PLANT SCIENCE BULLETIN

SUMMER 2005 VOLUME 51 NUMBER 2
The Botanical Society of America: The Society for ALL Plant Biologists

News from the Society

Announcements

in Memoriam

Personalia

Other News

If you haven't already registered for Botany 2005, you only have a few more weeks to take advantage of early registration - - Check it out online at http:/www.botanyconference.org! As you know, this year the Botanical Society will be meeting in Austin, Texas, with a theme of "Learning from Plants." In the last issue we featured one of the local botanical treasures you will be able to visit on a morning or afternoon during the meetings - - the Lady Bird Johnson Wildflower Center. For those of you with a little more time and the inclination to head up I-35, there is another fantastic botanical treasure you'll want to visit in downtown Ft. Worth - - the Botanical Research Institute of Texas (BRIT). Our lead article provides some background to the broad mission and extensive resources BRIT provides to professional botanists and to the general public. I'm sure you'll enjoy it and hope you'll be able to plan a visit on your way to or from the meetings.

Of course, at the meetings we'll be involved in sharing new ways to learn from plants (as we share our research results) - -and to help others learn from plants

(as we devise ways to place plants in a more prominent position in school and university curricula). In our second featured article, Kimberly Evenson shares some of her experiences in moving from the traditional, factual-oriented classroom approach to teaching about plants toward an inquiry-based pedagogy. As highlighted later in the issue, the Society has made a commitment to help facilitate inquiry about plants at the K-16 level. Sci-p is a Botanical Society initiative that will connect student research teams from around the country with each other and with professional botanists and educators as they explore plant-related questions. Come to the Botany 2005 forum to learn how you can integrate your classes into this exciting initiative. Hope y'all have "happy trails" till we meet again - - in Austin!

-editor

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The Botanical Research Institute of Texas (BRIT)

ABOUT BRIT

The Botanical Research Institute of Texas isa not-for-profit international botanical resource center that is open to the public. BRIT is committed to encouraging a deeper understanding of Earth's ecosystems and the pivotal role plants play in them. The Institute conducts research in classical and modern systematic botany; holds in public trust a remarkable collection of about one million plant specimens and a botanical library of more than 7,000 volumes of books, periodicals, and journals; publishes journals and books, thereby contributing to global conservation by making current botanical research available worldwide; and provides quality science education programs for children and adults and professional development for teachers.

BRIT's primary facility is in downtown Fort Worth, Texas, in a restored historical warehouse at the corner of 4th and Pecan Streets.

RESEARCH

BRIT research primarily covers three interrelated areas. The basic part of the program focuses on what kinds of plants there are, where they are found, and their evolutionary relationship to one another. Better tools for plant identification globally, regionally, and locally are an important product of this research. The herbarium is inextricably linked to the systematic research. Another part of the research program documents knowledge of the world's peoples regarding use of plants for food, fiber, shelter, medicine, and ritual. Finally, on a large-scale landscape view, BRIT scientists study and document the relationship of people and their environments. The relationship of people to their environment is an important component of their quality of life, and this is at the heart of BRIT research.

Floristics and Systematics

BRIT botanists have detailed taxonomic expertise in a number of families and are actively engaged in systematic studies of Asteraceae, Cucurbitaceae, Myristicaceae, Rosaceae, Verbenaceae, Xyridaceae, and others. BRIT staff and Research Associates also are currently involved in a number of floristic inventories and summaries in Texas and the southeastern USA, as well as those abroad and in the larger North American region. The Illustrated Texas Floras Project combines floristics and systematics in a centerpiece of BRIT research.

The Flora of North America Asteraceae Project is an account of all of the native and naturalized species of the sunflower family in North America north of Mexico. The Editorial Center for FNA-Asteraceae is at BRIT; the entire project is centered administratively at the Missouri Botanical Garden. The Asteraceae treatments include 420 genera and 2,420 species fill three volumes, all of which are scheduled to be published in 2005. More than 80 contributing authors and numerous reviewers, editors, and technicians have been involved in the overall production.

BRIT's interest in places like the Philippines and Papua New Guinea is to document plant diversity before so much of it disappears. A former project in the Philippines, in collaboration with the National Museum in Manila, was an attempt to document the last bits of remaining forests there.

Plants & Peoples Program

Research of plants used by the world's peoples for food, fiber, shelter, and medicine will be a major focus at BRIT. When funding is available, an ethnobotanist will lead the Institute's efforts to preserve indigenous knowledge of plant use and will focus on plants used by people for the treatment of diseases and the maintenance of human health.

Landscape Ecology Program

This program takes an ecological approach to large-scale environmental restoration, conservation, land management, and sustainable development issues. BRIT provides environmental characterization, impact assessments, mitigation plans, and long-term monitoring protocols. BRIT projects toward ecological restoration and conservation have been carried out in South China and in New Guinea. In Texas, BRIT collaborates with organizations like the Texas chapter of The Nature Conservancy and others to study vegetation of reserves and parks.

Andes to Amazon Botany Program

The Andes to Amazon Botany Program (AABP) at BRIT is an expansion of a project in the lowland rainforests of southeastern Peru known as the *Botany of the Los Amigos Conservation Area and* initiated in 2001-2002 in collaboration with the Amazon Conservation Association (ACA). The goals of the *Los Amigos Botany Project* are to document the plant diversity in the Los Amigos Conservation Biological Station and Conservation Area, provide tools and services for plant identification, monitor and inventory forest dynamics and diversity, and contribute to the education and training of students and local parataxonomists.

The development of the AABP grew out of a vision to connect botanical studies along the elevational gradient from Los Amigos in the Amazonian lowlands to cloud forests in the Andes Mountains. With the support of a $2.3 million grant from the Gordon and Betty Moore Foundation, the AABP team is carrying out a three-year project focused on science, technology, education, and conservation in southeastern Peru. Project scientists, students, and research assistants focus on the diversity and ecology of a variety of organisms and their interactions with each other and their environment. Although botany serves as the foundation of the project, the cross-generational, international, and multidisciplinary team also includes expertise in mammals, birds, insects, vegetation ecology, GIS, remote sensing, and information technology.

The AABP team is involved in teaching undergraduate and graduate students at Texas and Peruvian universities as well as local Peruvians through field courses, workshops, and field research in the region. The AABP team has initiated a project in the Osa Peninsula of Costa Rica to replicate botanical and ecological protocols in other regions of lowland neotropical moist forests http://www.osaorganization.org.

The major project components of the AABP are connected by six ongoing activities of the AABP staff, partners, and collaborators:

- Environmental data collection in the field
- Biodiversity data collection in the field & museum
- Technology development and testing for managing and disseminating biodiversity and environmental data
- Data analysis and integration
- Dissemination and publication in digital and print format
- Training and education in the field & museum

Summaries and further information about research by BRIT staff are found on the BRIT Web site: www.brit.org. For more information about the Andes to Amazon Botany Program, visit http://www.andesamazon.org.

Herbarium Collections

Approximately one million plant specimens are held in public trust at BRIT. The core of the herbarium is the Lloyd H. Shinners Collection in Systematic Botany, composed of approximately 410,000 specimens and originally created at Southern Methodist University (SMU) in Dallas. The collection, sent on permanent loan in 1987 at BRIT's inception, is the source of many historically important specimens from early Texas botanists. Since 1987, six major orphaned collections have joined those from SMU. In 1997, BRIT acquired a 400,000-specimen collection from Vanderbilt University (VDB) that contains voucher specimens for many threatened and endangered species from the Southeast. The SMU and VDB collections are large and significant. Because they maintain their identities as somewhat separate entities from the rest of the BRIT collections, the herbarium is sometimes abbreviated BRIT-SMU-VDB.

More recently acquired collections include those from Southeastern Oklahoma State University in 2000 (a strong collection of Oklahoma material from John and Connie Taylor on which the checklist for the Flora of Oklahoma is based) and from Dartmouth University in 2002. The collection of Texas specimens has been increased by acquisition of collections from the Houston Public Museum in 2001 and from the Fort Worth Museum of Science and History in 2002. The most recent major acquisition is the Heber W. Youngken Sr. Herbarium, which was donated by the American Botanical Council to BRIT in 2003. Youngken, the father of modern pharmacognosy, amassed this collection of 7,000 medicinal, spice, and dye-plant specimens at the Massachusetts College of Pharmacy and Health Sciences.

The BRIT collections alone (not counting these orphan accessions) have grown at an average rate of 12,000 specimens per year over the past five years. This growth is due to specimens acquired as a part of ongoing research projects and through specimen exchange programs with other herbaria worldwide. Major research projects in the Philippines, Papua New Guinea, Vietnam, Colombia, and Peru have contributed to BRIT's holdings and to the scope and usefulness of the herbarium.

The geographic strengths of the BRIT collections are in Texas and the southern United States, especially the Southeast.The large size and geographic focus combine to make BRIT one of the most important herbaria in the southwestern U.S. Taxonomic strengths include the plant families of composites, sedges, beans, mints, and grasses. Approximately 30% of the BRIT specimens are from Texas, 35% from the southeastern US, and 15% from the remainder of North America. The BRIT herbarium houses approximately 180,000 Texas plant collections, excluding the VDB herbarium, which has a relatively minor component of Texas plant collections and a larger component of plant collections from the southeastern U.S. Brit also holds

significant collections from Mexico, Central America, South America, Europe, and Southeast Asia. In addition to the vascular plant collection, BRIT has a comprehensive bryophyte and lichen collection.

Libraries: Treasure Chests of Botanical Literature, Natural Science, and History

The Scientific Reference Collection

The BRIT Research Library contains approximately 75,000 volumes of scientific and taxonomic books, periodicals, and journals from more than 90 countries representing the majority of the world's written languages. The collection exists to support the taxonomic research undertaken by the botanists of the Botanical Research Institute of Texas and visiting botanical researchers, to support the varied programs sponsored and hosted by BRIT, and to preserve a valuable collection of rare books of historical information on taxonomy, pharmacology, and geology. The nucleus of the Library consists of the collections assembled at Southern Methodist University from 1945-1971 by Lloyd H. Shinners, considered one of the major botanists of the 20th century, and Eula Whitehouse, professor of botany and head of the SMU herbarium. The remainder of the collected works has been carefully selected to represent a comprehensive library of scientific and taxonomic books and publications primarily for naming and classifying plants.

Library Holdings

One of the largest and finest collections of botanical literature in the southwestern United States, the BRIT Research Library contains journals, series, encyclopedic works, horticultural works, floras, monographs, and reprints. Twentieth century holdings include works in botany (floras), gardening, and biographies. The basic reference works in systematic botany of the 20th century are available, including such standards as *Index Kewensis* (alphabetical index to published names of seed plants worldwide citing original publication since 1753), *Index Londinensis* (index to illustrations of plants from 1753 to 1935), *Bradley Bibliography* (guide to the literature of the woody plants of the world before 1900), and printed catalogs of such great libraries as Kew, Lindley, and Arnold Arboretum.

The library is especially rich in taxonomic literature on botany and horticulture of the 19th and latter half of the 18th centuries, the Golden Age of gardening in its broadest sense. Holdings of the 16th and 17th centuries include volumes detailing expeditions of various explorers as well as books on botany, horticulture, and medical botany. BRIT's oldest book is a 1549 edition of *De Materia Medica*, written originally by Discorides, a Greek physician in the first century AD.

Oliver G. Burk Children's Library

In 1997, William R.Burk, biology librarian at the University of North Carolina at Chapel Hill, established the Oliver G. Burk Memorial Library at BRIT in memory of his father. The initial donation included 2,000 volumes on botany and natural history, many of which are rare and date from the 1700s. The collection greatly enhanced BRIT's holdings of children's botanical literature and immensely strengthened its educational program. Spanning three centuries, these volumes are especially representative of children's literature on natural science in the 20th century. Some of the types of children's books represented are catechisms of the 18th and 19th centuries, chapter books of the 19th century, shape books, board books, cloth books, and alphabet books. Through support provided by Mr. Burk, the library has grown to more than 3,000 volumes, with about 200 titles added annually in botany, specialized ecosystems, animals, and other topics related to the environment and science.

Press

Progress in systematics depends upon access to and efficient retrieval of botanical information. While gathering and preserving botanical samples and information and supporting related research are important to BRIT's mission, information and research are not complete and have little value until the results are made available to other interested individuals and organizations. Publishing, therefore, is an integral part of BRIT's commitment to conserving our natural heritage.

