups can pursue as projects.

### **University Facilities as Real-World Foci of Multidisciplinary Science Learning.**

Wojdak, Jeremy, Judy Guinan, Joseph Wirgau, Charles Jugler, Georgia Hammond, Christine Small, Charles Manyara, Frederick Singer, Chester Watts, Bethany Bodo, and Andrew Baldwin. *Journal of College Science Teaching* XXXIX: 8-16.

This article reminded me of the University of British Columbia (see *Plant Science Bulletin* 55(1):20-23), but with a vengeance. Radford University designed a storm water remediation wetland, with input from faculty, to collect campus runoff and facilitate multidisciplinary science learning. The constructed wetland is

used by four departments in seven of their courses: Introductory Biology, Microbiology, Pollution Biology, Ecology, Geography, Hydrogeology, and Chemistry integrated by an annual "Wetland Forum." It's too bad there's no botany course to share the wealth.

## Some Highlights at the Upcoming Annual Meeting

### **Plenary Lecture Kenneth R. Miller**

Kenneth R. Miller is Professor of Biology and Royce Family Professor for Teaching Excellence at Brown University. A cell biologist, he serves as an advisor on life sciences to the NewsHour, a daily PBS television program on news and public affairs, and is a Fellow of the American Association for the Advancement of Science (AAAS). Miller is coauthor, with Joseph S. Levine, of five different high school and college biology textbooks used by millions of students nationwide. In 2005 he served as lead witness in the trial on evolution and intelligent design in Dover, Pennsylvania. His popular book, *Finding Darwin's God: A Scientist's Search for Common Ground between God and Evolution*, addresses the scientific status of evolutionary theory and its relationship to religious views of nature. His latest book, *Only a Theory: Evolution and the Battle for America's Soul* addresses the continuing struggle over how evolution is to be understood in American society. His honors include the Presidential Citation of the American Institute of Biological Science (2005), the Public Service Award of the American Society for Cell Biology (shared with Dr. Barbara Forrest in 2006), and the Distinguished Service Award of the National Association of Biology Teachers (2008). In 2009, Miller was honored with the AAAS Public Understanding of Science and Technology Award, and with the Gregor Mendel Medal, presented by Villanova University. He has twice been a guest on the *Colbert Report*.

In addition to the Plenary lecture, Dr. Miller will be presenting a workshop/discussion on

Saturday morning from 10am - noon.

#### Teaching Evolution: A Discussion

Dr. Ken Miller will join us for a discussion of the challenges instructors face when they teach evolutionary theory. This is an opportunity to bring your questions and successes to share with the group. This discussion will be especially useful for those new to teaching evolution, and those dealing with heterogeneous student populations, such as community colleges.

#### Women in Science Luncheon

*“Creating Change in Scientific Institutions through Subversion, Revolution, and Meteorology.”* Enjoy lunch and networking – with guest speaker Dr. Debra Rolison, Naval Research Laboratory. 12:00 pm to 1:00 pm \$30.00 Students \$15.00 This is an event for ALL botanists and men are encouraged to attend and support their female colleagues, not only at this event at our meeting in Providence, but at their home institutions!

#### Regional Botany Lecture Elizabeth Farnsworth

Elizabeth Farnsworth is Senior Research Ecologist with the New England Wild Flower Society (NEWFS), and a biologist, educator, and scientific illustrator. She is currently principal investigator on a National Science Foundation-funded project to develop an on-line guide to the regional flora for teaching botany. She previously coordinated NEWFS planning for the conservation and management of over 100 species of rare plants. She has illustrated the forthcoming Flora of New England for NEWFS and the Natural Communities of New Hampshire with the NH Natural Heritage Bureau, and is currently illustrating *The Ants of New England* (Yale University Press). She is co-author of the Connecticut River Boating Guide: Source to Sea and the Peterson Field Guide to the Ferns. She is a member of the graduate faculties of the University of Massachusetts at Amherst and the University of Rhode Island, a Master Teacher at the Conway School of Landscape Design, and has taught at Smith College and Hampshire College. She formerly served as

Ecologist with the Connecticut Chapter of The Nature Conservancy. She has conducted scientific research on many ecosystems throughout the world, focusing on restoration, conservation, and climate change. She was awarded a Bullard Research Fellowship by Harvard University in 2005 and a National Science Foundation Postdoctoral Fellowship in 1999. She has been a scientific consultant to the National Park Service, The Trustees of Reservations, U. S. Forest Service, Massachusetts and Connecticut Natural Heritage Programs, United Nations, and the Mount Grace Land Conservation Trust. She obtained her Ph.D. in biology from Harvard University, M. Sc. from the University of Vermont, and a B.A. with honors in Environmental Studies from Brown University. She is Editor-in-Chief of the botanical journal, *Rhodora*.

#### Kaplan Memorial Lecture Dr. Nancy Dengler Inside Leaf Development.

Land plants display a striking diversity of external morphologies. Leaf size and shape are major contributors to this multiplicity of plant form in the natural world. Mature function of all leaves depends on the developmental coordination of leaf morphogenesis with the processes that give rise to cells and tissues on the inside of the leaf. During development within the shoot tip, leaf shape is manifested very early, as basic leaf symmetry and sub-regions are apparent almost from inception on the shoot apical meristem. Initial leaf shape, as expressed during early primary morphogenesis, can be highly altered during leaf expansion and secondary morphogenesis, however. Histogenesis of internal tissues runs in parallel with the time course of morphogenesis: tissue patterning occurs during the earliest developmental stages, cell enlargement alters and enhances the initial differences among the tissue systems as leaves expand, and full cell differentiation is completed late, often after leaves reach full size. The diversification of photosynthetic pathways in the genus *Flaveria* (Asteraceae) provides a suitable model to examine some developmental links between morphogenesis and histogenesis and highlights how small developmental shifts can have large implications for mature form and function.

**Professor John L. Harper FRS  
CBE (1925-2009)**

Professor John Lander Harper, corresponding member of the Botanical Society of America, revolutionized plant ecology. "He brought population biology and experimental approaches into the forefront of plant ecology, linking demography and selection, and therefore ecology and evolution."

"John Harper's accomplishments and authority in the field of plant population biology gained him much international recognition. From 1971-1998 he served in various advisory roles for bodies including the Natural Environment Research Council, the Royal Society, the Agricultural and Food Research Council, the Comité de Direction CEPE (CNRS), the Joint Nature Conservation Committee, and as a Trustee of the British Museum of Natural History. He also held various editorial roles including Editor-in Chief of *Agroecosystems* (1974-1981), Co-Editor of *Oecologia* (1982-94), Assistant Editor, *Philosophical Transactions of the Royal Society of London B* (1992-98). He was President of the British Ecological Society (1966-7), elected to the Royal Society of London (1978), and Honorary Associate of the Swedish Society for Phytogeography (1981), a Foreign Associate of the US National Academy of Sciences (1984), named "Eminent Ecologist" by the Ecological Society of America," and Corresponding Member of the Botanical Society of America. "In 1999, the International Botanical Congress awarded him the Millennial Medal, and the British Ecological Society gave him the Marsh Award in 2000."

For a more complete notice see the obituary by R. Turkington in:

*Journal of Ecology* 97(5): 835-837.

**Missouri Botanical Garden  
Board of Trustees Appoints  
Dr. Peter Wyse Jackson  
as Successor to Garden  
President Dr. Peter H. Raven*****Wyse Jackson is the Director of the National  
Botanic Gardens in Dublin, Ireland***

St. Louis, MO: The Missouri Botanical Garden's Board of Trustees has appointed Dr. Peter Wyse Jackson, director of the National Botanic Gardens of Ireland in Dublin, as successor to internationally renowned Garden President Dr. Peter H. Raven.

With the Garden's Board of Trustees, Peter Raven played an integral part in the selection process and will play a key role in the future, especially during the 2010-2011 transition period.

Recognized as one of the world's leading botanists and advocates of conservation and biodiversity, Raven transformed the Garden into a world-class center for botanical research, education and horticultural display. He is known globally as an advocate for preserving plant diversity in the face of deforestation, degradation and global warming. In addition, Raven is credited for putting a spotlight on the growing problem of nature-deficit disorder, speaking about the need to instill in children a love of nature that will translate into concerned adults. The recipient of hundreds of awards and accolades over his 40 year tenure, Raven holds the country's highest award for scientific accomplishment, the U.S. Medal of Science. "I am extremely pleased with the selection of Dr. Peter Wyse Jackson as the next president of the Missouri Botanical Garden," said Raven. "He brings not only a wealth of horticulture and botanical experience, but also a deep understanding of the importance of sustainability and conservation."

Born in Kilkenny, Ireland, and educated at the University of Dublin, Trinity College, Peter Wyse Jackson has served as the director of the

National Botanic Gardens of Ireland since March 2005. During his tenure, Wyse Jackson placed a new emphasis on organic horticulture and home gardening. He made environmental sustainability a priority of the institution, reducing waste and energy consumption, promoting new programs and research on biodiversity, conservation and sustainable development. In addition, Wyse Jackson introduced a wide range of new cultural programs to the Garden, and secured for Ireland the fourth Global Botanic Gardens Congress, which will be hosted by the National Botanic Gardens in June 2010. In Ireland, he has also been a leader at national levels in environmental policy development, providing advice to government in fields including biodiversity, conservation and climate change.

Prior to his position with the National Botanic Gardens, Wyse Jackson served as secretary general for the Botanic Gardens Conservation International (BGCI), a chief executive position charged with leadership of the organization. BGCI is a worldwide organization promoting plant conservation, environmental education and sustainable development through botanic gardens.

Wyse Jackson is the author of scores of scientific books and papers on plant conservation, gardening and horticulture, Irish floristics and plant systematics, and the management and conservation of endangered island floras. He brings to the Missouri Botanical Garden an extensive knowledge of botanical institutions, having worked closely with botanic gardens in more than 50 countries. He is globally renowned, and has served as Chair of the Global Partnership for Plant Conservation since 2005, supporting the implementation of the U.N.'s Global Strategy for Plant Conservation.

"The Missouri Botanical Garden is one of the top botanical institutions in the world, internationally known for its global scientific endeavors and as a cultural institution," said Wyse Jackson. "It is an honor to have been selected for the presidency at this prestigious institution. The great challenges that we face worldwide in securing a sustainable environment for the future place great responsibilities to provide continued

leadership through such great institutions as the Missouri Botanical Garden. I look forward to working with the wonderful staff and leading this already superb center of science and horticultural display to even greater heights."

"The Garden has been fortunate to benefit from the long and rich tenure of Peter Raven. He has put Missouri on the global map," noted Arnold Donald, Chair of the Garden's Board of Trustees. "Going forward, we are in excellent hands with Peter Wyse Jackson, who will continue Peter Raven's outstanding legacy in both horticultural displays and science and conservation."

Peter Wyse Jackson and his wife, Diane, have three children.

## Announcements

### AIBS Launches Legislative Action Center

The AIBS Legislative Action Center is an easy-to-use tool that enables biologists and science educators to quickly and effectively communicate with their elected officials.

Each day lawmakers make tough decisions about science policy. For example, members of Congress are debating investments in federal research programs, biodiversity conservation, mitigation of climate change, and the opportunities of stem cell research for new medical treatments. Scientists now have the opportunity to help their elected officials understand the importance of these issues to the scientific research and education communities.

Become an advocate for your science and profession. Visit the AIBS Legislative Action Center and become an advocate for biology.

The AIBS Legislative Action Center is made possible by the generous contributions of AIBS Member Societies. The Society for the Study of Evolution, American Society for Limnology and Oceanography, Association of Ecosystem Research Centers, and the Botanical Society of America have made generous financial contributions to support this important initiative.