Illustrated Texas Floras Project

As part of a research effort by the Botanical Research Institute of Texas and the Austin College Center for Environmental Studies, BRIT published the *Illustrated Flora of North Central Texas* in 1999. This comprehensive flora details what species of plants grow in an area of roughly 40,000 square miles (a 50 -county region that stretches from the Red River border with Oklahoma on the north, south nearly to Austin, east to Paris, and west nearly to Wichita Falls and Abilene) and includes keys, descriptions, and illustrations necessary to identify these plants. The first of three volumes of the *Illustrated Flora of East Texas* is nearing completion. This is the first fully illustrated flora for this area of vastly diverse ecosystems and extreme biological richness. Research includes study of plants in an area covering 87 counties and encompassing 60,000 square miles, an area roughly the size of the state of Georgia, and home to approximately two-thirds of all the plants found in Texas.

Sida, Contributions to Botany and Sida, Botanical Miscellany

Sida, Contributions to Botany (SCB) is an international journal of systematic botany and has been a source of current research in classical and modern systematic botany for readers throughout the world for 43 years. The journal publishes primary research papers in fields such as anatomy, biogeography, chemotaxonomy, ecology, evolution, floristics, genetics, paleobotany, palynology, and phylogenetic systematics. Coverage is global: it is not restricted to any geographical area, and papers are contributed from authors around the world. *SCB* is published twice a year and each issue contains articles on various groups of plants. Papers appear in English or Spanish, with abstracts in both languages. All papers are peer-reviewed and are frequently illustrated with maps and line drawings. Each issue includes short communications on floristic discoveries, book reviews, and notices of new publications.

Sida, Botanical Miscellany (SBM) is a series of monographs with each issue devoted entirely to a comprehensive study of one topic, ranging from floras, to

systematic monographs, to botanical histories. Published since 1987 by BRIT as an adjunct to *Sida, Contributions to Botany* , it provides a greater depth of coverage for larger, key topics. SBM is published once or twice a year. As with SCB, papers in SBM appear in English or Spanish, with abstracts in both languages. *Lloyd Herbert Shinners: By Himself*, published by BRIT Press in 2002, is both a history of botany and exploration in Texas and North America (particularly north central Texas and the Gulf Coast of the United States) and an historical view of one man's perception of teaching and researching in America in the mid-20th century.

Science Education

BRIT's nationally recognized education program emphasizes the vital interdependence among all living things and the critical role plants play in that broad scheme. Both children and adults are challenged to develop an awareness and appreciation of the natural world and an environmental ethic that encourages responsible stewardship of Earth's resources. The basic premise of BRIT science education is that this awareness and appreciation is best developed through active inquiry, exploration, and discovery.

As a respected science resource in the community and with a staff committed to educational excellence, BRIT provides support for teachers who guide students in building a foundation for understanding science and, more importantly, inspire students to develop a passion for learning about the world. As participants in BRIT's Environmental Science Ecosystem Expeditions, teachers are immersed in a study of the entire ecology of a region. The Environmental Science program educates and equips schools in the study of urban ecology with a look at urban forests, rivers, and cities. Professional development for teachers (levels K-12) includes workshops in life sciences, botany, environmental science, and ecology. During workshops, program leaders guide participants through background information and activities to explore concepts and practice skills specified in the Texas Essential Knowledge and Skills (TEKS). Professional development for elementary teachers models a student-centered, guided discovery approach to learning. Workshops for secondary teachers incorporate hands-on activities for the classroom and methods for teaching in the field.

Good science education requires both a firm understanding of scientific concepts and development of scientific thinking skills. BRIT provides a variety of Discovery Programs for students in public, private, and home school groups. BRIT's Youth Mentoring program introduces students to real-life environmental issues and connects them with community professionals. Studies are enriched by use of books from the Institute's vast library, both the scientific reference and children's collections, and through opportunities to interact with staff to see first-hand the scientists' work and the significance of BRIT's plant collections. BRIT collaborates with the Rainwater Foundation to enrich the REAL Schools Initiative, a program established by the Foundation to support the construction of outdoor learning areas in Fort Worth schools. As a partner in the project, BRIT provides curriculum resources and professional development to help teachers and students connect their learning with the natural world.

BRIT's outreach program is an important educational resource, both locally and beyond. The *T.M. Barkley Plant Science and Ecology Seminar Series* , a partnership between BRIT and Texas Christian University, provides a venue in which to promote collegial sharing of current advances and research in plant science and ecology. Bringing international speakers to Fort Worth, BRIT's *Distinguished Lecturer Series* features world-renowned experts who share their knowledge in areas such as biodiversity hotspots, conservation in Texas, and medicinal plant use. During monthly *Brown Bag Botany* informal lunch seminars, staff and friends of BRIT gather in the Learning Center to hear reports of scientific expeditions and the latest research from local as well as visiting scientists. *Botany 101 at BRIT*, begun in spring 2005, provides opportunities for plant enthusiasts to increase their understanding of basic botany concepts through continuing education courses taught by BRIT scientists.

Text and photos by Annette Gunter, Head Special Events/Membership, Botanical Research Institute of Texas

Steve Manchester - self portrait. (Steve hopes that given the current trends this will not be a foreshadowing of things to come!)

Reinventing Plant Biology

This commentary grew out of the frustration of reviewing plant biology texts and plant education literature and finding little that connects classroom learning to the real lives of students. With so much emphasis placed on active learning and inquiry-based learning, why aren't more people teaching this way? Why aren't students puzzling over data, speaking and writing more about plants, trusting and following their own curiosity, choosing the topics *they* feel are important?

What works? There are so few models out there, and so few approaches that appeal to an aesthetic curiosity. Teaching in any way other than `factual', is not encouraged or expected, and too few innovative plant biology instructors are documenting their successes for others to follow. Over and over inexperienced teachers must re-invent the wheel. Textbooks, overheads, and Powerpoint images are available to teachers, but provide little creative stimulus. Obviously, compiling facts and prepackaging lectures for instructors is an easier task than breaking the mold and coming up with good course themes, real case studies, interesting project ideas, and challenging assignments that allow students to grapple with ideas. The problem: facts and canned laboratories don't generate a great deal of passion or enthusiasm for the subject. Shouldn't we, as teachers, seriously consider the admonishment of the Botanical Society of America in their publication *Botany for the New Millenium: "*An emphasis on botanical terms is not the approach to take when introducing students or the public to botanical work"?

My discovery of Walter Bateman's book *Open to Question: The Art of Teaching and Learning by Inquiry* _ the `bible' for this style of teaching _ completely changed the way I think about teaching. It's written as a guide to inquiry, but reading the book is an adventure in itself. In a very short time I found myself discarding teaching methods that were incompatible with my style in the classroom. Why present the material as though I'm an authority on every topic? Should I be the only one digging for treasure _ choosing the topics for discussion, and piecing together the details for a course? Why not let students in on the adventure of discovery? Many of us have forgotten (as we plod through our heavy texts) that it's the process, or journey, that's important and not the accumulation of random intellectual thoughts. Bateman's examples, while not related to the plant sciences, were embedded in a mystery, tied to a puzzle, where the outcome was always a surprise. How could I extrapolate his ideas, so my plant biology students felt the same sense of excitement and intrigue? It would require a shift in
my way of thinking, and a new way of organizing the material.

While pondering what to do for inquiry activities in plant biology, I began searching for books and articles that were of comparable interest. Hershey's jewel of an analysis (Hershey, 2002) reminded me of that mysterious link I must foster between plant biology and students' lives. Francis Hallé's delightful book *In Praise of Plants* summarized in its first chapter a history of zoo-chauvinist attitudes toward plants, and provided thoughts on how I could rid my courses of "such errors of perspective". The BSA publication *Botany for the Next Millennium* highlighted critical and neglected areas of study. And finally, sixteen years after its publication, *My Weeds: A Gardener's Botany* by Sara Stein, crossed my path. The book drew me in like a good novel. I read it slowly; it was exactly what I was looking for: chapter upon chapter filled with fresh examples, stories, and botanical curiosities juxtaposed in interesting ways. It set me dreaming. Stein's book only skimmed the basic science, and there were errors in some of her analogies, but that didn't diminish its value for me. (For fact checking, botany texts already offer that opposite extreme: encyclopedias of information with little connection to personal experience). What *My Weeds* offered instead of the usual `summary of facts' was something I believe we all yearn for: readings that lead to insights, convey depth and nuance, are unexpected or controversial, or highlight a new path. Before reading this book I had worried: what were *our* stories in plant biology? Her book contained stories I connected with; they seemed like my own, and they drew me in.

I immediately saw the book as a guide, but for what? The road had not been mapped yet. I was reminded of things I hadn't thought about in years; some of the analogies made me laugh. And so I began; first using her fun, informative, sometimes curious information to build some case studies, labs, inquiry-based activities, even a `Linneaus comic strip' for the cover of my lab manual. How could I not be drawn in by Stein's anecdotes? Note her discussion of *Ipomoea pandurata*, in a delightful overview of taxonomy; (p.35)

pandurata, in a delightful overview of taxonomy." (p 35)

There are times, of course, when literal translation misses the point. For example, "fiddle-leaved morning glory" for *Ipomoea pandurata* ignores the real drama of the plant's anatomy, which is best captured in the popular name man-under-ground. The "man" is a storage stem, buried at the depth at which we store corpses, or nine feet under. It can grow as long and as thick as a man's leg, and weighs up to thirty pounds," and, (p 35) "…the dreaded man-under-ground, can be neither forked nor chopped, for to get to the "man" would require turning the garden into an open grave."

And, here is another taxonomical treasure from the same chapter: (p 37) "Something of Linneaus's personality appears from time to time in the names he chose. For the ragweeds, those rank-smelling things that uglify waste places in late summer, he invented the genus *Ambrosia*, which means "food of the gods". Did he picture generations of botanists and gardeners smiling at his joke?"

Stein's book generated ideas, and Hershey (2002) suggested possible starting points for student reading and writing: "biographies of famous botanists in history, a daily botany quotation, the botany question of the week, a plant profile, a plant misconception" and of course, describing a plant process. The possibilities for developing activities now, seemed endless. For me, the treasure hunt had begun, and now everything seemed to interconnect in unexpected ways. I only needed those fresh examples from a few good writers to glimpse the possibilities - to play, to invent. Piaget said "to understand is to invent" and "to understand is to discover, or reconstruct by rediscovery". I need these opportunities in my life to invent and re-connect with plants, and so do my students.

So, to come back to my initial question: What works? What is valuable to students? How do we design a course that connects the dense scientific literature to personal interests, experiences, and directions in life? What assignments allow students to experience, to reflect, and to find their own voice? I suggest that scientists and journalists write more about plants for the popular audience. Then as teachers, we have available those resources that inspire, that generate enthusiasm and controversy, and that allow us to develop our *own* course materials which go beyond the compilation of facts. Let's break out of this mold the textbook writers have locked us into, and search beyond their encyclopedias for our inspiration. When a textbook alone becomes our guide, our subjects can become pretty stale. Let's speak from our hearts about plants; we need to hear from those who will highlight the mystery and beauty of plants, and their experiences with them. We need to regularly put plants into fresh contexts. (Simply reviewing the details of photosynthesis and doing a starch test is *not* sufficient or memorable). In my experience, the best courses had nothing to do with subject matter. Instead, they drew me in with stories, and the focus was on my curiosity, because discovering my place in the world can only be done by me.

-**Kimberly Evenson**, Associate Professor, Biology Department, 212A Pasteur Hall, Winona
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News from the Society

The Evolution of www.botany.org

I'd like to start this short piece by acknowledging the webmasters and web builders who have gone before me. As I read the Society's history, it appears that Scott Russell and the education committee Chaired by David Kramer played a large role in the early developments (http://www.botany.org/bsa/psb/1997/news97-3.html#news3). From 1997 to early 2003, Scott appears to have led the charge. To all the others who took part, the Society thanks you for your contributions. I trust it was rewarding to take such a lead in developing an online interface for science. As a point of interest, over 1,000,000 people visited the BSA website over the past year!

The web has put so many resources at our fingertips that most people will ask a few simple questions in determining which tool to use when searching for directed access to desired information - quickly: 1. How does it work, 2. Can I get it to work, and 3. **What's in it for me**, if able to solve 1 and 2.

With a tool, a searchable resource for botanists, by botanists, such as www.botany.org I'd like to start with "what's in it for me if I can get it to work". At the BSA's worldwide headquarters we call this the **M&M&M** strategy. Here are the concepts behind what we are developing:·

- Member recognition _ if you have publications/images/contributions placed or listed on the BSA website, we will make every effort to ensure people find them.
- Member services _ as a tool the website is designed to make all membership services and services to the society more efficient and effective.
- Mission _ everything we do will in some way support the mission of the Society. This includes supporting science education, our meeting, our publications, preserving the institutional memory/history of the Society and broadly promoting botany.

The best place to start is at www.botany.org itself. Things to note include the BSA mission and objectives, Special Announcement for Members and the fact that the image on the page should be different every time you enter the site (if not try refreshing every once in awhile). The Menu down the left side of the page should take you wherever you want to go and help you find most things concerning the Society and it's resources. As an example, go to the "BSA Member Services" tab. You'll find membership information, benefits of membership, options for online or mail joining/renewing, a membership directory….. you get the idea. Please have a look at the other menu options when you have some time. You may be surprised with what you find.