## Hunt Institute Announces Rogers McVaugh Gift

Pittsburgh, PA—The Hunt Institute is honored to announce that the late taxonomist and botanical explorer Rogers McVaugh (30 May 1909–24 September 2009), a member of the original Hunt Botanical Library advisory board and a longtime supporter of the Hunt Institute's mission, has bequeathed the remainder of his academic research papers and books to Hunt Institute. Dr. McVaugh was internationally renowned for his expertise in Compositae, Myrtaceae, Campanulaceae, woody Rosaceae, and the flora of Mexico, as well as in botanical history and nomenclature. He spent much of his career at the University of Michigan, where he was curator of vascular plants (1946–1979) and director of the herbarium (1972–1975). He retired in 1979 and moved to Chapel Hill, where he was appointed research professor of botany at the University of North Carolina and where he continued to work for nearly 30 years. He published about a dozen books and 200 shorter articles in the history of botany, floristics and systematic botany. His many awards included the Merit Award (1977) and the Centennial Award (2006) from the Botanical Society of America, the Gold Medal for “Mérito Botánico” from the Sociedad Botánica de México (1978), the Henry Allan Gleason Award from the New York Botanical Garden (1984), and the Millennium Medal from the International Association for Plant Taxonomy at the International Botanical Congress in 1999. He was also the first recipient of the Asa Gray Award (American Society of Plant Taxonomists, 1984), the Luz María Villarreal de Puga Medal (University of Guadalajara, 1993), and the Cuatrecasas Medal for Excellence in Tropical Botany (Smithsonian Institution, 2001).

The donation includes McVaugh's professional library, his work on *Flora Novogaliciana*, his research files on botanical exploration, and correspondence and notes from his years at the University of North Carolina at Chapel Hill. The books and papers will be deposited in the Institute's Library and Archives, respectively. This gift adds to the archival material previously donated by Dr. McVaugh, which includes his 1944–1979

correspondence and his collection of group and individual photographs of botanists and explorers (HI Archives McVaugh Collection no. 322).

We appreciate Dr. McVaugh's longstanding commitment to the Hunt Institute, and we are committed to making the collection open to researchers upon request. Please contact the Library or Archives to make an appointment.

The Hunt Institute is located on the 5th floor of the Hunt Library building at Carnegie Mellon University. Hours: Monday–Friday, 9 a.m.–noon and 1–5 p.m.; readers' hours in the Library, 1–5 p.m.; additional gallery hours on Sunday, 1–4 p.m. during exhibitions. For further information, contact the Hunt Institute at 412-268-2434.

The Hunt Institute for Botanical Documentation, a research division of Carnegie Mellon University, specializes in the history of botany and all aspects of plant science and serves the international scientific community through research and documentation. To this end, the Institute acquires and maintains authoritative collections of books, plant images, manuscripts, portraits and data files, and provides publications and other modes of information service. The Institute meets the reference needs of botanists, biologists, historians, conservationists, librarians, bibliographers and the public at large, especially those concerned with any aspect of the North American flora.

Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library. The current collections include approximately 29,000 books; 30,000 portraits; 30,000 watercolors, drawings and prints; and 2,000 autograph letters and manuscripts. The Archives specializes in biographical information about, portraits of and handwriting samples from scientists,

illustrators and all others in the plant sciences. The Archives is a repository of alternate resort and as such has collected over 300 institutional and individual archival collections that may not have otherwise found an easy fit at another institution. Including artworks dating from the Renaissance, the Art Department's collection now focuses on contemporary botanical art and illustration, where the coverage is unmatched. The Art Department organizes and stages exhibitions, including the triennial *International Exhibition of Botanical Art & Illustration*. The Bibliography Department maintains comprehensive data files on the history and bibliography of botanical literature. Known for its collection of historical works on botany dating from the late 1400s to the present, the Library's collection focuses on the development of botany as a science and also includes modern taxonomic monographs, floristic works and serials.

## Swingle Plant Anatomy Reference Collection

At the University of Miami, Walter T. Swingle completed his monograph "The Botany of Citrus and its Relatives of the Orange Subfamily," which remains the premier reference for the taxonomy, morphology, and anatomy of these plants. With his staff, he began the ambitious project that became the Swingle Plant Anatomy Reference Collection, carefully preparing thousands of microscope slides of plant structures from tropical crops and their wild relatives. <<http://merrick.library.miami.edu/specialCollections/wtswingle/>>

The Plant Anatomy Digital Archive features over 1,700 images from more than 250 species of plants collected from all over the world. The images are digitized micrographs of parts of plants that were sectioned, stained, and permanently mounted to a glass slide. Although the earliest specimen was collected in 1769 (*Limonia acidissima* L., accession number SV221), the majority were collected in the early 20th century. The Digital Archive shows a small selection of slides present in the Swingle

Reference Collection, which consists of 3,200 specimens on over 26,000 glass microscope slides, from 575 plant species. Animations were also created by transforming images of consecutive microtome sections into individual "frames" using JavaScript, so that time represents movement up the axis of the plant structure. The results provides a new perspective on how plants are constructed in three dimensions.

The collection is freely available for use to support teaching and research. Visit <http://swingle.miami.edu>

## Some Plants Native To NYC Area Have Become Locally Extinct As New Flora Has Moved In

Brooklyn, NY—Brooklyn Botanic Garden (BBG) announces findings from the most comprehensive study of plant biodiversity ever undertaken in the metropolitan New York area.

New York Metropolitan Flora Project (NYMF) data, gathered over the course of the last 20 years, provide the first hard evidence of how native species are faring—and how non-native species are spreading—in counties within a 50-mile radius of New York City. The area of study includes all of Long Island, southeastern New York State, northern New Jersey, and Fairfield County, Connecticut.

While much of the botanical science community concentrates on researching and tracking the threats to biodiversity in the tropics, scientists at BBG have chosen to undertake an unprecedented study of their own region.

At least 50 varieties of native plants are locally extinct or nearing elimination, say project scientists. Nuttall's mudflower (*Micranthemum micranthemoides*), last collected from the region in 1918, is likely extinct throughout its former range. Scarlet Indian paintbrush (*Castilleja coccinea*), pennywort (*Obolaria virginica*), sidebells wintergreen (*Orthilia secunda*), and sundial lupine (*Lupinus*

*perennis*) are among the wildflower species to have seriously declined in the region. Black crowberry (*Empetrum nigrum*) is locally extinct, without a trace of a population remaining today in the New York City metropolitan area.

“In many areas, the snapshot this report provides is startlingly different from the printed maps, plant manuals, and landscape shots of just 40 years ago,” says Dr. Gerry Moore, director of Science at Brooklyn Botanic Garden and coordinator of the New York Metropolitan Flora Project. “A number of invasive species introduced from distant areas that have climates similar to ours—such as parts of Asia, Europe, and the southeastern United States—are newly thriving in the New York City area. For example, camphor weed, native to the southern United States, is common in Brooklyn now; however, at the time of the Garden’s founding a century ago, it was considered to be quite rare.”

Offering a precise map of as many as 3,000 plant species, the NYMF project findings are vital reference points for those involved in environmental efforts like conserving rare plants, planning parks and greenways, repairing degraded habitats, and designing home gardens.

Although agencies and municipalities may wish to restore native species to particular habitats, the NYMF findings suggest that some native species can no longer survive in their native region. “How do you, say, restore the flora original to a coastline, when you know that the sea level is rising each year?” asks Dr. Moore.

Some plants native to the region, like Britton’s violet (*Viola brittoniana*), are now rare in their natural habitats but thrive when brought into cultivation in the metropolitan area. Some non-native cultivated plants, such as Japanese barberry (*Berberis thunbergii*), can escape from cultivated landscapes and overrun natural areas, where they thrive and spread, crowding out more fragile plants. Efforts are now underway to better recognize and manage for invasive plant species, which can be particularly disruptive when introduced to a new habitat due to the absence of the insects, diseases, and animals that naturally keep its

population in check in its native region.

Dr. Moore notes that changes to plant biodiversity also affect insect and animal life, as well as other aspects of the local ecosystem.

The mapping phase of the NYMF project is now concluding, and steps are underway to create manuals in collaboration with the U.S. Forest Service.

“The NYMF project is a model, not only for gathering data over time, but for applying that data in a precise and visually-oriented way,” says Scot Medbury, president of Brooklyn Botanic Garden, who notes that data from the research project will be shared with Federal and State governments, as well as the New York Flora Atlas, published in partnership with the state’s Biodiversity Research Institute. “Studying the vegetation changes in highly populated areas is critical to understanding the future of biodiversity in our rapidly urbanizing world,” Medbury notes.

The study of native plants has long been a core mission at Brooklyn Botanic Garden, which celebrates its centennial this year. In BBG’s early years, botanist Norman Taylor intensively studied local flora by walking nearly 2,000 miles over Long Island, mapping locations of plant families. Taylor then published a book on flora of the region, providing as clear a picture as was possible at the time of the state of native flora.

Today, many new plants are present in the area. Some have been intentionally cultivated, while others have moved here inadvertently: brought in with soil, animals or people. “NYMF has identified entire plant communities that would have been unknown to Norman Taylor and his colleagues a hundred years ago,” says Medbury.

For more information, please visit [bbg.org/sci/nymf/](http://bbg.org/sci/nymf/).

Past and present major funding for the New York Metropolitan Flora project is provided by the Andrew Mellon Foundation, Eppley Foundation for Research, Hudson River Watershed Foundation and New York Biodiversity Research Institute.

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## Symposia, Conferences, Meetings

### **2010 Field Botany Seminars on the Maine coast ... Advanced, professional, specialty, and introductory field seminars offered by the Humboldt Institute**

<http://www.eaglehill.us/programs/nhs/nhs-calendar.shtml>

Introduction to Bryophytes. May 23 - 29. Alison C. Dibble.

Introduction to Modern Phylogenetic Methods. May 30 - Jun 5. Brigid O'Donnell and Hillary Manus.

Lichen Chemistry: Spot Tests and TLC in Lichen Identification. Jun 6 - 12. Scott LaGreca and ThorstenLumbsch.

Liverworts and Liverwort Ecology. Jun 6 - 12. Blanka Shaw and Jon Shaw.

Sterile Crustose Lichens: An Introduction with Special Emphasis on Identification. Jun 13 - 19. James C. Lendemer.

Sedges, Rushes, and Grasses: Advanced Taxonomy and Ecology of Wetland and Upland Species. Jun 27 - Jul 3. Anton A. Reznicek.

Botanical Illustration with Color Pencil. Jul 4 - 10. Wendy Hollender.

Botanical Illustration on Vellum and Paper: Botanical Portraiture and Microlandscapes. Jul 11 - 17. Carol Woodin.

Applied Field Identification of Sedges, Rushes, and Grasses. Jul 11 - 17. Tyler Smith.

Forest Ecosystem Analysis for Sustained Forestland Values and Uses. Jul 11 - 17. Norman A. Richards

Wetland Identification and Delineation. Jul 25 - 31. Robert W. Lichvar and Russell Pringle.

Freshwater Diatoms: Taxonomy and Biomonitoring. Jul 25 - 31. Jeffrey R. Johansen.

Salt Marsh Restoration Adapts to Global Climate Change. Aug 1 - 7. Susan C. Adamowicz and David Burdick.

Mushrooms and Other Fungi. Aug 8 - 14. Rosalind Lowen and Dianna Smith.

Lichens and Lichen Ecology. Aug 15 - 21. David Richardson and Mark Seaward.

Bryophytes and Bryophyte Ecology. Aug 15 - 21. Nancy G. Slack.

Crustose Lichens: Identification Using Morphology, Anatomy, and Simple Chemistry. Aug 22 - 28. Irwin M. Brodo.

Taxonomy and Biology of Ferns and Lycophytes, with Guest Lectures on Isoetes. Aug 22 - 28. Robbin Moran and W. Carl Taylor.

Plants as Alternatives to Well-known Medicines, Spices, Teas, and Vegetables. Aug 29 - Sep 4. James A. Duke.

Flora of Coastal Habitats and Islands of Maine. Aug 29 - Sep 4. Glen H. Mittelhauser.

Toxic and Look-Alike Mushrooms and the Management of Mushroom Toxicities: A Seminar for Emergency Care and Health Care Providers. Sep 14 - 18. John Saucier, Tamas R. Peredy, and Lawrence Leonard.

Phytogeography and Taxonomy of the North American Flora: Recent Advances in Digital Technology and the Development of Digital Floras as Research Tools. Sep 19 - 25. John Kartesz.

Nurturing Biodiversity in the Managed Landscape: Gardening with Native Plants, Insects, and Wildlife. Sep 26 - 30. Marjorie Peronto.

Information on lodging options, meals, and costs may be found at <http://www.eaglehill.us/programs/general/application-info.shtml>

Eagle Hill offers specialty seminars at different ecological scales for those who are interested in understanding complex natural history questions. Seminars range from watershed level subjects, and subjects in classical ecology, to highly specialized seminars in advanced biology, taxonomy, and ecological restoration.

Eagle Hill has long been recognized as offering hard-to-find seminars and workshops which provide important opportunities for training and meeting others who are likewise dedicated to continually learning more about natural history.

Eagle Hill field seminars and workshops are of special interest because they focus on the natural history of one of North America's most spectacular and pristine natural areas, the coast of eastern Maine from Acadia National Park to Petit Manan National Wildlife Refuge and beyond. Most seminars combine field studies with follow-up lab studies and a review of the literature. Additional information is provided in lectures, slide presentations, and discussions. Seminars are primarily taught for people who already have a reasonable background in a seminar program or in related subjects, or who are keenly interested in learning about a new subject.

—  
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and Eagle Hill Foundation  
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04680-0009 United States  
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FAX: 207-546-3042. Skype: joergeagle  
<http://www.eaglehill.us>



## Assisted Migration of Plants

A Janet Meakin Poor Research  
Symposium  
Chicago Botanic Garden, Glencoe, IL  
June 11, 2010

In a changing climate, plant species will respond in various ways. Some will cope by changing their physiology, some will adapt via natural selection, some will migrate, and others, unable to make these changes, will go extinct. When fragmentation limits migration potential of plants or when natural migration and adaptation rates are outstripped by the pace of climate change, some conservation biologists propose purposeful, human-mediated migration, known as "assisted migration" or "managed relocation," as a way to prevent extinction. In this symposium, we examine this controversial topic from both sides of the issue and suggest ways that the benefits of assisted migration can be maximized while the costs and risks can be minimized. <http://www.chicagobotanic.org/school/symposia/JMP.php>

### Schedule

8:30 a.m. Welcome

Moderator: Kayri Havens, Ph.D., Medard and Elizabeth Welch Director, Plant Science and Conservation, Chicago Botanic Garden, Glencoe, IL

8:40 a.m. Keynote Presentation

Can Plants Adapt to Climate Change? Art Weis, Ph.D., Professor, Director, Koffler Scientific Reserve at Joker's Hill, University of Toronto, Toronto, ON

9:30 a.m. Big and Little Are Not the Same: How Range and Population Sizes Could Affect Management Strategies Under Climate Change. Pati Vitt, Ph.D., Curator, Dixon National Tallgrass Prairie Seed Bank Conservation Scientist, Chicago Botanic Garden, Glencoe, IL

10 a.m. Break

10:30 a.m. Managed Relocation

Jason McLachlan, Ph.D., Assistant Professor, Department of Biological Sciences, Notre Dame, Notre Dame, IN

11 a.m. Is Managed Relocation another Pathway for Biological Invasions? Sarah Reichard, Ph.D., Associate Professor, School of Forest Resources, University of Washington, Seattle, WA

11:30 a.m. Multi-stage Modeling Approach to Evaluate Migration Potential of Tree Species under Climate Change. Anantha M. Prasad, Ecologist, Northern Research Station, USDA Forest Service, Delaware, OH

Noon Lunch

1:30 p.m. Assisted Migration of Trees: a Canadian Perspective. Tannis Beardmore, Researcher, Tree Seed, Atlantic Forestry Centre, Natural Resources Canada, Fredericton, NB

2 p.m. The Other Assisted Migration: Moving Genotypes Within a Species Range. Jessica Dawn Pratt, Vice President, OCSCB, and Ph.D. Student, Mooney Lab, University of California at Irvine, Irvine, CA

2:30 p.m. Stretch Break

3 p.m. Assisted Migration and Invasive Species: Exploring an Ethical Dilemma. Jay Odenbaugh, Associate Professor, Department of Philosophy, Environmental Studies, Lewis & Clark College, Portland, Oregon

3:30 p.m. Panel Discussion, Q&A

4 p.m. Posters and Lemonade

5 p.m. Adjourn

Register Now!  
Call 847-835-8261 or go to  
<http://www.chicagobotanic.org/school/symposia/JMP.php>

## **Phytogeography and Taxonomy of the North American Flora: Recent Advances in Digital Technology and the Development of Digital Floras as Research Tools**

September 19 - 25, 2010

Our knowledge of North American floristics is predicated upon four centuries of vouchered

collections that number some 80 million records. Therefore, our basic knowledge of floristics is no longer a mystery. By using even antiquated floristic practices, we can generate informative traditional floras with a great deal of precision regarding where our 23,000 species occur within North America, how we identify them, which ones are rare, which ones are exotic, what characteristics do they share, etc. However, by applying many new and readily available alternative technologies to these antiquated floristic practices, new and wholly different paradigms can be produced. From our vast herbarium records, we know that there are 23,714 species of vascular plants in North America, of which 19,402 are native, 4,366 are exotic, 2,748 are trees, 6,429 are shrubs, etc. However, by incorporating Digital Technology, it is also possible to show richness and similarity coefficients of floras from different elevations, from different ecoregions, from different heat and hardness zones and from different physiographic zones. Digital Technology can also produce species area curves, illustrate density gradation patterns and compare floras with similar rainfall, heat and hardness zone patterns. It is also possible to monitor floristic shifts due to climate factors such as global warming and other factors. Moreover, by using random access keys and digital imagery, we can produce more effective identification systems and more accurately pinpoint locations of individual plant populations, or even individual plants that grow in parks, forests or along roadsides.

This seminar will to a significant extent focus on the U.S. Army Corps of Engineers new web site, <https://rsgis.crrel.usace.army.mil/apex/f?p=703>, based on the National Wetland Plant List (NWPL), a key component of the Corps' national wetland program. While designed to support a project to update the NWPL, the site includes extensive botanical information of more general interest. Its robust search capabilities allow users to explore a wealth of information on nearly 10,000 U.S. wetland plants, including detailed distribution maps and spectacular photographs. (Non-Corps users may need to accept a web certificate the first time they visit the site.)

John Kartesz ([john\\_kartesz@yahoo.com](mailto:john_kartesz@yahoo.com)) received his Bachelor's and Master's Degrees

in Biology from West Virginia University and his PhD from the University of Nevada. His area of interest includes the development of a National floristic database and accompanying county-level digital atlas for the vascular flora of the North America. Dr. Kartesz worked for the North Carolina Botanical Garden at Chapel Hill for 17 years and currently serves as Director of the Biota of North America Program (BONAP). The BONAP database has tracked all vascular plant species (native, naturalized, and recently adventive) over the last 40 years in North America, north of Mexico. BONAP's plant distribution data represents the most comprehensive currently available for the North America continent. BONAP also tracks and maintains current names, classifications, and related fields for all North American plants.



## Special Opportunities

### **MSc Degree/Postgraduate Diploma in the Biodiversity and Taxonomy of Plants Royal Botanic Gardens Edinburgh/ University of Edinburgh**

#### **Programme Philosophy**

The MSc in Biodiversity and Taxonomy of Plants was established by the University of Edinburgh and the Royal Botanic Garden Edinburgh (RBGE) to address the growing worldwide demand for trained plant taxonomists and whole-plant scientists. A detailed knowledge of plants and habitats is fundamental to their effective conservation. To communicate such knowledge accurately and effectively, training is required in plant taxonomy – the discipline devoted to plant diversity and evolution, relationships, and nomenclature.

The MSc is perfect for those wishing to develop a career in many areas of plant science:

- Survey and conservation work in threatened ecosystems
- Assessment of plant resources and genetic diversity
- Taxonomic research
- Management of institutes and curation of collections
- A stepping stone to PhD research and academic careers

Edinburgh is a unique place to study plant taxonomy and diversity. The programme and students benefit widely from a close partnership between RBGE and the University of Edinburgh (UoE). RBGE has one of the world's best living collections (15,000 species across our four specialist gardens – 5% of world species), an herbarium of three million specimens and one of the UK's most comprehensive botanical libraries. The School of Biological Sciences at UoE is a centre of excellence for research in Plant Sciences and Evolutionary Biology. Recognised experts from RBGE, UoE, and from different institutions in the UK deliver lectures across the whole spectrum of plant diversity. Most course work is based at RBGE, close to major collections of plants, but students have full access to the extensive learning facilities of the university.

#### **Aims and Scope**

The MSc provides biologists, conservationists, horticulturists and ecologists with a wide knowledge of plant biodiversity, as well as a thorough understanding of traditional and modern approaches to pure and applied taxonomy. Apart from learning about the latest research techniques for classification, students should acquire a broad knowledge of plant structure, ecology, and identification.

#### **Programme Structure**

This is an intensive twelve-month programme and involves lectures, practicals, workshops and essay writing, with examinations at the end of the first and second semesters. The course starts in September of each year and the application deadline is normally 31 March.

Topics covered include:

- Functions and philosophy of taxonomy

- Evolution and biodiversity of the major plant groups, fungi and lichens
- Plant geography
- Ecology of plants and ecosystems
- Conservation and sustainability
- Production and use of floras and monographs
- Biodiversity databases
- Phylogenetic analysis
- Population and conservation genetics
- Tropical field course, plant collecting and ecology
- Curation of living collections, herbaria and libraries
- Plant morphology, anatomy and development
- Molecular systematics

Fieldwork and visits to other institutes are an integral part of the course. There is a two-week field course to Belize in which students are taught field collection and identification of tropical plants and ecological survey techniques. The summer is devoted to four months of a major scientific research project of the student's choice or a topic proposed by a supervisor. These research projects link in directly with active research programmes at RBGE.

### Entry Requirements

Applicants should ideally hold a university degree, or its equivalent, in a biological, horticultural, or environmental science, and above all have a genuine interest in plants. Relevant work experience is desirable but not required. Evidence of proficiency in English must be provided if this is not an applicant's first language.

### Funding

The course is currently supported by eight Natural Environment Research Council studentships that are open to EU students only. Other international funding bodies have supported overseas students in the past.

### Further Information

For further details on the programme, including a course handbook please visit the RBGE website:

<http://www.rbge.org.uk/education/professional-courses/msc-in-biodiversity-andtaxonomy-of-plants>

You can also contact the Course director or

Education Department at RBGE, or the Postgraduate Secretary of the University of Edinburgh:

**MSc course Director**, Dr Louis Ronse De Craene

Royal Botanic Garden Edinburgh

Tel +44 (0)131 248 2804

Email: [l.ronsedecraene@rbge.ac.uk](mailto:l.ronsedecraene@rbge.ac.uk)

**Postgraduate Secretary**, The University of Edinburgh

School of Biological Sciences, Darwin Building  
The King's Buildings, Edinburgh EH9 3JR, UK

Tel +44 (0)131 650 7366

Email: [icmbpg@ed.ac.uk](mailto:icmbpg@ed.ac.uk)

To apply online, please go to:

<http://www.ed.ac.uk/studying/postgraduate/finder/details.php?id=1> and click on the link to apply for this degree.



## 2010 Native Plant Conservation Initiative (NPCI) grants cycle

The National Fish and Wildlife Foundation (NFWF) is soliciting proposals for the 2010 Native Plant Conservation Initiative (NPCI) grants cycle. The NPCI grant program is conducted in cooperation with the Plant Conservation Alliance (PCA), a partnership between the Foundation, ten federal agencies, and more than 270 non-governmental organizations. PCA provides a framework and strategy for linking resources and expertise in developing a coordinated national approach to the conservation of native plants. Since 1995, the NPCI grant program has funded multi-stakeholder projects that focus on the conservation of native plants and pollinators under any of the following 6 focal areas: conservation, education, restoration, research, sustainability, and data linkages.

The deadline for pre-proposals is July 1, 2010. See <http://www.nps.gov/plants/nfwf/> for more information about the grant programs including the full request for proposals.