In support of our mission you'll find 99.9% of all images lead to a scientific explanation for that image. As an example go to the "About the BSA" tag at the top of the menu, select "About the BSA" and click on the *Alpinia* image. There you'll be taken to a page with information about the image, who took the photo, the article it supported in the AJB, a link to that abstract and a link to the larger version of the image (and the BSA Online Image Collection). On this one "About the BSA" page you'll see the M&M&M concept in action. You can learn a bit about the BSA, discover that W. John Kress created the image, gain access to member services, find out about member benefits and learn a wee bit about *Alpinia* the largest genus in the ginger family (Zingiberaceae), and the fact that is largely pollinated by bees.

Now for the fancy tricks, go back to the home page (www.botany.org), locate the search engine at the bottom of the page, and type in *Alpinia* or Kress. The first takes you to any entries for *Alpinia* and the second to all publications/images/contributions placed or listed on the BSA website by Dr. W. John Kress. What comes up when you search your name?

Other nifty features include the full run of abstracts for the *AJB* 1914-1997. The search on the home page will pick these up as well. From there you can use your BSA username and password and log directly into the JSTOR archives to view/download the article as it appeared in the journal. We are in the process of loading all past Plant Science Bulletins, updating all the awards pages, adding in our history and developing concepts for educational outreach (BSA Sci-p and the McIntosh Apple projects as examples).

We have added a feature outlining grant opportunities, used the site to move many of our processes to a totally paperless environment (2005 award nominations) and are gaining wide acceptance for others, such as online membership renewals. We even use our join/renew system to support and assist the American Fern Societies membership function. Botanists working together for botany and plants!

With all this said, I need to remind you that we are just at the beginning of developing a tool that supports you, the Society, and the plant sciences. That we need your help and the resources that may be sitting idly on your shelves or hard drives. Please have a look at the site and let us know where you can help (any

carnivorous plant experts out there, we have a few gaps in the collection). Come to the discussion session at Botany 2005 and here how you can help and share ideas on how the BSA website can help you. What information would you like to see? Please send your ideas into us at the BSA office via bsa-manager@botany.org. Thanks for your input!

American Journal of Botany, Open Access and Publishing Alternatives

A number of years ago, Harold Varmus, in one of his last speeches as Director of the National Institutes of Health, urged free access to the results of NIH's publicly funded research. He noted that tremendous funds were being invested in subscriptions and that science was impeded by not having results available immediately to the public[1]. The federal government initiated what was originally dubbed PubMed Central—a central repository of the biomedical and scientific literature, which would take electronic content from scientific publishers and make it available on PubMed Central's servers at no charge.

The response among the selected non-profit publishers who participated was encouraging, once initial concerns about loss of subscriptions were met—specifically, publishers requested that free access be delayed long enough to assure that subscriptions would still be purchased. At that point, a number of leading publishers decided to provide free access within 6 months to one year after publication, with an embargo period during which the journals would be available only to subscribers.

A competing concept that extended this model was announced somewhat later as "Open Access."[2] Under this alternative model, all published material would be made freely available once accepted in final form. The model for paying for this is based on author payments, and assumes that online publication will reduce the costs of production such that at most a modest contribution would be made by each author. One of the most conspicuous examples of this model is the Public Library of Science (PLoS), which publishes two journals, *PLoS Biology* and *PLoS Medicine.* (Three more PLoS journals [*PLoS Computational Biology*, *PLoS Genetics*, and *PLoS Pathogens*] are now considering papers). The contribution required of authors is $1500, with the "aim" of becoming self-supporting, but much of the current muscle is in their $9 million support from the Moore Foundation (support from other medical foundations is not specifically enumerated, but they have received substantial additional funding from Wellcome Foundation and Howard Hughes Medical Institute). PloS is offering institutional memberships that provide a "discount" for publication. Membership discounts (available on the web), vary from a 10% discount for a $2000 "active" membership, with five steps up to a 75% discount in the case of a $100,000 "championing" membership. In seeking this transition to a differently funded model, PLoS has amassed a large amount of support from prominent medical foundations.

Clearly, open access to science is a goal of all scientific organizations, and the support of a high-quality literature is the initial reason that many non-profit organizations launch their own journals. Journals of non-profit scientific organizations have traditionally outperformed commercially published for-profit journals in impact factor and value for money spent. Additionally, there seems to be an assumption that journals—even those of non-profit societies—are unfairly earning large dividends for the societies that could and should be offset by raising other direct membership-related costs. In spite of this, a statement is made in "open access" proposals that not all areas of science will be able to make this economic transition as easily as some biomedical journals. The goal of this article is to present some of the real costs of several different models for access to journals via university libraries.

Currently, the *American Journal of Botany* has about 1,800 institutional subscribers at $415 (online only) to $485 per year (overseas print subscription). We publish between 200 and 230 papers per year (up to 2,200 pages per year). In point of fact, the Botanical Society of America and the *American Journal of Botany* are behaving quite frugally. Our investment in publishing and printing the Journal has always used volunteer reviewers, Associate Editors, and Editors-in-Chief. Up until this year, all of our employees (copy-editors, production editor, office manager) were part-time. This year, however, we hired our first full-time employee, in the person of a Managing Editor. Still, our journal's subscription rates are half to one-third of most of our competitors—a record that indicates that excellent journals can cost a fraction of what commercial publishers charge.

So, assuming that the membership is satisfied with our current *Journal* , what would it cost to allow open access? What would be our share for a manuscript accepted for publication, on average?

According to my most conservative figures (I have ignored revenues from print subscriptions by the membership, for example, and divided by the most papers we have ever accepted), author contributions would need to be on the order of $3,400 per article to maintain our current quality and size, assuming universally successful revenue collection. To support a self-sustaining model, these figures would need to be maintained and increased to offset future inflation. Unless I have missed something, the $1,500 charge for publication in *PLoS Biology* is quite a bargain, although bear in mind it is a token payment, with the full cost subsidized by multiple medical foundations. PLoS does publish print versions of their journals, so the comparison is not that far-fetched.

Now that we have considered "open access," where do we stand as members/publishers of a not-for-profit journal **AND** as authors?

Open Access Goals	**Current *American Journal of Botany* Policies**
-Ability to make publications available for free, as soon as they are published	-Author copyright release allows posting PDF files on author's web sites
-Low cost of publication	-Authors pay for only editorial costs, if more than 8 pages per year (most papers are shorter) [58% of regular articles were under the free page limit last year]
-Available immediately to all major research universities	-Essentially all major research institutions and institutions and universities have our reasonably priced subscriptions
-Available to third world countries with reliable internet access	-AJB participates with Agora, eIFL, and Hinari, which provide free online access to 70 countries with the lowest income[3]
-Author retention of copyright	-Authors retain the right to their material
-Author retains rights to republication including decline use	-BSA refers requests for republication to ability to corresponding authors for approval
-Access to supplementary data for free	-Currently free
-Free access to journal articles	-Free access to all papers over 24 months old (from 1997)

These services of the AJB are currently funded by subscription fees. Some astute institutions add the cost of such subscriptions to their indirect cost basis and thereby recover some subscription fees from grants on a collective basis, because the cost of extensive library research resources is a legitimate cost of research. In the above Open Access model, at institutions where BSA members are actively publishing in AJB the cost of an AJB institutional subscription would be far less than the cost of "open access" if institutions are required to buy into it.

Not -for -profit societies outside of the medical mainstream are in particular danger in the open access model, as they do not have the economic resources to recover from experimenting with untried economic models. One fear in the open access model is that poorly funded authors and research areas will not have equal access to "open access" journals; another fear is that developing-world scientists will have increased need to rely on commercial publishers. Researchers will need to obtain more direct funding, rather than relying on collective indirect costs to fund the research infrastructure.

The Botanical Society of America, after careful consideration, joined the DC Principles for Free Access to Science[4] in order to meet our objectives as member-authors, as well as those of other free access consortia for developing countries. The unspoken goal in "open access" is to provide a more attractive model to authors to attract them away from commercial publishers and thereby stem increasing subscription costs. There is little evidence to support that it has had that effect. Please contact me if you have any questions or comments.

Scott Russell, srussell@ou.edu[5]

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[1]Harold Varmus and Anne Okerson interview on access to scientific literature on NPR's "Science Friday" on June 22, 2001: URL:http://www.npr.org/templates/story/story.php?storyId=1124750
[2]Bethesda Statement on Open Access Publishing (Released June 20, 2003): URL: http://www.earlham.edu/~peters/fos/bethesda.htm
[3]URLs for Agora, eIFL, and Hinari are given on the American Journal of Botany home page at http://www.amjbot.org/
[4]DC Principles for Free Access to Science: URL: http://www.dcprinciples.org/
[5]Thanks to Judy Jernstedt and Claire Hemingway for editorial suggestions. Any mistakes, however, remain my own.

BSA Sci-π "Scientific Inquiry Through Plants" — Watch it grow!

BSA SCI-π "Scientific Inquiry Through Plants" is The Botanical Society of America's education outreach program. If you haven't already heard the buzz about it this rapidly developing project, we would like to take the opportunity to tell you about its goals and recent developments. BSA SCI-π links students, educators, and scientists in an online community that fosters discovery through hands-on and minds-on experiments with plants and mentorship to direct scientific inquiry. There are three basic concepts behind what we are trying to achieve: first is scientific inquiry and the wonders of "doing" real science; second is the peer-to-peer problem solving; and third is mentorship and support for scientific inquiry and peer-to-peer problem solving from subject-matter experts.

The BSA SCI-π project meets the BSA mission goal of promoting botany, the plant sciences, and science in general. It also creates the opportunity to reach and promote relationships with potential plant scientists. We don't expect all students who participate in the BSA SCI-π program to become scientists, but our hope is to support you and your colleagues as you teach your students to think scientifically, and support those who want to join the field by helping them to become engaged earlier.

The project developed in response to a challenge to the Botanical Society of America from Dr. Bruce Alberts, President, The National Academies. As the Keynote Speaker at the Botany 2003 Conference, he challenged us to become involved with science in a way that used sound research to illustrate the power of "scientific inquiry", and the absolute joy of experiencing science, as a base for the program. And to make whatever we developed accessible and usable by all. For more information about the project's background, see http://www.botany.org/Scientific_Inquiry/about.php.

In March of 2005, we were ready to move forward, and the development committee met in St. Louis to plan a small pilot project. We thank the development committee for their input and dedication to science and education. (A full list of members is available at: http://www.botany.org/Scientific_Inquiry/committee.php.) Barbara Schultz, Director of the Teachers Advisory Committee for the National Academy of Science, identified several top-notch K-12 educators to plan and participate in the pilot.

Approximately 150 students—across middle schools, high schools, and university levels—will be a part of "The Wonder of Seeds" pilot. The pilot centers on a hands-on activity of sprouting seeds and builds on a guided-inquiry project that Beverly Brown developed for her students at Nazareth College. Participating schools received seed sprouting kits, and Marsh Sundberg's students from Emporia State University have begun posting their data to the website. The high school and middle school teams have just begun the pilot. Watch their progress at http://www.botany.org/Scientific_Inquiry/.

Results of the pilot and further developments in the BSA SCI-π project will be featured at the Botany 2005 Conference in Austin, Texas (August 13-17). We are also pleased that Barbara Schulz has agreed to be this years' Educational Forum Keynote Speaker.

We'd appreciate your comments and input to assist in the evolution of the project. Please contact us at: bsa-scipi@botany.org

Botanical Society of America - 2005 Darbaker Prize in Phycology

The Botanical Society of America is accepting nominations for the 2005 Darbaker Prize in Phycology. This award is presented for meritorious work in the study of microscopic algae, based on papers published by the nominee during the last two full calendar years (2003-2004). The award is limited to residents of North America, and only papers published in the English language are considered. Nominations for the 2005 award should include a list of all of the nominee's work to be considered for the 2003-2004 period, and a statement of the nominee's merits addressed to the committee. Nominations for the 2005 Darbaker Award should be sent by June 10, 2005 to the chair of the Darbaker Award Committee, Dr. Richard McCourt, Department of Botany, Academy of Natural Sciences, 19th and the Parkway, Philadelphia, PA 19103; email: mccourt@acnatsci.org.

Announcements

In Memoriam:

Wilbur H. Duncan, 1910-2005

We are saddened to report the passing of Wilbur H. Duncan, University of Georgia Professor Emeritus of Botany and retired Curator of the GA Herbarium. He died at his home attended by his family on 25 March 2005 in Athens, Georgia. He was over 94 years old.