# Reports and Reviews

## The Flowering of Botany at the Harvard Forest

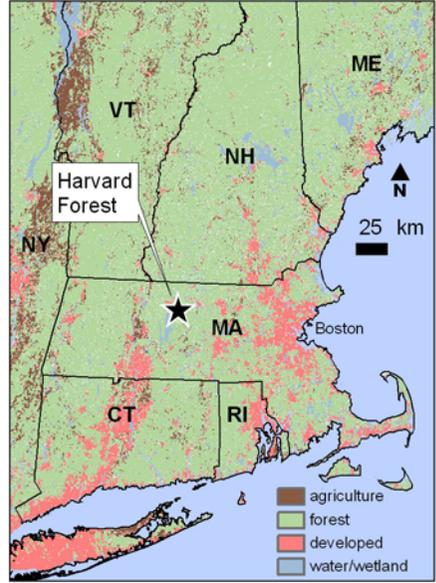
Audrey Barker Plotkin<sup>1</sup>, Site Coordinator and  
 P. Barry Tomlinson, Professor Emeritus  
 Harvard Forest, Harvard University, 324 N.  
 Main St., Petersham, MA 01366  
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The Harvard Forest is less than 100 miles (less than a 2-hour drive) from Providence, RI. The Fisher Museum, featuring twenty-three internationally acclaimed dioramas portraying the history, conservation and management of central New England forests, is open Monday - Friday 9am - 4pm and Saturday - Sunday 12pm - 4pm from May – October. Self-guided trails are always open.

### Introduction to the Harvard Forest

Located within the New England Upland physiographic region, the Harvard Forest's rolling hills and valleys range from 220m to 410m above sea level. The bedrock underlying the terrain is a mixture of metamorphic rocks formed during continental collisions during the middle Devonian. Local site conditions are driven by the stony glacial tills deposited during the Wisconsin ice age. These are interspersed with local glacial outwash deposits and wetland peats. Soils are stony and acidic, with a wide range of depth and moisture. The very few calcareous or shoreline sites contain a disproportionate amount of the floral diversity of the Forest.

Since its establishment in 1907 the Harvard Forest has served as Harvard University's outdoor laboratory and classroom for research and education in forest biology, ecology, and conservation. Located 65 miles west of Cambridge in the rural town of Petersham, Massachusetts, the land base includes diverse forests, wetlands and streams, as well as the 70-acre Harvard Pond (**Figure 1**). From a center comprising 3500 acres of land, research facilities, classrooms, residences and the Fisher Museum (Foster and O'Keefe 2000),



**Figure 1.** Harvard Forest's location in New England (Map: B.R. Hall).

the scientists, students, and collaborators at the Forest explore topics ranging from forest and biodiversity conservation and environmental change to land-use history and the ways in which physical, biological and human systems interact to change our earth.

The climate is cool, moist temperate: July mean temperature is 68°F and the January mean temperature is 21°F. Throughout the region, winter temperatures have warmed nearly 5°F over the last 40 years, a remarkably rapid change. The average annual precipitation is 110cm and is distributed fairly evenly throughout the year as rain and snow. Forest cover dominates the current landscape. While there are some quite old trees, the land was largely cleared for agriculture during the 18<sup>th</sup> and 19<sup>th</sup> centuries (**Figure 2**). Remaining primary forests were used as woodlots during the agricultural period, and remnant old-growth forests were blown down in the Great 1938 Hurricane. Historical land-use determines the basic patterns of vegetation distribution even after more than 100 years (Motzkin et al. 1999).

The Harvard Forest Long Term Ecological Research Program (NSF) has served as a foundation for integrated, long-term studies of forest dynamics since 1988. Beginning this



**Figure 2.** Second-growth forest with stonewall legacies of the agricultural past (photo: D.R. Foster)

year, the National Ecological Observatory Network (NEON) is initiating research at Harvard Forest as part of its continental-scale network of ecological observatory sites. The Harvard Forest is a department within the Faculty of Arts and Sciences of Harvard University and administers the Graduate Program in Forestry and a Summer Research Program in Ecology. The Forest has extensive field research infrastructure including three eddy flux towers, two walk-up towers, a mobile canopy lift, a meteorological station, two gauged low-order watersheds, numerous long-term experimental plots, and paleoecological, historical and permanent plot studies. Twelve buildings (70,000 ft<sup>2</sup>) provide laboratories, an archive, library, museum, lecture hall for 125, two classrooms and numerous discussion rooms, dormitories and single-family housing, commercial kitchen and a dining room for 100. The on-site staff of 35, together with >100 collaborating scientists, engage in research spanning a wide range of the biological, physical, social, and computer sciences. An integrated administrative and facilities staff supports all aspects of research, education and outreach.

Despite the geographic distance, faculty at the



**Figure 3.** The 2010 Harvard Forest Freshman Seminar class. The course title this year is "Global Change Ecology – Forests, Ecosystem Function, and the Future" (photo: D.R. Foster)

Forest fulfilled their teaching obligations mainly in Cambridge so that interaction between them and both graduate and undergraduate students was always a priority. Forest staff were early adopters of Harvard's innovative Freshman Seminar program, which has been conducted for nearly 30 years (**Figure 3**). The course runs over four weekends at Harvard Forest, introducing basic concepts of forest biology to generations of first-year students. The success of this seminar and recognition of the unique facilities for field research prompted the formation of a summer research program in ecology, instigated by current director David Foster and now superbly led for more than 25 students annually by Senior Ecologist Aaron Ellison. The program involves Forest staff and mentors from collaborating institutions, and makes full use of the Forest's accommodations, laboratories and field facilities.

### Botanical Research at the Forest

Through the years, researchers have focused on forest management, soils and the development of forest-site concepts, the biology

of temperate and tropical trees, plant ecology, forest economics, landscape history, conservation biology, and ecosystem dynamics. Historically, we may recognize three periods, each with a different emphasis: first, the establishment of an understanding of the nature of the forests themselves as exemplars of forest dynamics in New England, which coincided with a lengthy period of active forest management and research in silviculture; second, a period when research was funded extensively by the Maria Moors Cabot Foundation during which a diversity of botanical projects were supported; and third, the current period when the Harvard Forest returned to its strong integration of field, laboratory and theoretical studies and became part of the Long-Term Ecological Research program funded by the National Science Foundation with the main focus on the ecological dynamics of the vegetation and land-use at the Forest and throughout New England. Throughout the

many studies of silvics and soils. Most publications from this era focused on the growth and site relations of commercial timber species, with some work conducted on wood anatomy by Irving Bailey, who earned the Master of Forestry at Harvard in 1909 and then served on the Harvard faculty (e.g., Bailey 1910).

The first records of the woody plants at Harvard Forest were collected by John George Jack and his students in 1908. Jack was an assistant professor of dendrology at the Arnold Arboretum, and published his findings in the 1911 *Bulletin of the Harvard Forestry Club*.

**The Blossoming of Botanical Research, 1937-1987**

As a consequence of efforts by Fisher's successor, Ward Shepard and botanical administrator Edwin D. Merrill, the Maria Moors Cabot Foundation for Botanical Research was established at Harvard University in 1937 with funding from Godfrey L. Cabot, a Boston industrialist. For fifty years, this foundation would provide steady support for a wide range of research at Harvard's botanical institutes, including the Harvard Forest. Dr. Cabot, the benefactor, was particularly interested in enhancing the productivity of trees, with a



**Figure 4.** Fisher Museum diorama depicting the first thinning of a mixed-hardwood forest, ca. 1930.

various programs researchers at the Forest and beyond have maintained a strongly collaborative approach, which is a hallmark of the scientific community in Petersham.

**Establishment of the Forest, 1907-1937**

The early years saw the establishment of extensive experimental forest plantations and the development of mixed-species silviculture (**Figure 4**), notably by R.T. Fisher, who served as the Harvard Forest's first director from 1907-1934, and his student and third director Albert C. Cline. Demonstration of sustained yield forestry was a primary focus, supported by



**Figure 5.** This 1910s photo of the old-growth Pisgah tract appeared in Merrill's announcement of the Cabot Foundation in *Scientific Monthly*. The forest was destroyed one year later by the Great Hurricane of 1938 (photo: Harvard Forest Archives)

rationale that sounds quite modern: to better utilize the energy embodied in living plants so that we might be less dependent on fossilized plant remains (fossil fuels). Professor Merrill's announcement of the foundation in *The Scientific Monthly* (Merrill 1937) featured several photos of forest types and experiments at the Harvard Forest (**Figure 5**).

The botanist Hugh M. Raup came to the Harvard Forest in 1937 and served as director from 1946-1967. He made many fine botanical collections that were complemented by his wife Lucy's collections of lichens and bryophytes and produced a *Checklist of the Vascular Plants of Petersham*, but much of his botanical work was in the Arctic. His broad-minded



**Figure 6.** Hugh Raup holds court next to a birch growing on top of a treefall mound (photo: Harvard Forest Archives).

understanding of the ecology, geography, botany and history of the Arctic and New England led to his challenge to stable-state successional theory with his counter-message of change, unpredictability of natural and human systems, and ecosystem resilience (**Figure 6**).

Later, in association with the newly established Department of Organismic and Evolutionary Biology at Harvard, academic horizons were

broadened when as many as five faculty made Harvard Forest their home. Notably they laid emphasis on the purpose of the Cabot Foundation, which was to support research on trees and communicate this knowledge widely. The scholarly presence always focused on interactions among different researchers, a well-sustained tradition with all Forest visitors.

Martin Zimmerman, who was brought to the Forest in 1954 by Professor Raup and became Harvard Forest Director in 1969, had an insightful ability to combine structure with function that led to a better understanding of long distance transport in woody plants (Zimmerman 1971, 1983). His reach extended well beyond the Forest itself. For example, he made fundamental discoveries about the anatomy of palm trees that could be translated back to more conventional trees.

John G. Torrey chose to move his research from Cambridge to Petersham in order to build state-of-the-art laboratories and greenhouse facilities that made possible the study of plants outside their natural habitat in order to explore the development and physiology of roots (Torrey and Clarkson 1975). His work on the symbiotic relations between trees and microbial organisms bridged the interface between physiology and ecology (Torrey 1978). Peter DelTredici, now Lecturer in the Department of Landscape Architecture and Senior Research Scientist at the Arnold Arboretum, assisted this research during the 1970s.

On his appointment at Harvard in 1971, Barry Tomlinson chose to be located in Petersham so as to continue a long-established research association with Martin Zimmerman. He brought an international perspective to the study



**Figure 7.** The palm *Rhaps excelsa* L.S. crown (photo: P.B. Tomlinson)

of trees and other plants relating to prior experience in the tropics and subtropics. In retirement he still uses Forest facilities and has recently updated an early study of palm anatomy in collaboration with Jack B. Fisher and J.W. Horn (**Figure 7**).

**Botanical Research in an Ecological Context, 1988-Present**

As the Cabot funding era came to a close, John Torrey was instrumental in positioning Harvard Forest to become an NSF-funded Long-Term Ecological Research Site. Since then, botany has been explicitly tied to conservation (Foster et al. 2005) and ecology and engages many faculty including Richard Forman from the Graduate School of Design, Steve Wofsy from Earth and Planetary Sciences, Paul Moorcroft, Andrew Richardson and Anne Pringle from Biology. Plant population dynamics, scaling leaf-level physiology to whole-forest function, studying how plants become invasives, and documenting physiological response to climate change are all examples of botanical research in an ecological context (Foster and Aber 2004). The students of Fakhri Bazzaz conducted work in many sites including the Harvard Forest, linking plant allocation, competition, and genetic strategies, with the field of global change biology. A former post-doc, Kristina Stinson is a now plant population ecologist at the Forest, and her current studies include population-to-landscape studies of invasive plants and the mechanisms of increased ragweed pollen production in response to climate change.

Research on long-distance transport of water in trees by Missy Holbrook at the Harvard Forest informs long-term monitoring of carbon and water exchange between the forest and the atmosphere and extends the research legacy of Zimmerman. Twenty years of phenology monitoring of tree leaf-out by Dr. John O’Keefe complements a new phenology web-cam at the Forest that is part of a regional phenology network.

This year, the Harvard Forest is installing a 35-hectare Forest Dynamics Plot in which all woody stems >1cm will be censused every five years, allowing detailed understating of tree demographics in this temperate forest and

comparisons to the Center for Tropical Forest Science network of tropical and temperate plots throughout the world. In addition, David Orwig



**Figure 8.** Coring a 400-500 year-old black gum (*Nyssa sylvatica*) near the Harvard Forest (photo: D.R. Foster)

conducts detailed dendroecology research on problems including tree response to invasive pests such as the Asian Long-horned beetle and developing a better understanding of the dynamics of the pockets of old-growth forest that remain in Massachusetts (**Figure 8**).