Wilbur was born on October 15, 1910, in Buffalo, New York, and received a A.B. (1932) and M.A. (Botany, 1933) from Indiana University. After earning a Ph.D. from Duke University under forest ecologist Clarence F. Korstian in 1938, he began his distinguished 40-year career at the University of Georgia, Department of Botany (now Department of Plant Biology) as faculty member and curator of the GA Herbarium. His work at the university was interrupted by three years of service in the U. S. Public Health Service (1943-1946) during World War II.

Wilbur had an illustrious career in botany and conservation spanning seven decades. He collected over 30,000 plant specimens in his lifetime (typically in multiple sets) that he deposited at GA and other herbaria throughout the southeastern United States; during his curationship of GA Herbarium, the collection grew from 16,000 to 135,000 specimens. Wilbur authored 65 articles in scientific journals, mainly on the floristics of the southeast, particularly of Georgia. He is probably best known, however, for his popular field guides published by the University of Georgia press after his "retirement:" *The Smithsonian Guide to Seaside Plants of the Gulf and Atlantic Coasts* (1987), *Trees of the Southeastern United States* (1988), and *Wildflowers of the Eastern United States* (1999). The three books, illustrated with his beautiful photographs, brought botany to the public at an understandable level, and are all coauthored by his wife of 64 years, Marion Duncan, also a professional botanist. The Duncans logged over 80,000 miles together for these projects. At the time of his death, he was completing a manuscript for *Shrubs of the Southeastern United States*, a significant guide including 700 color photographs.

Wilbur belonged to 18 professional societies and associations. He was a charter member of the Association of Southeast Biologists and a Fellow of the American Association for the Advancement of Science, and he held several offices with the Botanical Society of America, was President of the Georgia Academy of Science (two terms), and served as Council Member of the American Society of Plant Taxonomists (four years). He was awarded the 1990 Elizabeth Ann Bartholomew Service Award by the Southern Appalachian Botanical Club; in 1998, the Department of Plant Biology, University of Georgia, initiated the Wilbur Duncan Teaching Award which honors outstanding graduate students in the department.

initiated the Wilbur Duncan Teaching Award in his honor to recognize outstanding graduate students in the department.

In his retirement Wilbur continued to be a botanical resource for the GA Herbarium. When students had difficulties identifying a plant, they would finally consult Wilbur - who would absentmindedly rattle off a plant name that inevitably was correct, much to the amazement of the students. Always busy in the herbarium and nattily dressed in coat and bow tie, Wilbur was an enviable model of a true botanist devoted to his craft. As age and health issues encroached on his schedule, he willed himself to continue until his shrub book was completed.

To honor him, his family has requested donations to the Wilbur and Marion Duncan Publishing Fund, a charitable trust established with the University of Georgia Foundation to ensure the publication of the Duncans' last manuscript, *Shrubs of the Southeastern United States*. Those wishing to participate may send tax-deductible contributions to: The University of Georgia Foundation, Wilbur and Marion Duncan Publishing Fund, 394 S. Milledge Avenue, Suite 100, Athens, GA 30602-5582.

- Wendy B. Zomlefer and David E. Giannasi, Department of Plant Biology, University of Georgia, 2502 Plant Sciences, Athens, GA 30602-7271. email: wendyz@plantbio.uga.edu

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Scott Sundberg, 1954-2004
Scott D. Sundberg of Corvallis, Oregon, died 30 December 2004 of cancer. An Oregon native, Scott's interest in the plants of the state began as an undergraduate at the University of Oregon. He was a botanist for the Bureau of Land Management, Coos Bay District from 1978-1980. He received his Ph.D. in botany in 1986 from the University of Texas at Austin, where he studied the taxonomy of plants within the Compositae. After post-doctoral studies in Ohio, and several years of research and botanical consulting in Seattle, Scott returned to Oregon to oversee the integration of the University of Oregon and the Oregon State University Herbaria.

In 1994, Scott initiated the Oregon Flora Project, with the goal of writing a new flora of Oregon. He served as director for that project until his death, supervising over 60 students, several professional employees, and directing over 230 volunteers. Along with a new flora was his vision for and the establishment of the Oregon Plant Atlas, the Oregon Vascular Plant Checklist, the Oregon Flora Photo Gallery, and the *Oregon Flora Newsletter*.

Scott's 29 scientific publications include taxonomic papers, laboratory-based investigations in plant systematics, and treatments for checklists, field guides, and floras. The majority of his publications concern the composite family. A complete list of his scientific publications will appear in the *Oregon Flora Newsletter*.

Memorial gifts in Scott's honor can be made to NPSO—Oregon Flora Project, and mailed to P.O. Box 402, Corvallis, OR 97339.

(Editor's note: Scott and I were not related)

Personalia

2004 AAAS International Scientific Cooperation Award goes to Michael J. Balick of The New York Botanical Garden

17 FEBRUARY—AAAS, the world's largest general scientific society, today named Michael Jeffrey Balick of The New York Botanical Garden to receive the 2004 International Scientific Cooperation Award.

Balick, Philecology Curator and Director of the Garden's Institute of Economic Botany and Vice President for Research and Training, was honored by AAAS for his tireless efforts to promote scientific collaboration within the field of ethnobotany — the study of the relationship between plants and people across cultures. In particular, Balick was cited for his research emphasis "on preserving traditional knowledge and respect for the values of local peoples, and his support for the development of scientific institutions in areas of the world where they are needed most."

"Over the past 30 years," AAAS Chief International Officer Sherburne Abbott said, "Dr. Balick has developed a shared vision of research with his collaborators in many different parts of the world, working with them to gather essential financial and intellectual resources. He has been a leader in revitalizing the little-known field of ethnobotany."

Balick comments, "I am honored to accept this award on behalf of my colleagues—the dedicated scientists, students, and indigenous people with whom I have worked in many places around the world. I have been privileged to collaborate with, educate, and, most importantly, learn so much from them. Our model in this scientific research is one of full partnership, ensuring local interest and benefits that will last far beyond the lifetime of the immediate project."

Balick's research, which has helped to transform ethnobotany into an internationally recognized academic discipline, has taken him to some of the most remote and biologically diverse sites on the planet, Abbott noted. Beginning in Costa Rica, for example, Balick played a key role in building a major botanical garden, then worked on the domestication of native plants in the Amazon Valley and Northeastern Brazil. In Belize, he and his collaborators established critical links between ethnobotany, conservation, local education and economic development. His investigations also have taken him to China, Thailand and India, as well as the Caribbean, where he developed a new program to fund research projects in ethnobotany and economic botany with support from the Rockefeller Foundation.

Currently, Balick is working in the Federated States of Micronesia in the Pacific, with a coalition of groups that include The New York Botanical Garden, The National Tropical Botanical Garden, The College of Micronesia, The Continuum Center for Health and Healing at Beth Israel Medical Center, The Nature Conservancy, the Pohnpei Council of Traditional Leaders, and Pohnpei State Government. The goal of Balick's current work is to build a locally based scientific infrastructure that fosters the sustainable utilization of resources while also preserving traditional knowledge, in keeping with Micronesian values.

Balick received his bachelor's degree in Agriculture and Plant Science from the University of Delaware and his master's degree and doctorate in Biology from Harvard University. He has worked at The New York Botanical Garden since 1980, and holds adjunct positions at Yale University School of Forestry and Environmental Studies, Columbia University, through the Consortium for Environmental Research and Conservation, New York University Biology Department, and City University of New York. He is a co-founder of the Ix Chel Tropical Research Foundation in Belize, which promotes the importance of traditional knowledge, conservation and sustainable farming.

"Balick was a leader in opening the dialogue and debate on intellectual property rights, long before it was fashion," said Abbott, who also directs the AAAS Center for Science, Innovation & Sustainable Development. "When he received one of the first collecting contracts from the National Cancer Institute to gather plant samples from Central and South America for screening against AIDS and cancer, he positioned his work with traditional healers in Belize, making them equal partners in the endeavor. He also worked to ensure that local people would benefit from any discoveries that were made from their plants."

Balick, also a MetLife Fellow, a Fellow of the AAAS, and former President of the Society for Economic Botany, has helped to influence the training of many young people in the field of ethnobotany. He serves on the boards of many local and international conservation organizations.

The American Association for the Advancement of Science (AAAS) is the world's largest general scientific society, and publisher of the journal, *Science* (http://www.sciencemag.org). AAAS was founded in 1848, and serves some 262 affiliated societies and academies of science, serving 10 million individuals. *Science* has the largest paid circulation of any peer-reviewed general science journal in the world, with an estimated total readership of one million. The non-profit AAAS (http://www.aaas.org) is open to all and fulfills its mission to "advance science and serve society" through initiatives in science policy; international programs; science education; and more. For the latest research news, log onto EurekAlert!, http://www.eurekalert.org, the premier science-news Web site, a service of AAAS.

The New York Botanical Garden, a National Historic Landmark founded in 1891, is one of the world's great collections of plants, the region's leading educational center about gardening and horticulture, and an international center for plant research. The New York Botanical Garden is located at Bronx River Parkway (Exit 7W) at Fordham Road, and is easy to reach by car or by a 20-minute ride on the Metro-North Railroad from Grand Central Terminal. For more information on the Garden, see http://www.nybg.org.

For more information on AAAS awards, see http://www.aaas.org/aboutaaas/awards/winners.shtml. Awards will be bestowed at the 2005 AAAS Annual Meeting in Washington, D.C., on 19 February.

Contacts: Ginger Pinholster, 202-326-6421, gpinhols@aaas.org; or George Shakespear, 718-817-8512, gpinhols@aaas.org

America's Oldest Plant Conservation Institution Welcomes New Director

Framingham, Massachusetts _ New England Wild Flower Society announced that **Gwen Stauffer**, formerly of Warrenton, Virginia, is the Executive Director of America's oldest plant conservation institution.

"Gwen Stauffer loves native plants", said Frances Clark, the Society's new President, and botany faculty member of the Society's education program. "A rising star in public horticulture, Gwen is enthusiastically looking forward to taking on the challenges of the Society's strategic plans for conservation and horticulture. She succeeds David DeKing, who contributed ten years of remarkable conservation leadership.

"I am thrilled to part of such a great team doing such significant work", said Ms. Stauffer. " Even though the New England Wild Flower Society's plant conservation work spans more than a century, there is still a great deal of critical work ahead of us to keep our natural areas healthy and conserve our native plant heritage. I'm particularly interested in the Society's role in sharing education programs throughout the region". The Society collaborates with many regional organizations, such as the Arnold Arboretum, the Delta Institute in Bowdoin Maine, the Coastal Maine Botanical Garden, the Yale Peabody Museum, and other fine institutions with shared goals. New England Wild Flower Society offers the largest public native plant education program in America with more than 275 classes, tours, and events for adults and children. Strategic plans include new plant education opportunities in all six New England states, including the Society's certificate program offerings for students seeking an in-depth native plant educational experience.

Ms. Stauffer has a passionate commitment to the mission of public horticulture and conservation. She developed her twenty-year career in horticulture after receiving a B.S. Degree from the Delaware Valley College of Science and Agriculture and a Masters Degree in Public Horticulture Leadership and Administration from the Longwood Program affiliated with the University of Delaware. Stauffer's stellar background includes seven years at Hillwood Museum and Gardens, the former estate of Marjorie Merriweather Post, in Washington, D.C. Most recently she served as Executive Director of Gardens at Callaway Gardens in Georgia. Ms. Stauffer has served on multiple committees of the American Association of Botanical Gardens and Arboreta (AABGA).

The new Director will lead strategic initiatives including work on Nasami Farm, the Society's new native plant nursery in Whately, Massachusetts and the creation of the next Flora of New England, by Arthur Haines. She heads the Society's continuing award-winning programs including three conservation programs served by more than 900 volunteers in Maine, New Hampshire, Vermont, Rhode Island, Connecticut and Massachusetts. For information call 508-877-7630 or visit www.newfs.org < http://www.newfs.org> .

The Rupert Barneby Award

The New York Botanical Garden is pleased to announce that **Vidal de Freitas Mansano**, of the Instituto de Pesquisas Jardim Botânico do Rio de Janeiro, and **Benjamin M. Torke**, currently a graduate student in the Department of Biology, Washington University, St. Louis, are the joint recipients of the **Rupert Barneby Award** for the year 2005. They will be studying the systematics and diversification of *Swartzia* (Leguminosae, Papilionoideae, Swartzieae), a prominent neotropical tree genus of approximately 140-180 species, with species diversity concentrated in lowland rainforests of the Guianas and Amazonia.

The New York Botanical Garden now invites applications for the **Rupert Barneby Award** for the year 2006. The award of US$ 1,000.00 is to assist researchers to visit The New York Botanical Garden to study the rich collection of Leguminosae. Anyone interested in applying for the award should submit their curriculum vitae, a detailed letter describing the project for which the award is sought, and the names of 2-3 referees. Travel to the NYBG should be planned for sometime in the year 2006. The application should be addressed to Dr. James L. Luteyn, Institute of Systematic Botany, The New York Botanical Garden, 200th Street and Kazimiroff Blvd., Bronx, NY 10458-5126 USA, and received no later than December 1, 2005. Announcement of the recipient will be made by December 15th.

Anyone interested in making a contribution to **THE RUPERT BARNEBY FUND IN LEGUME SYSTEMATICS**, which supports this award, may send their check, payable to The New York Botanical Garden, to Dr. Luteyn.

Other News

The Oregon Plant Atlas

The Oregon Flora Project announces the launching of the Oregon Plant Atlas, the first comprehensive on-line mapping tool for Oregon plants. Over 385,000 data points representing 4,337 taxa are derived from the Atlas specimen and observation databases, and virtually all information associated with each data point is accessible to the user by clicking on the dots. Information is continuously updated through the efforts of avid field workers and Oregon Flora Project staff. The Oregon Plant Atlas can be accessed through the Oregon Flora Project website at www.oregonflora.org. The Atlas is partially funded by National Science Foundation grant BRC-0237459, and by donations from individuals and plant-oriented societies including the Native Plant Society of Oregon.

Hunt Institute Publication Receives Ewell L. Newman Award

The Hunt Institute for Botanical Documentation's exhibition catalogue *American Botanical Prints of Two Centuries* (2003) has won the 2005 Ewell L. Newman Award. Sponsored by the American Historical Print Collectors Society, the Newman Award honors new titles that enhance understanding and appreciation for prints as part of the history and culture of North America.

With essays and a concise bibliography of 19th-century American illustrated botanical books by Bibliographer Gavin D. R. Bridson, a preface by Curator of Art James J. White, and biographies of the artists and catalogue design by Assistant Curator of Art Lugene B. Bruno, this illustrated exhibition catalogue features two centuries of American printed plant images from utilitarian to creative, the earliest from 1806 and the most recent, 2000. The catalogue is available from the Institute for $25.00 plus shipping and handling.

"This reasonably-priced reference belongs on the bookshelf of anyone who wants to know about botanical prints," says Michael McCue of Asheville, North Carolina, chair of the award jury. The Newman Award, which comes with a prize of $500, will be awarded 14 May in Springfield, Massachusetts, at the society's

2005 annual conference.

The award is funded by an endowment in memory of Ewell L. Newman, a founder of the American Historical Print Collectors Society, which fosters the collection, preservation, and study of prints produced from the beginning of the 17th century through the 19th century. The society's Web site (www.ahpcs.org) includes an index of *Imprint*, its journal of the field, as well as a chronicle of the past distinguished winners of the Newman Award.

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 founded 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 28,000 books; 24,000 portraits; 30,000 watercolors, drawings and prints; and 2,000 autograph letters and manuscripts.

Hunt Institute for Botanical Documentation
Carnegie Mellon University
5000 Forbes Avenue
Pittsburgh, PA 15213
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Editor's note: For a review of this book, copies of which are still available from the Hunt Institute, see *Plant Science Bulletin* 49(4):149-150.

Linnaeus Link Project

The Linnaeus Link Project is an international collaboration aimed at producing an online union catalogue of material relating to the eighteenth-century Swedish scientist Carl Linnaeus and his students. The Project is supported by a consortium of museums, archives, libraries and other institutions in Europe and the United States, led by the Natural History Museum in London. The Project is indebted to the Linnean Society of London, which is providing funding for two years from January 2004.

A Database Officer has recently been appointed to undertake the technical implementation of the catalogue, which will involve investigating the available options and consolidating the substantial body of catalogued material into a working union catalogue. It is hoped that a test version will be running by the end of the year.

Once the mechanism for the union catalogue is established, it is intended that the holdings of other libraries will be linked to the core catalogue, providing researchers with a vast warehouse of resources on Linnaeus and his times. The core catalogue will be a bibliographic database of detailed title records, based on Linnaean materials at the Natural History Museum. By the end of 2004, over 500 records of Linnaean material had been created or upgraded to agreed Project standards.

Further information is available on the Project website at http://www.nhm.ac.uk/library/linn/.

Paintings by Patricia Rottino Cummins on Display in the Cabinet Meeting Room

Tallahassee, FL (1 April, 2005) — Secretary of State Glenda E. Hood announced today an exhibition of oil paintings by Miami artist Patricia Rottino Cummins. The exhibition entitled "Biscayne Botanicals at the Capitol" will be on display in the Cabinet Meeting Room from April 11, 2005 through July 8, 2005.

"We welcome this extraordinary body of work by this talented artist to the Cabinet Meeting Room," said Secretary Hood. "The colorful paintings of Patricia Rottino Cummins truly express the incredible beauty found in some of our state's natural flora and fauna."

In her own expressive and vibrant style, Cummins has created a unique series of oil paintings depicting the magnificent, yet fragile and often unnoticed, plant life commonly found in Biscayne National Park. With over 95% of its 172,000 acres covered in water, the park is home to a wide range of plant species which Cummins eagerly captures in her bold and dramatic works. "My goal as an artist and a painter is to "arrest motion," and communicate the beauty found in nature," states Cummins. "To make my viewers look again at what we normally take for granted is what I find most important in my work."

Originally from New York, Patricia Cummins is a fine arts instructor for Miami-Dade Public Schools, where she has worked for the past 25 years. She is also an adjunct professor at Barry University and a resident artist at ArtSouth in Homestead. She holds a B.A. from the City University of New York, and an M.S. in Art Education from Florida International University.

This exhibition is part of the Florida Department of State, Division of Cultural Affairs' Capitol Complex Exhibition Program. For more information, contact Erin Long at 850/245-6475 or visit: www.florida-arts.org.

Necklace Pod- *Sophora tomentosa*
30"x40", Oil on Canvas

Plant info..... http://www.killerplants.com/plant-of-the-week/20031110.asp

The common name, necklace pod, refers to the plant's moniliform (constricted at intervals) seed pod. The shrub is called mamane in Hawaii and sea-coast laburnum in Australia. In both Australia and Hawaii, invasive exotic shrubs are encroaching into natural stands of *Sophora tomentosa*.

The seeds contain cytisine, a strongly emetic and purgative toxin. They should be kept out of reach of young children. A related species (*Sophora secundiflora*) from the desert southwest and Mexico was used by natives in religious rituals.

Teachers, Kids, Explore ***New*** Science Curricula at The New York Botanical Garden on "Wondrous Ways Plants Adapt To Challenges"

Story Idea: All across America, schools are striving to find better ways to teach science, math, and literacy. In New York, there is an urgent need for better science education and professional development for science teachers, especially at the elementary school level. A unique science curricula called Garden Adventure SEEDS (Science Exploration and Education Discovery Series) is changing the way science is taught in some New York City schools.

The SEEDS curricula includes three units designed for students of different ages: SEEDS 1: *Plant Parts* for kindergarten-Grade 1; SEEDS 2: *Plant Adaptations* for Grades 2-3, and SEEDS 3: Plant-Animal Interactions for Grades 4-5.
Seeds 2 in April: Teachers and students are pilot-testing SEEDS 2: *Plant Adaptations,* at the Everett Children's Adventure Garden and in classrooms. Classes visit the Garden for SEEDS 2: *Plant Adaptations* on **three Tuesdays in April: April 5, 12 and 19**. Students use the Garden as an extension of the classroom to discover the wondrous ways plants adapt to environmental challenges. Hands-on activities include exploring seed adaptations with hand lenses, investigating

what factors affect roots, and designing experiments on competition for resource.

Seeds 1 In April: On Saturday, April 2, there will be more opportunities for interviews, video, and photos during a professional development workshop for teachers for SEEDS 1: Plant Parts.

Photos, Video and Interviews:

- Students doing hands-on science activities in the Steere Discovery Center
- Teachers and students using SEEDS at the Garden
- Interviews are available with teachers, kids, and parents
- Schools pilot-testing SEEDS 2: *Plant Adaptations* include P.S. 178 and P.S. 96 in the Bronx

Flórula del Parque Nacional Natural Amacayacu Amazonas, Colombia

Colombia is remarkable for its extraordinary biological, ethnic, and cultural diversity. In order to maintain these, riches the government has established a system of protected parks, including the Amacayacu National Natural Park. This park is situated in the rainforest on a section of the Amazon River on Colombia's southern border.

The Flórula del Parque Nacional Natural Amacayacu, Amazonas, Colombia, the ninety-ninth Monograph in Systematic Botany from the Missouri Botanical Garden, documents the vascular plants of the park, presenting detailed information about them in simple yet precise language, together with illustrations of representative species. All of this is made possible by intensive botanical fieldwork begun in 1991, followed by years of identification and compilation by scientists from around the world. The Flórula de las Reservas Biológicas de Iquitos, Perú (MSB 63), published by the Garden in 1997, similarly documents a preserve in a nearby region of Amazonian Peru. One surprising result of this work is the discovery that more than a fourth of the species of Amacayacu National Natural Park do not occur in Iquitos. Thus these two floras are complementary works, contributing to our knowledge of the flora of the upper Amazon basin.

In this volume, introductory material, in both English and Spanish, describes the site and presents a floristic analysis. The rest of the book, entirely in Spanish, contains a general key to families of seed plants, keys and descriptions of all genera and species, information on the habit and citation of representative specimens for each species, as well as a glossary to the botanical terms used.

New Flora of Amboró National Park Region in Bolivia - Documents One of the World's Richest Areas of Biodiversity

Twenty years in the making, the first volume of *Flora de la Región del Parque Nacional Amboró,* was published by Editorial FAN, Santa Cruz de la Sierra, Bolivia, at the end of 2004. Author Michael Nee, a scientist at The New York Botanical Garden and an expert in the plants of tropical America, spearheaded the effort, from plant exploration through research, documentation, and writing.

This volume, *Magnoliidae, Hamamelidae y Caryophyllidae,* is the first in a series of five. Two further volumes are in production and will be published in 2005. The first volume documents, among its 363 species, the first magnolia found in Bolivia. The series will include several dozen new species, including new species of wild peppers.

Parque Nacional Amboró and its vicinity includes an area the size of the Delaware, which contains more than 3000 species of vascular plants. That's approaching the number for the entire northeastern United States east of the Mississippi and north of the Mason-Dixon line.

Amboró National Park is located in the eastern edge of the Andes of central Bolivia and sits at the intersection of four very different habitats, which is why the area so rich in biodiversity. It includes the southern limit of the Amazon lowland tropical rain forest, montane forests, arid desert valleys (the northern tip of chaco woodland with cacti, a vegetation that extends into northern Chile and Argentina), and lowland dry forest. In addition, the Park ranges widely in altitude, from 200 meters (600 ft) above sea level in the humid tropical lowland parts, to over 3000 meters (10,000) feet in the cloud forests in the mountains. The confluence of these very different habitats accounts for the richness of biodiversity. Not only is this one of the most botanically diverse national parks in the world, the area is known as one of the top two areas for bird diversity in the world.

The books are written in Spanish by Dr. Nee and published in Bolivia. For maps, images, and more information on the flora of Amboró National Park, see: http://botanypages.org/nee/

Native American Ethnobotany (humor)

This was told to me today, by a member of the Oneida tribe in Wisconsin. He was telling us about the traditional planting patterns and techniques he'd like to display for us, and then he looked up and said "we'd like to surround the whole thing with a giant circle of onions. Know why?" I shook my head, trying to guess what pests might be discouraged by pungent onion leaves. He continued "So we can have an onion ring."

I have to admit I was completely taken in, and that made it all the more funny... The third time my boss asked him to repeat it for other guests at the meeting he added, "we do also have to watch where we plant the potatoes: we don't want them to close. They'd get tears in their eyes."

-Matthew Cole

Mathematicians and Nature Lovers

Let me, for a moment, step out of my role as mere compiler of these mathematical stories and anecdotes and become a bit more personal. Having associated from early years with two particular classes of scholars—botanists (or, more widely, nature lovers) and mathematicians—I came to notice, and through the years have confirmed, a striking general difference between these two classes. The botanists are usually the most pleasant sort of people to be with; they radiate gentle modesty, are openminded, enjoy one another's company, are kind in their professional comments about one another, and are found interesting by their nonbotanical friends. The mathematicians, on the other hand, are too often unpleasant to be with; they frequently exude selfimportance, are professionally opinionated, tend to bicker and quarrel among themselves and to say unkind things of one another, take an almost gleeful pleasure in unearthing an error in another's work, and are often quite boring to their nonmathematical acquaintances…Thirtysome years ago, when I was a graduate student of mathematics at Harvard University, I had a dear and sagelike friend in the form of a fellow student with whom I often conversed and rambled. In one of our walks, I said to my friend: "Tell me, why are botanists so much nicer to get along with than mathematicians?" I cannot recall receiving an answer at the time, but a couple of summers ago we two met again after three decades of separation. To my surprise, my friend reminded me of my question of so many years ago, and I asked him if he had arrived at an answer. Part of his answer was this:…As for the botanists, it seems quite reasonable that a close association with the intricacies and mysteries of nature would perhaps tend to engender a spirit of modesty, awe, and selfeffacement.