Aaron Ellison uses the northern pitcher plant, *Sarracenia purpurea*, to study the dynamics of food webs. The inquiline foodwebs within the water-filled pitchers of *Sarracenia* are a model system for community ecology work. At the other end of the temporal spectrum, current Forest director David Foster maintains a paleoecology laboratory in which he and others investigate the assembly of vegetation communities over hundreds to thousands of years.

**A Centennial Flora**

A complete update and analysis of the vascular flora of Harvard Forest was conducted by Jerry

Jenkins, Glenn Motzkin and Kirsten Ward from 2004-2007. This is an elegant, thoughtful work that includes comparisons to previous floras and an analysis of change over the past 100 years. The work is explicitly embedded in an ecological context:

“Harvard Forest is an ecological research station, and our goal in the centennial flora project was to provide an ecological description of the flora. To us this meant that we had to both enumerate the species that were present and describe what they were doing. . . our guiding principle was that plant populations are ecologically interesting entities in a way that individual plants are not. A few stems of a rare species, seen once in one place, are an interesting botanical detail but provide little ecological information. A group of occurrence of the same species starts to have an ecological shape; a group of occurrences with a habitat and a history have a story to tell.” (Jenkins et al. 2008, p.21)

In addition to lively species accounts and an extensive discussion of the taxonomy of “badly behaved species,” the *Flora* provides an analysis of how site, land-use change, climate change and natural disturbance influenced changes over four surveys since 1911. Despite a dynamic century, the native flora has been remarkably stable. The number of alien species has increased, but they have not (yet) made many inroads into the intact second-growth forests.

## Conclusion

Investigating the lives of plants will continue as the Harvard Forest settles into its second century, and we look forward to the surprises that await discovery. Here is but one small example. The first author (a forester by training, so no crack botanist) observed purple fringed orchid in 2008, a species never-before recorded at the Harvard Forest. Glenn Motzkin identified the species as *Platanthera grandiflora*, the greater purple fringed orchid (**Figure 9**). While its congener, the lesser purple fringed orchid (*Platanthera psycodes*) was observed elsewhere on the Forest in 1933 and 1947, this species is a new addition to the flora. After even the most careful botanical survey and a century



**Figure 9.** Large purple-fringed orchid (photo: A. Barker Plotkin)

of intensive research, the woods reveal new and lovely surprises.

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**Seed Dispersal by Bats in the Neotropics.**

Lobova, Tatyana A., Cullen K. Geiselman, and Scott A. Mori. 2009. ISBN-13 978-089327-501-3, ISBN-10 0-89327-501-8 (Cloth US\$70.00) xiii + 471 pp. Memoires of the New York Botanical Garden, Vol. 101, The New York Botanical Garden Press, Bronx, New York.

Bats are important seed dispersal vectors in all tropical forests. They play a key role in tree regeneration and forest succession (Kelm et al., 2008; Melo et al., 2009). Some bat species can fly 30 to over 300 km in one night and therefore are, besides birds, the most important long-distance small seed dispersal agents (Mendes et al., 2009; Richter & Cumming, 2008). This new volume, *Seed Dispersal by Bats in the Neotropics*, is based on the original research in forests of central French Guiana. However, it is also the first synthetic treatment of frugivorous bats–plant interactions in the Neotropical region as a whole.

The volume begins with Introduction, summarizing what is known about Neotropical plant diversity, forest regeneration, bat diversity, bat–plant interactions, characteristics of bat-dispersed plants, and the effectiveness of bats as seed dispersal agents. The study area, field methods, and terminology used in the book are described in Materials and Methods. The body of the text is divided into two main parts: Bat-Dispersed Plants and Frugivorous Bats. Here the lists of known bat-dispersed plant species and their characteristics are analyzed and feeding habits of frugivorous bat species are reviewed. Following the main text, there are four appendices that include (I) a list of plant species diaspores collected from bats during the field observations and experiments in central French Guiana, (II) a list of plants with the bat species that disperse their diaspores in the Neotropics, (III) a list of frugivorous bat species along with the plants they disperse in the Neotropics, and (IV) a glossary of botanical terms used in this volume.

According to this monograph, 549 plant species, belonging to 191 genera and 62 families, have been found to be dispersed by bats in the Neotropics. However, this number is certainly very conservative because it includes only published reports and results of authors' field studies up until October 2006. More recent records are available through the online Database of Neotropical Bat-Plant Interactions ([http://www.nybg.org/botany/tlobova/mori/batsplants/database/dbase\\_frameset.html](http://www.nybg.org/botany/tlobova/mori/batsplants/database/dbase_frameset.html)). In central French Guiana, at least 15% of the native angiosperm species and 29% of those bearing fleshy fruits may rely on bats to disperse their seeds. The majority of these plants (77%) are endozoochorously dispersed and possess small diaspores (<8 mm), whereas 22% are stomatochorously dispersed species with larger seeds, stones, or pyrenes. Main plant families with bat-dispersed seeds are *Piperaceae*, *Solanaceae*, *Moraceae*, *Araceae*, *Clusiaceae*, *Cyclanthaceae*, *Melastomataceae*, *Anacardiaceae*, *Marcgraviaceae*, and *Chrysobalanaceae*. Descriptions of 112 bat-dispersed species are complemented by excellent color photographs of their fruits and seeds. Besides detailed species descriptions, the authors analyze the diverse traits of bat-dispersed plants to reexamine a phenomenon known as the "bat-fruit syndrome." Moreover, descriptions of the foraging ecology and feeding behavior of the 37 fruit-eating bat species found in central French Guiana are presented in a separate chapter. Over 350 references from the period 1910–2007 serve as additional sources of information.

The book summarizes decades of research from many parts of the Neotropics. It will definitely provide a stimulus for further ecological and evolutionary studies on bat-plant interactions. Because there aren't any publications of this kind covering the Old World tropics, I am sure that this volume will serve as a model for similar syntheses from other tropical areas.

-Marcel Rejmánek, Department of Evolution and Ecology, University of California, Davis, CA 95616

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#### Botanicals: Environmental Expressions in Art. The Alisa and Isaac M. Sutton Collection.

White, James J. and Lugene B. Bruno. 2009. ISBN 978-0-913196-83-0 (Paper US\$35.00) 133 pp. Hunt Institute for Botanical Documentation, 5th Floor, Hunt Library, Carnegie Mellon University, 4909 Frew Street, Pittsburgh, PA 15213-3890.

*Botanicals Environmental Expressions in Art The Alisa and Isaac M. Sutton Collection* presents another exhibition from the Hunt Institute for Botanical Documentation at Carnegie Mellon University, arguably the world's finest organization dedicated to botanical art and related topics. This work commemorates the exhibition of a private collection by a couple whose lives have led them from the Middle East to New York, and by extension via business travel, throughout the world. At least in part, the collection was driven, as Isaac Sutton describes succinctly in two pages, by a desire to connect to nature while living in an urban setting. The collection also clearly shows, based on the plants depicted, the connection of the collectors to both North America and the Middle East.

Overall, the most obvious features of the collection are the heightened realism and bold colors of most of the works. True, there are a few highly stylized items (e.g. pp. 20-21) and some works with more muted tones (lichens, pp. 74-75), but most works reproduced tend towards the brilliance of *Symplenia globalifera* and *Rosa*

*roxburghii* 'Plena' (pp. 90-91 and 104-105, respectively). Most of originals are watercolor on paper, but there are a noticeable fraction done on vellum. Enthusiasts of botanical art and illustration will enjoy this very attractive collection.

-Douglas Darnowski, Department of Biology, Indiana University Southeast.

**Chinese and Related North American Herbs. Phytopharmacology and Therapeutic Values. Second Edition.** Li, Thomas S.C. CRC Press Taylor & Francis Group. Boca Raton, London and New York. 705 pp.

This is a large book with large aspirations as it seeks to describe similarities and differences between medicinal species used in China and in North America. The idea of the book is challenging and it has some importance for the development of the use of plants in both alternative medicine and as a potential source for industrial product development. However, the book holds big surprises for the reader. Of its 705 pages only 4 are text pages proper, while the remainder consist of tables, literature, appendices and indices. The book is a compilation of the data on the subject published in the literature in English and presented schematically and without analysis. Although in the Foreword to the book Ernest Small, PhD, states that the book is a work of genius and a superb and invaluable synthesis, a detailed reading of the content may lead one to dispute this view from the standpoint of formal scientific evidence, botany and chemistry, and from that of existing and potential applications. Nevertheless, the book can be read in a critical spirit by botanists and other specialists.

However, the book is a result of a large research compilation effort and has a value for the beginners in the subject and as an introduction to Chinese traditional uses of herbs, and to the alternative use of medicines of herbal origin globally. These topics of applied botany are interesting and the second edition of the book testifies to present day interest in past herbal cures, especially in cases when scientific pharmaceutical achievements are unable to provide remedies for new serious diseases and other problems. The new high technology

development of medicines is also interested in working with both Eastern and Western experience of herbal medicine. Alkaloids as the products of plants and other organisms have been and continue to be a basis for development of new synthetic medicines. The potential use of virus-lines in the treatment of brain cancer is a good example of the development of high-tech medicine utilizing natural mechanisms. As plant species are distributed around the world so also has been their use. Therefore, traditional Chinese medicine can be not analyzed without taking into account both global and local aspects.

The best and most value parts of the content in the book are the names of plants in three languages (Latin and common names in Chinese and English) and the lists of the major constituents of plants taken from the literature (p. 4 - 173). However, on the same pages the "therapeutic values" are not sourced from the literature and are very general. The annotation that this information should not be used for diagnostic purposes adds to the vagueness of these values. Moreover, close reading of the book yields both useful material and also some confusions. For example, on page 79 it is mentioned in the case of *Hyoscyamus bohemicus* that major constituents in the root are "alkaloid, hyoscyamine, hyoscine, scopolamine... ". Alkaloid is only the name of group of compounds and hyoscyamine as well as hyoscine or scopolamine are simply alkaloids. On pages 175-304 the author compares the major constituents of plants in China and similar species in North America. As the information is drawn from different sources, the comparison of the constituents is controversial and imprecise and at odds with the scientific methodology. The literature cited covers 621 items, which represents only a very small part of the literature published in the year 2000 or later. The rest of the book contains repetitions put in the form of appendices and indices. *Summa summarum*: an interesting and useful book of a general and thesaurus-like character with some controversial aspects. It should therefore be read carefully and critically as risk regarding its content is laid at the door of the reader.

Prof. Dr. Tadeusz Aniszewski  
University of Eastern Finland

**The Fruit Hunters: A Story of Nature, Adventure, Commerce and Obsession.**

Gollner, Adam Leith. 2008. ISBN 978-0-7432-9694-6 (Cloth US\$25.00) 279 pp. Scribner, 1230 Avenue of the Americas, New York, NY 10020.

The Fruit Hunters by Adam Leith Gollner is a tremendously disappointing work. It's title brings to mind the exotic fruits and fruit tastings which can make teaching botany so much fun. And it does successfully aim to present lots of information on exotic fruits. However, there are quite a few major problems.

Gollner does do a good job of describing many fruits not commonly eaten in North America (the author is Canadian), and he discusses the ethnobotany of fruit at some length. He also touches on topics like illegal importation of rare fruits and rare cultivars of commoner fruits, the history of miracle berry, and fruitarians (those who only eat fruit). He extolls the need to preserve rare and exotic species and to broaden the taxonomic base of our diets. All good.

He misses some obvious organizations to be brought up in such a work. Although he provides a whole chapter on the Rare Fruit Council International, based in Florida, the other large, active amateur society in North America which is dedicated to underutilized fruits, the California Rare Fruit Growers, flies under Gollner's radar.

And then there is his seeming obsession with sex. OK, fruit is a product of botanical sex, we get it. Linnaeus wasn't a poster boy for charity, check. But does the author need to inject sex over, and over, and over. A lengthy and detailed description of how the coco-de-mer's fruit and flowers resemble human genitalia and erogenous zones in various stages of sexual activity is one of the less offensive examples.