From: *In Mathematical Circles: A Selection Of Mathematical Stories And Anecdotes, Quadrants III and IV* (1969). Pg. 85-86. Prindle, Weber & Schmidt, Inc., Boston

Books Reviewed

Ecological

Economic Botany

Alien Species and Evolution: The Evolutionary Ecology of Exotic Plants, Animals, Microbes, and Interacting Native Species. Cox, George W. 2004. ISBN 1-55963-009-4. (Paper, US$40.00) 377 pp. Island Press, 1718 Connecticut Ave., NW, Suite 300, Washington, DC 20009, USA.—The invasion of natural habitats by alien species has become a topic of controversy and great urgency (Reichard & White 2003). In the last two decades, the number of publications addressing this issue has increased dramatically (Reichard & White 2001). It is in this state of heightened awareness that Dr. George W. Cox introduces his most recent book on invasive species, *Alien Species and Evolution: The evolutionary ecology of exotic plants, animals, microbes, and interactive native species*.

This is Dr. Cox's second book on invasives, and as its title suggests, it is more comprehensive than his first book *Alien species in North America and Hawaii*, also published by Island Press (Cox 1999). Island Press has published other books on invasive species that accentuate the devastating effects of specific alien species introductions (Van Driesche & Van Driesche 2000) or address a wider audience (Baskin 2003), but *Alien Species and Evolution* is unique in the manner in which it highlights the evolutionary potential of alien and native species.

In fact, even the definition of alien species takes a back seat to the evolutionary aspects at play, and when the author finally addresses the "major issue" of "defining what is and what is not an alien" in page 15, the definition is not made clear immediately to the reader. Instead, a series of questions are laid out to entice the reader to think about the complexity encompassed by the concept of alien species. The unwillingness to provide a precise definition may be considered a flaw by some people. In a practical sense, knowing the precise extent and boundaries of the term is critical to develop effective regulatory strategies. However, throughout the entire book an exhaustive collection of examples successfully illustrate that, to be truly meaningful, the concept of alien species must be defined in the context of very specific conservation goals.

The book adequately matches the publisher's overall goal to "provide solutions-oriented information to professionals, public officials, business and community leaders, and concerned citizens who are shaping responses to environmental problems", but to take full advantage of the book, the readers will need to have knowledge of basic biological concepts. Nonetheless, the ease with which the author explains complex experiments and results is commendable. Definitions for most scientific terms are provided in the text and can sometimes be found in the relatively abbreviated glossary. Cox also includes in his book succinct descriptions of several molecular tools available to study genetic variation in invasive species. This section should serve well to biology undergraduates who are familiar with molecular techniques and who are curious about their applicability to the study of invasive species.

The abundance of examples and the practical nature of the chapters' organization make this book a wonderful resource for identifying primary literature on specific areas of invasive species evolution. Each chapter starts with a citation that provides insight into its content and highlights an important publication relevant to that specific topic. The last section summarizes the main points of the chapter and transitions into the following chapter. An outstanding compilation of examples and citations are effectively organized throughout the book under chapter subheadings that make it quick and easy to identify examples within particular categories.

The last five chapters of the book were the most interesting. They focus on the negative and positive impact of alien species and the dynamic nature of "permanently altered biotic communities". Discussions on the potential of native communities and their alien species to coevolve, and the potential of alien species to increase the rate of speciation will sound refreshing to those who have been accustomed to reading only about the devastating effects of alien species. Cox emphasizes the importance of understanding the "dynamic nature of biotic communities in a changing world", especially under global climate change, and urges the reader to think about developing conservation efforts that are "in tune with biogeographic and evolutionary realities".

Half a decade ago, the National Academy of Sciences colloquium titled "The Future of Evolution" was already addressing the importance of the study of evolution of invasive species (Mooney & Cleland 2001). *Alien Species and Evolution* demonstrates that our understanding of alien species evolution has advanced significantly and that much more work remains to be done. As Cox states, "the changes that are now under way in ecosystems through out the world's lands, freshwaters and oceans demand new strategies for conservation that recognize the dangers and benefits presented by the capacity of alien and native species to evolve". After reading this book, alien species and invaded communities can no longer be viewed as static entities. Instead, their ability to evolve must come to the forefront and start to influence the way we approach conservation efforts and address the issue of alien species.

- Nadilia Gomez, Department of Horticultural Science, University of Minnesota, St. Paul, MN 55108

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A Primer of Ecological Statistics. Gotelli, Nicholas J. and Aaron M. Ellison. 2004. ISBN 0-87893-269-0 (Paper US$34.95) 510 pp. Sinauer Associates Inc., P.O. Box 407, Sunderland, MA 01375-0407. Introductory statistics textbooks aimed at ecologists tend to be dumbed-down versions of statistics textbooks for statisticians. This isn't really surprising, since for the most part they are written by statisticians who must daily address the dumb questions ecologists ask them. However, this approach has its drawbacks. What we need as ecologists is not a simplified subset of the tools available to real statisticians; what we need is an understanding of the foundational concepts necessary to frame ecological questions in a statistical context.

Gotelli and Ellison wrote their primer to address this issue. They are not statisticians - they are ecologists with a strong grasp of statistics. In place of the usual

watered-down statistics, they present a distillation of those fundamentals of the discipline that are of particular interest to practicing ecologists. The writing is clear and engaging, and unlike many other textbook writers they make no attempts to present an unbiased treatment of their subject. They have strong opinions on the practice of ecological statistics, and they don't shy away from controversial ideas. This combination of content and style makes for a very engaging, readable book.

Part I of the book is devoted to basic probability theory, summary statistics and hypothesis testing. For the most part this is a clearly presented version of the standard treatment given these topics. The final two chapters of the section are of most interest. Chapter four presents framing and testing hypotheses. In addition to the usual summary of the hypothetico-deductive method, they include discussions of deduction vs. induction and Bayesian inference. Bayesian analysis is further developed in chapter five, where it is contrasted with Monte Carlo and traditional parametric techniques. While the presentation of analytical methods later in the book emphasizes parametric tests, Gotelli and Ellison balance this with Monte Carlo and Bayesian alternatives. Their explanation of permutational testing is very successful, and they argue persuasively for the use of such tests in place of standard non-parametric approaches. However, despite their best efforts I am still unclear on the concepts underlying Bayesian analysis. I would have happily traded a few pages of probability theory for a better explanation of this increasingly popular approach.

The second section of the book provides a very practical guide to designing and managing experiments. We all know that more samples are always better, but Gotelli and Ellison provide some useful hints and tips to use when making the inevitable trade-offs between number of replicates, number of treatments, and number of dollars. Remarkably, experimental and sampling designs are introduced without the aid of a single formula. Instead, they discuss the possibilities and pitfalls of regression, ANOVA, and tabular designs. By delaying the nuts and bolts of calculating sums of squares etc. they give themselves the time to consider the decisions that need to be made before any data is collected. I found the discussion of experimental regression as an alternative to ANOVA especially interesting in this regard.

Another great aid for the neophyte ecologist is the chapter on managing and curating data. Having just gone through this process with my first seasons' field data, I found myself ticking off their suggestions as I read: did that, did that, wish I'd thought of that! Data management is perhaps the most under-valued aspect of ecological research. Gotelli and Ellison try to address this problem, stressing the need to plan, and budget, for this component from the beginning of any project.

Data analysis forms the final section of the book, with chapters on regression, ANOVA, contingency tables, and multivariate analysis. With the underlying principles already established, the authors present a selection of specific methods that are frequently used in ecological studies. While I would be hesitant to try and publish a paper without having checked Gotelli and Ellison's suggestions against a more thorough reference (such as Sokal and Rohlf, 1995), they do help narrow down the options. I also found their explanations of various aspects of regression and ANOVA very helpful _ I have a better, more intuitive understanding of these techniques after reading these sections. On the other hand, I'm not sure how a statistician would feel about their claim that there is no need for correlation analysis in ecological studies, as regression is always preferred. They also present an intriguing argument against using the Bonferroni correction for multiple tests. Whether or not they convince ecologists, and editors, to accept their position, the point that intelligent interpretation of data is more important than blind adherence to significance tests is well made.

Unfortunately, this wonderful little book ends on a sour note. Their emphasis on underlying principles and selecting the best model to test the problem at hand did not carry through to the final chapter on multivariate analysis. Their discussion of the interpretation of ordination diagrams contains troubling inaccuracies and misleading statements. They refer to the joint plots of correspondence analysis as biplots, and don't mention the biplots available with principal component analysis; they claim that the rescaling of principal axes precludes their being related back to the original variables, when in fact the rescaling (as distance or correlation biplots) is what makes such a comparison possible; correspondence analysis is presented as a special case of principal component analysis, when the underlying calculations are actually quite different, and, more importantly, PCoA cannot be used to produce joint plots. Most troubling were the recommendations, where they state "it is rarely obvious which ordination technique you should choose", and then recommend PCoA for general use. PCoA is the most limited form of ordination in terms of plotting options, and each of the methods described has particular requirements and assumptions that need to be met. None of ter Braak's contributions to ordination theory (such as ter Braak and Prentice, 1988; ter Braak and Smilauer, 1998) were cited in the book, which is a shame because his concept of linear vs. unimodal ordination models would have nicely complimented the approach Gottelli and Ellison take in exploring univariate techniques.

The remainder of the twelfth chapter consists of a rather cursory treatment of clustering, discriminant analysis, and canonical or constrained ordination techniques. Perhaps this section wouldn't seem so disappointing had the authors not done such a good job presenting univariate techniques. Their treatment of ANOVA and regression displays an impressive grasp not only of the how's, but also of the why's of univariate statistics. In contrast, the multivariate chapter is a poorly summarized collection of commonly used techniques without any insightful commentary. It certainly should be possible to present a useful 60 page introduction to multivariate statistics. Sadly, this isn't it. Legendre and Legendre's "Numerical Ecology" (1998) provides a solid treatment of this topic, but as a comprehensive manual rather than a primer.

Overall, I would heartily recommend "A Primer of Ecological Statistics" as eleven chapters of essential reading for graduate students in ecology. This clearly written and very practical manual will be very helpful in allowing us to make more efficient use of the weightier tomes on our bookshelves. It provides sound advice for all stages of an ecological research project, from framing questions and managing data through to conducting rigorous analyses.

-Tyler Smith, McGill University, 21,111 Lakeshore Road, Ste. Anne de Bellevue, Quebec H9X 3V9 CANADA

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Statistics without Math. Magnusson, William E. and Guilherme Mourão. 2004. ISBN 85-902002-2-1 (Paper US$24.95) 136 pp. Sinauer Associates Inc., Sunderland, MA. 01375-0407. "The last thing the world needs is another statistics book." So begins *Statistics without math* , the work of two self-described incompetent mathematicians who have nevertheless endeavoured to produce an introductory guide to the discipline for ecologists. They contend that we are poorly served by traditional statistics courses, which spend "one day explaining concepts and nine days dealing with the mathematics." This book is based on a course they offer as an alternative, where they spend "10 days exploring the concepts in relation to the most commonly used techniques and [leave] the mathematics to subsequent courses or private study." It's an important difference, and one that has evidently made a strong impression on their students. They maintain that formulas distract students from the fundamental concepts, and that statistical analyses more complex than a scatter plot are rarely useful. It's an interesting perspective, but I found this book was only partially successful in presenting it.

Magnusson and Mourão do a wonderful job of presenting the philosophical underpinnings of statistical analyses. This includes framing a research question; using flowcharts, models and diagrams to visualize the study system; designing a sampling scheme appropriate to the scale of the question; recognising and avoiding pseudoreplication. These topics are often given short shrift in the rush to get to number-crunching. In *Statistics without math* they are discussed thoughtfully. The simple diagrams and straightforward writing style provide a very accessible treatment.

However, the authors' determination to convince us that only simple graphs and analogies are required to convey statistical ideas is a little forced. They do a great job of presenting regression and correlation, and I found their explanation of residuals very clear. On the other hand, there were times when the insertion of a few simple equations would have enhanced rather than detracted from the text. Normally I prefer words over symbols, but their treatment of descriptive statistics and ANOVA came across as needlessly vague for want of a bit of math.

I was disappointed with the chapter on multivariate analysis, which serves more to discourage the use of these techniques than to objectively introduce them to the novice. In 23 pages they cover multidimensional scaling, eigenvector based ordination, Mantel tests, discriminant analysis, and cluster analysis. They include far more information than is appropriate for such a brief introduction, and use language designed to mystify more than illuminate. In their view, eigenvector analysis is based on "often improbable assumptions" and principal components are best described as "phantom axes", closing their discussion by stating that the "Interpretation of these analyses is an art. If you are not feeling very artistic after reading the preceding section, you probably should not use multivariate techniques." Very few people would find artistic inspiration here, but more as a consequence of the overwhelming presentation than any fundamental challenges posed by the topic.

The chapter on multivariate analysis closes with the claim that "Most `specialists' in multivariate analysis are really just specialists in the use of a particular computer program." This sentiment recurs throughout the text, where we discover that few researchers understand statistical summaries and "few biologists, many fewer statisticians… recognise that most of the information in Figure 4.2A is useless". I found this irritating. It may well be true, but including such derogatory sentiments in an introductory text is of dubious value. At best it distracts from the content, at worst it imparts the idea that you don't need to understand the material because no-one else does either. Similarly, the claim that "every wasted research dollar could have otherwise been used to save the lives of underprivileged children" is undoubtedly true _ but the implication that if we don't follow the authors' advice we're killing children is a bit hard to swallow.

Overall, this book presents some important ideas that warrant more attention from ecologists. Unfortunately, the text is uneven, at times a concise introduction, but varying from too simplistic to overwhelmingly detailed. The occasional bitter remarks don't help either. The have done an excellent job conveying the principles underlying scientific investigations, and I find myself wishing they'd given us more of that discussion. The chapter on multivariate analysis could be dropped without any great loss, and students armed with the basics will be more than able to figure out ANOVA using more traditional sources. I would recommend this book to statistics teachers, as there are many good ideas for the presentation of the topic. For students, however, I would suggest Gotelli and Ellison's *A Primer of Ecological Statistics* (reviewed above), which provides a more balanced treatment from a similar perspective. -Tyler Smith, Plant Science, McGill University, Ste. Anne de Bellevue, Quebec H9X 3V9.

The Encyclopedia of Applied Plant Sciences from Elsevier, edited by Brian Thomas, Denis J. Murphy, and Brian G. Murray, strives to be a comprehensive reference work on applied aspects of modern plant science. It certainly does a good job of providing a wide range of perspectives, with over 200 authors listed from around the world.

The three volume set includes a brief guide to its use, to help the reader navigate the articles, in Volume tne, along with an appendix which lists commonly cultivated plants by both Latin and common names in Volume Three. There are both a Table of Contents (on all volumes but repeated in each volume), and an Index (Volume Three only).

Articles are grouped under broad headings, with each article under a heading being written by different authors than the other articles under that same heading. This provides expert information as much as possible for finely defined subjects. For example, under "Water Relations of Plants" in Volume Three fall articles on "Basic Water Relations;" "Xylem;" "Phloem;" "Stomata;" "Uptake, Loss, and Control;" "Drought Stress;" "Salt Stress;" and "Plant Responses to Waterlogging." In Volume Two, "Primary Products" contains information on "Cellulose," "Amino Acids," "Oils," "Proteins," and "Starch." Articles are almost all in the 5-10 page range, and 5-10 references are provided for each.

The references would be useful for beginning a literature search since they include some reference books and review articles from major journals as well as some primary literature. The proportions of these types of resources vary from article to article and author to author. In general, the focus is as the title suggests, on the applied aspects. When seed storage proteins are considered, for example, the basics are briefly discussed, but applied topics also receive considerable weight, such as efforts to genetically modify seed storage proteins to avoid allergens and increase the proportion of essential amino acids.

The editors and authors have done a fine job of keeping the language scientific enough to make this valuable for working scientists, providing abundant data, diagrams of genes important in applied plant biology, and technical measurements, while keeping the text clear and simple. The level of terminology which will be accessible to introductory students, since the authors use, among other things, the complete names of amino acids rather than the one- or three-letter codes. Sentences occasionally run a bit longer than needed, but compared to a typical journal article, this is easy reading.

To take a sample article which might be of interest to many readers of Plant Science Bulletin, either for their research or for courses which they teach, consider "Auxins," pp. 985-995 under "Regulators of Growth" in Volume Two. R. M. Napier opens with a brief survey of the history of auxin's discovery and then with the various known natural auxins as well as synthetic auxins important for applied plant biology. The rest of the 8 pages in the article deal in turn with synthesis and metabolism of auxin, transport, and then both its effects and the molecular biology of its effects. In all, the amount of information and the level of detail is less than can be found in Taiz and Zeiger's textbook on plant physiology, which many readers may use, which is appropriate for an encyclopedia. The information in Figures 2 and 3 (pp. 989 and 991, respectively) explains polar transport of auxin and the connection between auxin from the shoot apical meristem and phyllotaxis more clearly and simply than many textbooks manage to do.

Throughout The Encyclopedia of Applied Plant Sciences, the illustrations are clear and are almost all shown in black-and-white. Each volume contains a few color images in a centrally-located section, but these images are definitely not sharp, which sometimes detracts from the information which they attempt to portray. For an example, see Plate 5 in Volume One, which shows chromosomal spreads of a hybrid between two members of the Poaceae stained with fluorescent dyes. With a list price of $1000 for these three volumes, better quality in the color figures, and more of them, would have been appropriate. The black-and-white figures are of good quality, however. For example, on pp. 236-237 of Volume One, a number of virus genera are shown in Figures 1-3, and the negatively stained transmission electron micrographs display a reasonable amount of detail. However, with most viruses' subunits not clearly resolved, the figures cannot be called excellent as reproduced in the book.

This is a very valuable work and libraries, especially at universities, should strongly consider its purchase, though it is probably priced out of range for individual readers. University libraries which serve any branch of applied plant science, such as Horticulture, should definitely purchase this work.

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

Flower Chronicles: The Legend and Lore of Fifteen Garden Favorites. Hollingsworth, E. Buckner. 2004 (1958). ISBN 0-226-34980-2. 302 pages. The University of Chicago Press, Chicago. In the introductory chapter entitled "Books and Flowers, an amateur's adventure into research," the author explains how working in her own garden led to an insatiable curiosity about the origins and human uses of the ornamental plants she was growing. The depth and breadth of her subsequent research is certainly impressive and her enthusiasm for sometimes dusty and arcane subject matter shines throughout the book. However it requires a strong interest and background in ancient and medieval human history to fully appreciate the information that Hollingsworth presents about sixteen very common garden plants ranging from roses to narcissus. The author refers familiarly to numerous ancient herbalists and garden writers whom most present-day botanical researcher will never have heard of. Although her introductory chapter tries to establish the historical context for the welter of disparate information that follows for each plant, it can be as difficult for a botanist to follow her time line of human plant history as it would be for a historian to follow the geologic time line.

The wide range of subject matter is reflected in the subtitles of the bibliography which includes cookbooks and stillroom books, herbals and about herbals, pharmacy, medicine, archaeology and antiquity, the language of flowers, folklore, cosmetics and perfumes, heraldry, plant hunters, flowers and gardens and miscellaneous. These references, all English language, date from 1525 to 1954 in this 2004 reprint of a book first published in 1958. In an enthusiastic foreword botanist Peter Bernhardt notes several ways he has found to use the information in the book and lists eight additional modern references to "bridge the gap between general publications and technical treatments." Connections to modern plant usage can be made. For example, both historical and modern recipes share a common effort to translate the science of the time into palatable and healthful sustenance. Though Patina de Rosis is a recipe for rose hips and calves brains that dates from Ancient Roman days, its principal ingredients would certainly satisfy a current taste for a low-carb meal. Some of the more gruesome herbal remedies based on various parts of these garden ornamentals combined with less savory ingredients such as frog's urine will certainly catch the attention

of some audiences.

The legend and lore of sixteen different garden favorites is not a topic which lends itself to a cover to cover reading as each chapter appears to cover similar ground about a different plant with minor variations. Sometimes the author's use of common names and the historical confusion caused by pre-Linnaeus names makes it difficult to be sure just which plant is being described. However, if one is trying to interest the general public or undergraduate in plants, there are plenty of short stories about such events as the brief and financially disastrous tulip mania in the 1600's that relate directly to current events, and there are interesting recipes and herbal medicines that illustrate the great changes that have taken place in our understanding and use of plants since ancient times. - Joanne Sharpe, Coastal Maine Botanical Gardens, Boothbay Maine

Seeds: The Definitive Guide to Growing, History & Lore. Peter Loewer. 2005. ISBN 0-88192-682-5 (Paper US$17.95) 240 pp. Timber Press. 133 S.W. Second Avenue, Suite 450, Portland, OR 97204-3527. Understanding the biology of seeds is essential for botanists and gardeners alike. Peter Loewer's focus is on the concerns of gardeners, and will interest anyone interested in the life of plants and the planet. He provides detailed advice on buying, storing and germinating, sterilizing soil, indoor to outdoor transplanting, and building cold frames.

This paperback edition is largely a reissue of the original 1995 publication. The contents seem divided into two major sub-sections, the first classically botanical, opening with an introduction to seeds and the plant kingdom, and continuing with chapters about pollination, heredity, seed chemistry, the process of germination, the longevity of seeds, and seed dispersal. The coverage is reasonably thorough and well illustrated; hence this book would serve as a useful textbook for an introductory botany course taught through a botanical garden, horticulture or landscape architecture program. The second section considers the buying and selling of seeds. Those subjects include storing seeds for the future, the big business of seeds, a sampling of American seed houses, seed nurseries, seed exchanges, seed collectors, soil mixes, equipment and planting out, and collecting your own seed. Propagating ferns, the penultimate chapter out from strict adherence to the designation `seeds.'

Among the charming features of Seeds are the illustrations. The front and back covers are decorated with the author's figures of an array of seed types. Some individual chapters open alongside or contain an assortment of unattributed illustrations, and since the back cover describes the author as a longstanding writer and botanical artist, Loewer may have drawn them as well. These include the leaves and fruit of a Malabar gourd, the multiple flower of the salmon blood lily, *Haemanthus multiflorus*, a pod of the unicorn plant, *Proboscidea louisianica*, a typical fly flower - toad cactus, *Stapelia variegata*, seeds and blossoms of the spider plant, *Cleome hasslerana*, and an enduring favorite, seedpod of the lotus, *Nelumbo nucifera*.

The text is eminently readable, filled with descriptions of the author's and others' expeditions to collect seed and experiences as growers. The Big Business of Seeds covers important contemporary domestic as well as international economic trends: e.g. the growth in popularity, yield and quality of white corn. This book provides refreshing reading to a devoted gardener during the quiet winter months when there is little work to be done outdoors. It could serve as an excellent starting point for a concise plant biology course, from which the lecturer can launch discussions into a myriad of directions based on her/his individual interests and expertise. Dorothea Bedigian, Washington University and Missouri Botanical Garden, St. Louis.

11th International Exhibition of Botanical Art and Illustration. White, James J. and Lugene B. Bruno. 2004. ISBN 0-913196-79-7 (Paper US$25.00) 172 pp. Hunt Institute for Botanical Documentation, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, PA 15213. The 11th International Exhibition of Botanical Art & Illustration catalog shows yet another outstanding selection of recent drawings and paintings of plants from Carnegie Mellon University's Hunt Institute. These paintings are from the winter 2004/05 exhibit, and the renaissance in botanical art clearly has not lost speed.

Botanical art, which hit something of a nadir in the early twentieth century, has of late been booming. Works are now being produced which are the equal of the some of the best ever done, during the late eighteenth and early nineteenth centuries by Ehret, Redouté, and Ferdinand Bauer. All sorts of styles can be found being used by the members of the American Society of Botanical Artists (ASBA), the Guild of Natural Science Illustrators, and others.

A brief pair of introductory pages is followed by the collection of images, all excellently reproduced, one or two per artist. The book concludes with fairly extensive biographies of one to two pages for each artist, including a photograph of each artist, a nice touch.

There is something in this catalog from the Hunt Institute for every taste. Images range from highly detailed versions of autumn maple leaves by Toshi Shibusawa (Plate 79) to almost detail-free graphite images of unnamed leaves (Plate 68 by Bill Richards). Flowers, fruit and vegetables abound—interestingly, there are quite a number of paintings of Indian corn. Some of the pen-and-ink images are very strongly reminiscent of old engravings from early nineteenth century reprints which the reviewer has seen. Some artists show idealized views, leaves and fruits unspotted and without caterpillar holes (e.g. the Paphiopedilum in Plate 62), while others take advantage of these "flaws" as dramatic highlights (e.g. Plate 46, Asian lotus). Interestingly, a very nice plate showing Clematis, though far from the most striking or richly colored image in the book, is used for the cover, with a very attractive purple border to match the theme color of the plate.