There are a wide range of books and other works on exotic fruit which are better written and suitable for any age of reader (see the websites of the California Rare Fruit Growers and the Rare Fruit Council International for examples and recommendations).

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**Seed to Elegance: Kentia Palms of Norfolk Island, South Pacific.** Williams, Kevin. 2008. ISBN 978-0-9775121-1-9 (Paper US\$24.95) 72 pp. Studio Monarch Books, PO Box 534, Norfolk Island 2899, South Pacific.

In *Seed to Elegance: Kentia Palms of Norfolk Island, South Pacific* by Kevin Williams, we are treated to a brief history of the economic importance and commercial industry of kentia palms. The "queen of palms" is given a glowing historical account spanning several centuries. With its dozens of photographs and easy-to-read print, *Seed to Elegance* offers its readers a jumping off place into the realm of kentia palms.

Although being reviewed for *Plant Science Bulletin*, this book offers little of the lifecycle, habits, and growing patterns of kentia palms in the wild or commercial production. In over 60 pages of text, the botanical name *Howea fosteriana* is not mentioned once. If one were looking for a detailed botanical account of *H. fosteriana*, this would not be the place.

On the other hand, *Seed to Elegance* provides an enriching and lively account of the settlement of Norfolk Island in the South Pacific. From its initial discovery by Captain James Cook to penal colonies to the booming kentia seed and seedling export industry, this book takes the reader on a fascinating journey. From island native to aristocratic décor, kentias have secured their place in modern horticulture.

*Seed to Elegance* is a great read for anyone wishing to purchase a kentia for their home or office. The compelling text and glossy photos make the book accessible to anyone looking for an introduction into the world of kentia palms. Unfortunately, the book's claim that it "explains all" is a far cry from the truth, leaving the reviewer feeling as though he had just read an oversized sales pamphlet about kentias.

-Tony Bedell, 606 Alpine Ave, Boulder, CO 80304

**Principles and Practices of Plant Genomics, Volume 2: Molecular Breeding.** Kole, Chittaranjan and Albert G. Abbott, Eds. 2008. ISBN 978-1-578-08537-8 (Hardcover US\$129.95) 502 pp. Science Publishers, Inc., 234 May Street, Post Office Box 699, Enfield, New Hampshire 03748.

Genomics is a rapidly expanding set of methodologies for the study of organismal function, evolution, and even ecology based on the information contained in a plant's full complement of genetic material. Chittaranjan and Abbott have compiled a three-volume series devoted to the topic of plant genomics which is divided approximately according to the history of the technological developments in the field. The first volume is devoted to genome mapping, the second volume focuses on molecular breeding, and the third describes advanced genomics technologies, overall promising thorough coverage of the field as a whole.

In reviewing Volume 2 of this series, I closely read six of the thirteen chapters and skimmed the remaining seven to get a feel for the scope of the material covered. The organization of the volume broadly encompasses a set of chapters on molecular breeding based on the biological goals of breeding, a second set dealing with the opportunities and challenges of molecular breeding in particular types of plants, and a third set of chapters that were not easily categorized. This organization had a tendency to generate redundancies in the material covered in the book as a whole, but has the advantage of offering chapters focused on specific needs. As a result, most people using this book would probably only need to read one or two chapters to get a good feel for the approaches and current status of molecular breeding as they pertain to a specific crop or type of stress.

The introductory chapter outlines the complexity of the field of molecular breeding. As a doctoral student who is involved with some of the newer genomics technologies such as the use of microarrays for candidate gene discovery, I was interested to learn about the strong foundation upon which my area of research has been built. Nonetheless, even with my background I felt that access to the first volume

of the series would have helped me out in understanding some of the specific procedural details of how, for example, molecular markers are designed. In other words, Volume 2 may not stand well on its own for someone unfamiliar with the basics of molecular breeding.

The next six chapters each discuss different possible goals for the use of molecular marker use and/or molecular breeding, ranging from germplasm conservation to improving abiotic and biotic stress resistance. These chapters lean toward the "applied science" end of the research spectrum; for example, the chapter on biotic stress resistance has a strong focus on practical considerations necessary for marker-assisted selection studies conducted in an industrial context. I enjoyed getting a rare glimpse into the corporate ag-biotech mindset, and would recommend that students of molecular breeding who have not worked outside of academia read this chapter if they are considering working in industry.

The following four chapters focus on molecular mapping and breeding in fruit trees, forest trees, polyploids, and forage and turf plants, respectively. Since I am involved in research on forest trees, I closely read the chapter devoted to this set of plants. It approached the topic quite comprehensively, outlining the difficulties of molecular mapping and breeding in forest trees and then discussing the innovative ways in which such difficulties have been turned into advantages by creative researchers. Although the other three chapters are not nearly as thorough, they are still similar in that a major focus is given to the innovations that have been necessary for breeding these trickier crops which, due in part to their biological peculiarities, have been somewhat left on the margins of molecular research.

The last two chapters of the volume are not so easily categorized, but they are critical to the main thrust of the volume, focusing on the use of transgenics for genetic improvement and on intellectual property rights. The former chapter gives an overview on what technologies are available to generate transgenics, how they are used, and also briefly discusses transgenic risk assessment, a growing area of research unto itself. The final chapter on intellectual property rights provides a critical resource on a

topic that needs to be addressed more often in academia, although I had hoped for more depth than what the chapter provided.

Overall, this volume would make a useful addition to any research university's library. I personally would be somewhat tempted to wait and see if a second edition is to be released prior to purchasing this volume; the material in some chapters is unfortunately marred by proofreading and/or copyediting errors. The organization of the book limits its usefulness for any one student or researcher, but as a whole it covers the field from a number of perspectives, allowing it to benefit students and faculty working with a variety of different crop plants and having a range of breeding objectives. Held in a university library along with the other two volumes, it could provide a valuable resource for a wide range of researchers seeking to learn the basic challenges and current status of molecular breeding in a particular applied context.

-Lindsey K. Tuominen, Warnell School of Forestry & Natural Resources, The University of Georgia, Athens, GA 30602



**Biodiversity and Ecology of Lichens.** Aptroot, A., M. R. D. Seaward & L. B. Sparrius (eds). *Liber Amicorum Harrie Sipman Bibliotheca Lichenologica*, vol. 99 (2009). 439 pp. J. Cramer / Gebrüder Borntraeger, Berlin.

This recent collected volume in the *Bibliotheca Lichenologica* series includes twenty-nine miscellaneous contributions mainly in the systematics, taxonomy and floristics of lichen fungi (and lichenicolous fungi). The collection has been assembled as a *Festschrift* dedicated to the Dutch lichenologist H. J. M. "Harrie" Sipman on the occasion of his 64th birthday and final year before retirement from his scientific position in Berlin. The first editor, André Aptroot, is also author or co-author of eight of the 29 included papers. He leads off the volume with a lively, illustrated account of

Harrie Sipman's career and scientific adventures. However, the name of the institution where Dr. Sipman has spent so many productive years and the title of his position are nowhere stated, an odd and unfortunate omission in the career sketch. A chronologically arranged bibliography of Sipman's scientific work — 174 publications — is supplied (also by Aptroot) at the volume's end. A list of taxa he has described — nine genera and 213 species — is also appended.

The most substantial contribution in the collection (by Aptroot, Thor, Lücking, Elix and Chaves) segregates from the genus *Cryptothecia* a number of taxa under the resurrected name *Herpothallon*. Seventeen new species are described; a key is provided, along with detailed character descriptions and small but excellent color photos of the 29 taxa encompassed. The reinstated genus incorporates the well-known red-and-green corticolous crust (dubbed "Christmas lichen" in Brodo, Sharnoff & Sharnoff) now referred to as *Herpothallon rubrocinctum*.

Other biosystematic contributions deal with new species of *Cladonia* from the Azores (Ahti & Aptroot) and from Iceland (Kristinsson & Ahti), the genus *Bacidia* in the Canary Islands and western Europe (Brand, Coppins, van den Boom & Sérusiaux), a synopsis of *Placopyrenium* (Breuss), lichenicolous *Sphaerellothecium* and *Zwackhiomyces* (Diederich & Zhurbenko), new *Xanthoparmelia* from Tasmania (Elix & Kantvilas), *Chapsa* from Brazil (Frisch & Kalb) including new species with vegetative propagules, cryptothalline species of *Lecidea* (Hertel), new *Caloplaca* from Australia (Kondratyuk, Kärnefelt, Elix & Thell), a new *Micarea* from the West Indies (Sérusiaux & Coppins), a new genus in the Arthoniaceae (*Synarthothelium* Sparrius), the systematic position of *Schistophoron* (Tehler, Baloch, Tibell & Wedin), and *Xanthoparmelia lineola* and related taxa (Thell, Elix & Söchting). Lumbsch, Lücking & Tibell contribute a molecular study of *Tylophoron*, a mazaedioid genus formerly included in the polyphyletic Caliciales, providing evidence that these lichen fungi belong in the Arthoniaceae/Arthoniales.

More floristically-oriented contributions in this volume consider lichenized and lichenicolous

fungi from Montenegro (Bilovitz, Knežević, Stešević & Mayrhofer), pyrenocarpous lichens of Japan (Kashiwadani, Aptroot & Moon) and Korea (Moon & Aptroot), the genera *Cryptothecia* and *Stirtonia* from Thailand (Wolseley & Aptroot), a lichen community from the Namib with a new species of *Buellia* (Wirth & Bungartz), various taxa from southern Africa (Schulz, Zedda & Rambold) and the Asia-Pacific region (Kalb, Archer, Sutjaritturakan & Boonpragob), and offer a lichen checklist for the Seychelles (Seaward & Aptroot). A contribution by Högnabba, Stenroos, Thell & Myllys analyzes molecular sequences in ascomycete fungi to reconstruct evolutionary gains and losses of symbioses with cyanobacteria. Changes in the epiphytic lichen vegetation monitored in the Netherlands over nine years are attributed to climate change and nitrogen pollution (van Herk). And seemingly misplaced in this collection is an annotated checklist of Galápagos liverworts and hornworts (by S. R. Gradstein) that one hopes will somehow manage to find its public, or vice-versa. A total of nine new taxa described in this volume are named in honor of Dr. Sipman.

As with many of the *Festschriften* in the Bibliotheca Lichenologica series, this paperback volume, with its scattered themes and hefty cover price (89 euros; about US \$130), will not necessarily find a place in every lichen biologist's library. Those with less than unlimited funds to spend on bibliography will want to first peruse this collection and carefully weigh the relevance of the individual contributions to their own interests.

- William B. Sanders, Florida Gulf Coast University, Ft. Myers, FL.



**Lichen Biology, 2<sup>nd</sup> ed.** Nash, Thomas H. III (ed). 2008. ISBN 978-0-521-69216-8 (Paper US\$70.00) 486 pp. Cambridge University Press, 32 Avenue of the Americas, New York, NY 10013.

Lichen Biology, Second Edition, edited by Thomas H. Nash III, provides a wonderfully complete picture of these wonderful hybrid organisms, from their development and physiology to their important ecological roles. The various authors present a range of chapters starting with separate chapters on the photosynthetic and fungal components of the world's lichens, including data on the symbionts grown in isolation from their symbiotic partners. These chapters, like the others in Lichen Biology, are very clearly written in a style that even undergraduates should be able to follow. Also, these chapters as well as the rest of the book are excellently illustrated with a range of black-and-white photographs, diagrams, and tables.

Topics covered by other chapters include basic body plans of crustose, foliose, and fruticose lichens, lichen morphogenesis, and various aspects of their response to the harsh stresses they often face in their native habitats. Lichens in various ecosystems are considered, with an entire chapter devoted to their response to air pollution.

Lichen Biology finishes with chapters on their biogeography and systematics, and an excellent Appendix on culture methods for both lichens and their isolated components. The almost-100 pages of literature references should be a great help to users of this volume. The main improvement which could be made would be the addition of color photographs in future editions, especially given the vibrant colors of some lichens.

This book belongs in all college and university libraries as well as the shelves of those teaching advanced courses in plant biology that in any way touch on topics important to lichens (e.g. stress physiology). Parts of Lichen Biology could even be used with introductory students since it provides a look at an extreme group of organisms, extreme groups being so useful for peaking the interest of students.

-Douglas Darnowski, Department of Biology, Indiana University Southeast, New Albany, IN 47150.

**Araucariaceae: Proceedings of the 2002 Araucariaceae Symposium (*Araucaria*, *Agathis*, *Wollemia*).** Wilcox, M.D. and R.L. Beleski (eds). 2009. ISBN 978-0-473-15226-0 (NZ\$223) 546 pp. Published by The International Dendrology Society, through Touchwood Books, P.O. Box 610, Hastings, New Zealand. (<http://touchwoodbooks.co.nz>)

In 2002 The International Dendrology Society convened a symposium on the conifer family Araucariaceae in Auckland, New Zealand, with field trips before in New Zealand and after in New Caledonia, the centre of diversity for *Araucaria*. The meetings were attended by well over 100 people, the field trips by fewer but no less enthusiastic participants. The stimulus for this meeting, in part, was the recent discovery in New South Wales of a new genus in the family, *Wollemia*, which had received global attention through masterly Australian publicity. The Proceedings now exist in published format and attention should be drawn to them because they contain a wealth of information about the Araucariaceae, perhaps an unfamiliar group of conifers to botanists in the northern hemisphere.

This family, together with the Podocarpaceae, constitutes the bulk of the “southern conifers” in the tropics and at southern latitudes. Sadly, despite their frequent common names, none are actually true pines! This tropical and subtropical distribution is inevitable in the absence of large land masses at high latitudes in the southern hemisphere, although the family is well represented as fossils in Antarctica. This imbalance needs to be emphasized in relation to a common misconception that conifers (Coniferales) form an exception to what has been referred to as “Wallace’s Rule” (i.e., that cosmopolitan families show increasing number of species at progressively lower latitudes). This assumed exception is incorrect, but seems to result from some vague perception that conifers are particularly abundant in northern forests. Looking south, there are 43 species of *Pinus* in Mexico. On a broad global basis, conifers are rather uniformly distributed albeit with local concentrations, as one might expect from an ancient and successful group, alas, so over-exploited to the extent that 70% of all conifer species are under threat. So the broad

and detailed treatment of the Araucariaceae provided in this book is welcome.

Furthermore members of the Araucariaceae provide good examples of plants that can be referred to in an oxymoronic way as “living fossils.” *Araucaria* is the oldest identifiable existing seed plant, recognized as far back as mid-Jurassic and thus co-existent with dinosaurs. If that is not something to marvel at, the trees are regularly described as “majestic” because of their height and girth—easily 80 m and 15 m, respectively. Because they have no basal buttresses, a familiar measure is how many pairs of linked arms does it take to encircle the trunk—5-men trees are (or were!) quite common. They also have a distinctive crown physiognomy of which that of the familiarly cultivated *Araucaria heterophylla* and *A. columnaris* is but one example.

The book serves as a complete overview of botanical, ecological, biogeographical, historical, conservation biological, and anthropological information. It includes nine sections: the introductory ones range over botanically familiar topics such as fossil history, morphology, architecture, systematics, reproductive biology and propagation, with a large contribution from foresters on silviculture, dendrology and amenity use. Systematics is not stationary, with the suggestion that the segregate genus *Eutassa* in *Araucaria* should be reinstated.

The later sections deal with members of the family on a regional basis with a strong emphasis on conservation efforts in each region, as far apart as Vanuatu, Queensland, and South America. An account of the use of *Araucaria* seeds as human food provides interesting cultural parallels between Australian aborigines and two unconnected indigenous groups in Brazil and Chile, respectively. Regrettably, some papers are presented as abstracts only. It would have been useful to have learned more about the primitive weevils exclusively associated with pollen cones of *Araucaria* or *Araucaria* species cultivated in New Zealand and the United Kingdom. But the book is valuable alone for the very extensive bibliography that can be assembled from the great diversity of individual papers. The editors are to be congratulated on the successful

publication of a book prepared under difficult circumstances. Botanists should be encouraged to savor this publication. It might be a stimulus to take a rest from DNA, *Arabidopsis* and cladograms; go south, and admire these, “the most magnificent of all trees.”



-P. Barry Tomlinson, The Kampong of The National Tropical Botanical Garden, 4013 Douglas Road, Miami FL 33133 and Harvard Forest, 324 N. Main St., Petersham, MA 01366

**Flora de Nicaragua, Tomo IV, Helechos.** Luis Diego Gómez y Alba L. Arbeláez 2009. ISBN 978-1-930723-87-0 (hardcover, US\$109.00). 348 + xvii pp., Missouri Botanical Garden Press, St. Louis.

This fourth and concluding volume of the Flora of Nicaragua covers the ferns and so-called fern allies. It treats, in alphabetical order, 102 genera and 551 species known from the country. Twelve additional genera and 82 species are also given full treatment, and are included in the keys, with the expectation that at least some of these will eventually be found in Nicaragua. Information about each species includes the accepted name, citation of publication, basionym, common synonyms, description, habitat, representative specimens, range, an endangerment code, original line drawings in 151 full-page plates, and a dot distribution map. Keys to species, but not to families or genera, are provided. All species seem to be native; only *Nephrolepis cordifolia*, *N. hirsuta*, *Thelipteris dentata*, and *T. opulenta* are probably introduced from the Old World tropics.

Comparison with two other Central American states – Guatemala and Panama - puts the fern species richness of Nicaragua into a broader context (Correa et al.2004, Stolze 1983).

	Area (km <sup>2</sup> )	Max. elev. (m)	Primary forests (%)	Number of fern species
Guatemala	108,889	4,220	18.0	652
Nicaragua	127,849	2,438	15.2	551 (633)
Panama	75,517	3,475	40.6	938

Nicaragua is the largest of these three countries. However, it has the smallest elevational range and small area of primary forests; these factors seem to be responsible for its rather moderate number of fern species. Lower density of plant collections, however, could be another factor.

The last volume of the *Flora de Nicaragua* fills an important gap in our knowledge of Neotropical floras. It will be an irreplaceable source of information for all botanists working in Central America.

– Marcel Rejmánek, Department of Evolution and Ecology, University of California, Davis, CA 95616.

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Stolze, R.G. 1983. Ferns and fern allies of Guatemala. Part III. Fieldiana, Botany, N.S. 12: 1-91.

**A Flora of the Liverworts and Hornworts of New Zealand. Volume 1.** Engle, John L.I and David Glenny. 2008. ISBN 978-1-930723-67-2 (hardcover, US\$105.00 ). 897 pp. Missouri Botanical Garden Press.

Bryologists and bryophyte-enthusiasts alike have been long awaiting the arrival of this first volume in a series of three, which is a floristic treatment dedicated to the liverwort and hornwort flora of New Zealand. The last publication to focus on New Zealand liverworts was published in 1975 by K. W. Allison and John Child [1]. That work included keys and descriptions for only the most commonly occurring species. The hornworts have never been the subject of a comprehensive floristic treatment in New Zealand. Thus, these 'lowly' plants are finally getting the attention they deserve. Just over 600 species (595 species of liverworts and 13 species of hornworts) occur on the main North and South Islands and nearby islands (e.g., Stewart Island, Chatham Islands, and sub-Antarctic Islands), with nearly 50% of the liverwort species being endemic to the region. Of the non-endemic species, 284 species are found in New Zealand and Australia, with the majority shared between New Zealand and Tasmania.

The present work begins with a comprehensive introduction to New Zealand botanical history, biogeography, phylogeography, geology, and ecology with an emphasis on the liverwort and hornwort flora. I found this mini-review quite useful and interesting. A section on endophytic fungi found in the liverworts was contributed by Jeffrey Duckett and Roberto Ligrone, with fascinating transmission electron micrographs showing fungal associations in some of the species. A useful section on the types of oil bodies found in the liverworts is provided with detailed text descriptions, as well as drawings of each type. Oil bodies are unique to liverworts and their morphologies are taxonomically informative in some groups (although some families have lost oil bodies secondarily [2]). Although bryologists traditionally use the terms dioicous or monoicous for gametophytes with separate sexes, Engel and Glenny instead use dioecious or monoecious (as seed plant biologists do) for the liverwort descriptions. I would have liked to have seen a little discussion on this point included in the Introduction.

Amateurs and non-specialists would benefit from the inclusion of simple comparative line drawings of the most common leaf forms and arrangements.

Volume 1 includes descriptions of 211 leafy liverwort species (many of them new) in the orders Calobryales and the Jungermanniales, the latter of which is the largest group of liverworts. Subsequent volumes will cover the remaining leafy liverworts (Volume 2), and the thallose liverworts and the hornworts (Volume 3). An artificial key to genera in the Jungermanniales is included, with additional keys to species (and varieties) provided for each genus. A key to all of the orders of liverworts (including ones not covered in the present volume) would have been helpful, and I hope the authors will consider including such a key in the next volume. The taxonomic classification followed is traditional (i.e., morphologically-based) and the authors choose not to follow recent changes to the classification of liverworts and hornworts based on molecular phylogenetics. Perhaps in the forthcoming volumes, the authors could outline how their classification scheme differs from that of their colleagues [e.g., 3]. Nevertheless, detailed descriptions, including full synonymy and type information, are given for each species with 172 of them illustrated in black and white. Color plates span 16 pages and illustrate 47 genera, highlighting reproductive or interesting vegetative features.

A glossary is provided, which is particularly useful for a non-specialist (I happily found a definition for paroeicous). The Appendix includes a list of species (and family to which each belongs) mentioned in the volume, although I would have liked to have had a cross-reference back to the text [i.e., page number(s)]. A list of 'Liverworts not treated in this volume' is also given in the Appendix; these taxa will be included in subsequent volumes, although it would be nice to know which of the two volumes. The listing of lichens at the end of the Appendix is probably useful, but again a cross-reference to the text would be appreciated by the reader.

In short, I can highly recommend this first volume in the series. The writing is easily accessible for non-specialists, but bryologists will be happy to find thorough descriptions for the species.

Although the hefty volume (weighing in at ~4 pounds) is not meant as a field guide, this is a must-have reference for those working on or interested in bryophytes and/or the New Zealand flora. I will be eagerly awaiting the next volume.

—Jennifer Tate, Massey University, Palmerston North, New Zealand

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**Genera Orchidacearum. Volume 5. Epidendroideae (Part 2).** Pridgeon, Alec M., Phillip J. Cribb, Mark W. Chase, and Finn N. Rasmussen, editors. ISBN 978-0-19-850713-0 (Cloth US\$195.00) xxi+585 pp. Oxford University Press, New York.

This volume is the fifth in a projected six-volume series on genera of the orchid family. It is the work of 29 contributors, each an expert in the taxon under study, and edited by four prominent orchidologists. Organization of the taxa is alphabetical by tribe, subtribe, and genus. Genera are numbered consecutively throughout the five volumes and on the endpapers of the current volume. Tribe Cymbidieae, the subject of volume 5, consists of 11, mostly American, subtribes and 186 genera.

All taxa are thoroughly discussed with an extensive chronological review of nomenclatural taxonomy, description of the component plants and their geographical distribution, phylogenetics, taxonomic notes, and associated literature references followed by an artificial key to the subtribes.

Subtribal nomenclature is outlined with relevant literature followed by generic descriptions of the plants, their geographical distribution, and phylogenetics of the subtribe. A taxonomic

bibliography and artificial key to the genera follow. Each genus is illustrated by detailed line drawings of one or more species. Genera, beginning with *Catasetum*, are discussed taxonomically with synonyms and pertinent literature listed chronologically. Origins of generic names appear followed by morphological descriptions of the component plants and their geographical distributions. Large genera, as *Catasetum*, may be treated by an infrageneric analysis. An artificial key normally follows, including the infrageneric treatment if there is one. The body of each generic treatment has sections on seed morphology, vegetative anatomy, palynology, cytogenetics, phytochemistry, phylogenetics, ecology, pollination, uses, cultivation, and taxonomic notes. Each section has citations of relevant literature. Contributors always state where data are lacking for certain categories. The bulk of volume 5 consists of the generic treatments introduced by a preface, acknowledgements, and a table of contents in which all genera are listed with page numbers. Contributors and their professional affiliations appear followed by a species listing of the colored plates. A glossary of terms not already included in volumes 1, 3, and 4 is provided in the end matter. All references cited in the text come next. There are two fascicles of colored plates illustrating 225 species of orchids described in the text. Special to volume 5 is an addendum of nomenclatural changes in subtribe *Laeliinae* from volume 4, prompted by recent DNA analyses. The volume concludes with a paginated subject index.

Volume 5 of *Genera Orchidacearum* is a splendid work reflecting all known information on the systematics of 186 genera of orchids. It mirrors the combined expertise of the contributors and the careful, thoughtful editing of Alec M. Pridgeon, Phillip J. Cribb, Mark W. Chase, and Finn N. Rasmussen. The colored pictures, obviously carefully selected, represent the best in color photography. Volume 5 will justifiably join its predecessors in the generic study of *Orchidaceae* and find its place among the classic publications in this unique family of plants.

—William Louis Stern, Biscayne Bay Campus, Florida International University, North Miami, FL 33181

**The Vegetation of Egypt.** Zahran, M.A., Willis, A.J. 2009. 2<sup>nd</sup> edition. ISBN 978-1-4020-8755-4 (Cloth US\$279.00) 440 pp. Springer, 233 Spring Street, New York, NY 10013.

'Egypt: the Gift of the Nile', that statement attributed to the ancient Greek historian Herodotus, is an appropriate title for the opening chapter of this book, since the Nile's gift is a few centimeters of black loam - fertile in nutrients and minerals - replenished annually, when the flood waters recede. It is likely that without this renewable source of natural fertilization and flood plain irrigation, Egypt's agrarian culture would have ceded to salinity, making the land nonviable for continued agricultural production, as was the case in Mesopotamia.

In his retirement, British ecologist A.J. Willis collaborated with Emeritus Professor Mahmoud Zahran, of Mansoura University, near Alexandria, Egypt, to produce a landmark volume on the vegetation of arid and Mediterranean type regions, *The Vegetation of Egypt* (1992). Their second joint venture, *Plant Life in the River Nile in Egypt*, appeared in 2003 and a third volume, on the flora of the Red Sea region, was in preparation at the time of Willis' death. This is the second edition of their pioneering work, *The Vegetation of Egypt* that brought this disparate information together. Promotions for this edition indicate updates in the text and references, and the addition of two new topics: remote sensing for mapping Egypt's vegetation, and a review of the economic potential of some major desert species.

Zahran and Willis divided Egypt into four major eco-geographical geographical regions - the Western Desert, Eastern Desert, Sinai Peninsula and the Nile Region - are included among their review of vegetation of arid and Mediterranean-type regions. Within each of these areas, relevant information about geology, physiography, climate and land-use history is considered, before tackling the vegetation itself, and this greatly enhances the value of the work for general readers or travelers interested in botany and ecology.

Previously, Vivi Täckholm had pointed out in her *Student's Flora of Egypt* (1974: iii) that "Egypt occupies a key position between the

Asiatic and African continents, and its floristic composition shows affinities in all directions". Egypt's flora is unexpectedly varied and lush for a country which has such a large area of desert. Plant life includes desert species such as succulents, aquatic species such as reeds, lotus flowers and papyrus, and a range of trees. The second chapter concisely reviews Egypt's physical geography: geological characteristics, geographical characteristics, climate, and soil-vegetation relationships. As expected, vegetation in Egypt varies according to the different eco-regions found in the country.

Each chapter is devoted to the vegetation of Egypt's distinctive geographic regions with superb detail [1] The Western Desert: General features; Western Mediterranean coastal belt; Oases and depressions; Gebel Uweinat; the Gilf Kebir. The Western Desert is a harsh environment for plant growth. Most of the Western Desert is devoid of plant life, but in areas where there is a bit of water, desert perennials and grasses may occur. The hot summers (sometimes above 50°C) and the extreme daily temperature fluctuations in winter (from above 30°C in the day to below zero at night) contribute to this. Of course, rainwater is extremely rare. Heavy downpours may occur rarely, once in decades. Nevertheless, when they do occur, the rainwater quickly penetrates the permeable sand to a depth beyond the root zone. Seeds of only few plants succeed in germinating under such conditions. Excluding its northern Mediterranean fringe, Western Desert is the poorest regions in the country in terms of plant diversity. [2] The Eastern Desert: Geology and geomorphology; Ecological characteristics. The Eastern Desert has very little rainfall, but it holds varied vegetation that includes tamarisk, *Acacia*, and thorny shrubs, small succulents and aromatic herbs. A section about Invasive Weeds reports that the rapidly intensified development of the Red Sea coast for tourism during the last two decades introduced 31 new species. [3] The Sinai Peninsula: Geomorphology; Climate; Water resources; Vegetation. The coastal strip has a rich plant life in the Spring, including reeds, marsh vegetation and other aquatics. [4] The Nile region: Geomorphology; Climate; Vegetation. The Nile supports many varieties of water plants, including lotus, more than 100 kinds of grasses, including bamboo and

esparto, reeds and palms.

The next chapter, History of the Vegetation: its Salient Features and Future Study, introduces an outstandingly noteworthy subject. It opens with three challenging questions: what did the vegetation of Egypt look like in the past, to what extent was it similar to the present, and what changes occurred during which intervals? The chapter provides overly-general, weak answers. It does not offer a comprehensive sketch of Egyptian environmental history nor of the climatic and human factors that would account for the changes. While it offers some pollen data to reconstruct the past, I am astonished to discover that comprehensive works such as the wide-ranging contribution by Cappers (2006) is missing from the significant section headed: Information on the History of Agricultural Activities and of the Vegetation from Archaeological Sites.

The first new chapter in this revised edition: Remote Sensing and Vegetation Map of Egypt, is a supplement to this compendium co-authored by M.A. Zahran with B.B Salem and G.L. Anderson. Case studies of vegetation changes measure population dynamics with remote sensing. The book ends with Sustainable Development of Egypt's Deserts, a new, somewhat rambling concluding chapter that profiles some economically useful species, and seems to be a catch-all for work that did not appear previously.

The stated purpose of the original volume, Vegetation of Egypt was to compile and integrate the information documented by many botanists about that country. Middle East geographer Hobbs wrote (1994): "Zahran and Willis achieved this goal in an excellent synthesis based on an exhaustive survey of the literature on Egyptian flora.... Most of the cited sources are works of two generations of energetic Egyptian plant ecologists, including A.M. Migahid, A.H. Montasir, M. Hassib, T.M. Tadros, M. Kassas, M.N. El-Hadidi, and L. Boulou." They built on a foundation of general surveys by 19<sup>th</sup> c explorers including G.A. Schweinfurth and G. Volkens. The regional classification is sensible: the Western Desert is divided into the Mediterranean coast, inland oases and depressions, and Jebel Uweinat; the Eastern Desert, into the Red Sea coastal

land and the inland desert; the Sinai, into the Mediterranean and the coasts of the gulfs of Aqaba and Suez, and the inland deserts and mountains; and the Nile region, into the Nile valley and delta, the northern lakes, and the Mediterranean coast of the delta. Discussion of vegetation types refer to dominant and associated species and characterize communities by dominants or co-dominants.

The book is especially advantageous because it gives ample attention to deserts and the most remote and unique natural areas, Jebel Uweinat and Jebel Elba, with moderate attention to the Nile Valley and delta, contained in the last district chapter. Hobbs pointed out (1994) that "The main weakness in presenting the desert areas is the disproportionate emphasis given to lowlands that are most easily accessible by motor vehicle. Some of the most extraordinary plants grow at high elevations that are accessible only by difficult climbs. Zahran and Willis cite only botanical literature, which traditionally has not covered these remote places, and they overlook other sources that include botanical information on these locales." These suggestions and references were not incorporated.

Zahran and Willis addressed Egyptian flora in terms that matter to geographers (Hobbs 1994). They emphasize that Egypt is at a continental crossroads, enriched by species from the Mediterranean, Saharo-Sindian, Central Asiatic, and Sudano-Deccanian floral provinces. Biotic exchanges during glacial and interglacial periods further complicated the vegetation and added numerous endemic species, especially on the Sinai Peninsula. There are aspects of reporting that appear to be uneven, e.g., "Coverage of the Western Desert includes a discussion of historical relationships in which there is a brief sketch of ancient Egyptian and subsequent occupation. This information is not related to vegetation change, and has no equivalent in the coverage of the Eastern Desert and the Sinai, which have long histories of human occupation" (Hobbs 1994). This objection was not improved.

Thirty three pages of black-and-white photographs of plants in their habitats are valuable, revealing the overall appearance of plant communities, but a few of these are in

poor focus and in a revision of this magnitude, perhaps several new photographs should have been assembled. A review of the first edition (Hobbs 1994) critiqued the coverage by maps as inconsistent: "there are two regional maps of the Sinai, but none of the Eastern Desert or the Western Desert. The lack of maps of floral regions is unfortunate, because cartographical generalizations would complement the emphasis on soil-vegetation relationships in the text." That valid criticism was ignored, when preparing the revised edition. There is no doubt that the 18-page list of references is outstanding, a beneficial resource in itself. Hobbs (1994) commented that "Separate and very thorough indexes of species and subjects make the book easy to use as a reference" however, although this edition closes with a list of species, this revised edition lacks completely any subject index, that would certainly have aided users of the volume. This reviewer concurs with Hobbs (1994), that "An index of common Arabic names would have made the book a more useful research tool."

The Vegetation of Egypt is suggested to anyone studying the ecology and geography of plant life in Egypt, as well to those interested in the environment of the Middle East and North Africa. It is a useful reference work for studies of the vegetation of arid lands; it can provide an essential reference to advanced students and professionals in plant science, ecology, biogeography, climatology and remote sensing. The authors had obviously done extensive field work and were extremely familiar with Egypt's botanical diversity. This book can be a helpful foundation for development of a national conservation policy.

-Dorothea Bedigian, Research Associate, Missouri Botanical Garden, St. Louis

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## Books Received

If you would like to review a book or books for PSB, contact the Editor, stating the book of interest and the date by which it would be reviewed (15 January, 15 April, 15 July or 15 October). E-mail [psb@botany.org](mailto:psb@botany.org), call, or write as soon as you notice the book of interest in this list because they go quickly! **Note that books in green are already in review and no longer available.** Books received are now posted on the web site as they become available and may be requested as soon as they are posted.

- Editor

**The Art of Plant Evolution.** Kress, W. John and Shirley Sherwood. 2010. ISBN 978-1-84246-417-5 (Paper US\$41.00). 320 pp. Royal Botanic Gardens, Kew, distributed by The University of Chicago Press, 1427 E. 60<sup>th</sup> Street, Chicago, Illinois 60637.

**Baboquivarie Mountain Plants: Identification, Ecology, and Ethnobotany.** Austin, Daniel F. 2010. ISBN 978-0-8165-2837-0 (Cloth US\$79.97) 352 pp. The University of Arizona Press, 355 S. Euclid Avenue, Suite 103, Tucson, AZ 85719.

**Floral Diagrams: An Aid to Understanding Flower Morphology and Evolution.** Ronse de Craene, Louis P. 2010. ISBN 978-0-521-72945-1 (Paper US\$60.00) 441 pp. Cambridge University Press, 32 Avenue of the Americas, New York, NY 10013.

**Globalization and Agricultural Landscapes: Change Patterns and Policy Trends in Developed Countries.** 2010. ISBN 978-0-521-73666-4. (Paper US\$59.00) 275 pp. Cambridge University Press, 32 Avenue of the Americas, New York, NY 10013.

**In Splendid Isolation: A History of the Willie Commelin Scholten Phytopathology Laboratory 1894-1992.** Faase, Patricia E. (translated by Beverley Jackson) 2010. ISBN 978-90-69840541-8 (Cloth US\$60.00) 304 pp. Koninklijke Nederlandse Akademie van Wetenschappen Press, distributed by The University of Chicago Press, 1427 E. 60<sup>th</sup> Street, Chicago, Illinois 60637.

**Introduction to Conservation Genetics.**

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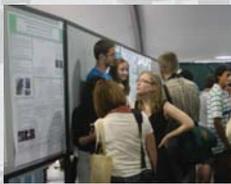
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**“We have a suspicion that ‘common’ names made all that great trouble at the tower of Babel.”**

**- Thomas Meehan, 1876**

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