This reviewer found Plate 50 by Barbara Oozeerally, of three ornamental gourds, to be the most appealing work in the 11th International Exhibition of Botanical Art & Illustration catalog for its combination of vibrant color and realism, though it is not in a photorealistic air-brushed style like the purple irises in Plate 32 by Olga Makrushenko. Elaine Musgrave's image of Auraucaria bildwilii, the Bunya Bunya of Queensland, Australia, would make a fine image for reproduction as prints, and even seems designed for that purpose, though the truncation of the cone does detract from the balance and elegance of Plate 44.

The 11th International Exhibition of Botanical Art & Illustration catalog is a lovely work, and with its price libraries should seriously consider buying a copy, as should anyone interested in botanical art and its support. The Hunt Institute is perhaps the most important center for botanical art anywhere, and it certainly holds that title in the US, among other things as host of the website for the ASBA. Buy a copy today. Douglas Darnowski, Department of Biology, Indiana University Southeast.

The Genus *Lavandula*. Upson, Tim and Susyn Andrews. 2004. ISBN 0-88192-642-6 (Cloth, US$49.95). 442 pp. Timber Press, 133 S.W. Second Avenue, Suite 450, Portland, OR 97204-9743. The dust jacket of The Genus *Lavandula* promises that this is the most comprehensive and authoritative account of lavenders to be published to date, focusing on their worldwide importance as garden plants and a mainstay of the perfumery and aromatherapy industries. Encompassing 39 species, their hybrids and nearly 400 cultivars, the contents open with a key to each section, followed by botanical description, and coverage of distribution, common names, habitat/ecology and ethnobotany. Additional chapters deal with propagation, pests and diseases, and an overview of commercial products, essential oils and chemistry.

The Preface written by Professor Sir Ghillean Prance, FRS, VMH accentuates a vital viewpoint, that for a genus of such economic, horticultural and industrial importance, it is essential to have a definitive taxonomy. He reminds botanists that horticultural taxonomy is an all too rare branch of the discipline, and urges more people to tackle the taxonomy of cultivated genera, where one is not only dealing with naturally evolved taxa, but also with those created by plant breeders through the ages. He also recognizes that it is a far more difficult job to unravel the taxonomic history of a group of plants that have been altered by man over so many generations.

The Genus *Lavandula* is a comprehensive and in-depth botanical monograph. Parts of this book have their origin in the Ph.D. research undertaken by author Tim Upson. It includes the results of phylogenetic studies that provide strong statistical support for the congruence of morphology and sequence data for hypotheses of relationships at the sectional level, within the genus. A high degree of confidence can be placed in the major groupings of species. The book raises issues in biogeography, citing more detailed studies, and showing links between disparate parts of the Old World. It takes account of chromosome numbers. It is beautifully illustrated with color plates throughout the book, including 31 full-page color paintings, close up color photographs, 45 line drawings and numerous distribution maps. I received this volume as I was coping with all the minute details of preparing my own monograph (Bedigian, 2005), and I can feel profoundly Upson and Andrews' painstaking and patient preparation of this masterpiece.

Having previously reviewed Lavender: the genus *Lavandula* edited by Maria Lis-Balchin, in these pages (Plant Science Bulletin 49(1): 24, 2003), I have an

example handy for comparison. The objectives of each book differ considerably, and I believe each one is a stunning success. The Medicinal and Aromatic Plants - Industrial Profiles series is addressed to an exacting audience of researchers in industry as well as academia. That volume is strong in phytochemistry and documents medicinal efficacy in considerable detail, enough to justify that medical college libraries consider owning the book as a valuable reference work about plant medicine.

This sumptuously illustrated monograph is scrupulously researched too, as Kew botanists and others subsequently reviewed the particulars. I particularly appreciate this volume's historic approach to lavender cultivation, and its color photographs illustrating a range of uses, starting with ancient lavender fascicles for placing among linen from the Ionian Islands of Greece. Other photographs depict a selection of edible lavender products, lavender bags and an aroma cushion, a collection of lavender flavored liqueurs, syrups and beer, an assortment of lavender essential oils, body and health products, and a display of French lavender labels and bottles. The book includes 18 pages of bibliography. Its 442 glossy pages, hard cover and excellent binding make it a long lasting, but hefty tome to lift. One minor objection from readers with weak eyes might be the small font size, possibly an economic decision to allow presentation of every detail within a reasonable number of pages.

The Genus *Lavandula* is a magnificent reference work that will give pleasure to botanists, perfumers, aromatherapists, growers and gardeners. At the cover price of $49.95, this book offers superb value and wide-ranging information, about the agreeable old healing favorite that it describes. - Dorothea Bedigian, Washington University and Missouri Botanical Garden, St. Louis.

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Bedigian, D. 2005. Taxonomy and Ecology of *Sesamum* L. (Pedaliaceae). Blumea 50: xxx-xxx.
Lis-Balchin, Maria, ed. 2002. Lavender: the genus *Lavandula*. Volume 29, Medicinal and Aromatic Plants - Industrial Profiles. Taylor & Francis Books, New York.

Phytochrome: A pair of Haiku

P_r

the chromophore waits
to receive the red photon;
small things cause great change

P_{fr}

a flash beyond red
altering conformation;
prior form returns

D.R. Taub
Southwestern University
Georgetown, TX

Handbook of Seed Physiology: Applications to Agriculture. Roberto L. Benech-Arnold and Roldolfo A. Sánchez (eds.) 2004. ISBN 1-56022-929-2. (Paper, US$ 49.95) xvi + 480 pp. Food Products Press, 10 Alice Street, Binghamton, NY 13904-1580. The short title of this book given under "Books Received" in PSB 50(4): 142 (2004) is *Handbook of Seed Physiology* . Thus, since my research interests center on the ecophysiology of seed dormancy and germination, I emailed Dr. Sundberg indicating that I wished to review the book for PSB. I had expected a book of the nature of J.D. Bewley and M. Black's *Seeds. Physiology of Development and Germination* ." 2nd ed. (Plenum Press, New York, 10013). However, upon receiving my review copy of *Handbook*, I quickly noticed that it had a subtitle: *Applications to Agriculture*, which somewhat dampened my enthusiasm for reviewing the book. Nevertheless, I read the book from cover to cover and actually found several chapters to be relevant to my interests in seed biology, e.g., chapter 7 on loss of dormancy and induction of germination and chapter 8 on modeling changes in dormancy of weed seeds in the field.

The authors state in the Preface that the scope of *Handbook* differs from that of other books recently published on seed biology, in that it addresses (1) aspects of seed biology related to crop production and industrial uses, (2) the use of basic knowledge of seeds to solve problems in agriculture, and (3) dormancy in seeds of crops and weeds and mathematical models for predicting their germination in the field. *Handbook* contains four sections and 13 chapters. Section I consists of four chapters (1-4) on prediction and improvement of crop stand establishment; Section II of four chapters (5-8) on dormancy in crop and weed seeds, including the problem of preharvest sprouting in cereals; Section III of two chapters (9-10) on seed longevity and storage, i.e., deterioration and repair of orthodox (desiccation-tolerant) seeds and an overview of the biology and of the practicalities of handling recalcitrant (desiccation-intolerant) seeds; and Section IV of three chapters (11-13) on the industrial quality of oil-crop seeds, of wheat and other cereals for flour, and of barely for malting. Each chapter has a long list of references, and there is a 24-page double-column subject matter/taxon index.

Each of the 13 well-written, up-to-date, and comprehensive chapters is authored by (an) expert(s) on the subject, and most of them are of the review and synthesis type, i.e., not a manual or guidebook *per se* as might be implied from the word "handbook" in the title. An exception is chapter 10 entitled "Recalcitrant seeds" by P. Berjak and N. W. Pammenter, which stands out from the other chapters in that it contains a wealth of information on the practical ("how to do it") aspects of handling recalcitrant seeds. Thus, for example, these authors present a considerable amount of information on harvest, transport, and storage of desiccation intolerant seeds.

I agree with the editors of *Handbook* (Preface) that the mix of topics covered in this book differs from that of books recently published on the agronomical, ecological, developmental, physiological, and technological aspects of seed biology. As such, it does a good job of filling a gap in the kinds of books available on seed biology. *Handbook* should be in the library of all institutions where faculty are engaged in seed research and/or in teaching courses in seed biology and/or plant physiology/plant molecular biology. Jerry M. Baskin, Department of Biology, University of Kentucky, Lexington, KY 40506-0225 USA

Speciation. Coyne, Jerry A. and H. Allen Orr. 2004. ISBN 0-87893-089-2. (Paper US$54.95) 545 pp. Sinauer Associates, Inc. P.O. Box 407, Sunderland, MA 01375-0407. The passing, at century mark, of Ernst Mayr, architect of evolutionary theories, coincided with my reading of Coyne and Orr's splendid new compilation, *Speciation.* Praised for his prominent contributions, Mayr' s (1942) investigations into systematics and the evolution of new species established that isolation was required for new species formation.

We've reached the century mark too, since a modern scientist defined species. Grant (1963) cites Jordan (1905), for an early use of the term. "Three common *Pieris* of the gardens of Goettingen, the carab beetles of the Hainberg, the physopodes in the flowers of the Botanical Garden, the mice on the fields of the Weend, the bembids on the sand of the sore of the Leine, they all prove that the living inhabitants of a region are not a chaotic mass of intergrading groups […]

which with Linnaeus we call species." Sachs (1906) unearthed even earlier views, of Cesalpino in *De plantis libri* (1583), of John Ray in *Historia plantarum* (1686), and of Linnaeus in *Critica botanica* (1737) and *Philosophia botanica*. Cesalpino stated, with reference to species, that **like always produces like**. John Ray went on to say that plants which spring from the same seed and produce their kind again through seed, belong to the same species. Linnaeus followed with statements contrasting species with varieties. "The Author of nature, when He created species, imposed on this Creation an eternal law of reproduction and multiplication **within the limits of their proper kinds**."

All biologists now recognize organisms by their species names, yet there is no single definition of a species that is universally accepted; rather, connotations of the designation `species' are still controversial. Likewise, the processes of speciation have more than a few explanations. Coyne and Orr's *Speciation*, and reviewers' plentiful and varied responses to it (e.g. Blackman & Rieseberg, 2004; Butlin, 2004; Forister & McKay, n.d; Mallet, 2004; Meyer, 2004; Wake, 2004), presents proof that species concepts are one of the most hotly debated areas of biology today. Methods of analysis have been revolutionized, compared with those given in earlier publications on the subject, e.g. *Plant Speciation* (Grant, 1971). It remains for independent researchers to substantiate how well these techniques have improved investigation of variability within species in relation to their ecological role.

`The species' is not a standardized unit. Genetic structuring of plant populations is strongly influenced by both common ancestry and current patterns of interpopulation genetic exchange (Schaal, et al., 1998). The application of **phylogeography** for studying plant evolution was still in its infancy a decade earlier, yet receives limited attention here as the word appears only once in this book, by way of a definition. **Phylogeography** is a field of study concerned with the principles and processes governing the geographic distributions of genealogical lineages, the study of genetic patterns over space. This includes both intra- and inter-species analysis. Authors Coyne and Orr admit (2004: 34) that the notion of species here is on a sliding scale, and a species concept allows some introgression to understand how coexisting populations came into being, and it is unimportant whether systematists consider such divergent populations as species. They see niche differences as more relevant to the persistence of species, for there is no necessary correlation between reproductive isolation and ecological differentiation.

There are few examples where reproductively isolated populations coexist while being connected by apparently gradual variation around geographic barriers (Irwin et al., 2005), although traditional models emphasized geographic separation as a necessary prerequisite to speciation.

Are the origins of adaptations to new ecological challenges within species, the foundation of speciation? Grant (1971) confirmed that in nature, subpopulations living in different parts of the species areas are normally exposed to different environmental conditions and hence to differential or disruptive selection. Natural selection acts in combination with the breeding structure of the species.

Genetic structuring of plant populations is strongly influenced by both common ancestry and current patterns of interpopulation genetic exchange (Schaal et al., 1998). The complexities of plant genetic structures affect genetic exchange and in some instances reproductive barriers are weak between otherwise morphologically well defined species. Phylogeographic methods, study of genetic patterns over space, show promise, but this application has been hindered by a lack of appropriate molecular variation.

Baum & Donoghue (1995) argued that the most fundamental division among phylogenetic species concepts is that some define species on the basis of characters, whereas others define them on historical relationships or ancestry. Only if a species possesses certain characters would it belong to a species. Baum & Shaw (1995) viewed a species as a "player in evolution, not a product of evolution."

Backing ecological speciation, Levin (1993) suggested that "isolates arise from the fragmentation or contraction of a species' range due to deterioration of the environment or through dispersal from the main geographic range of the species." Most models of speciation predict that it will occur in ecologically marginal conditions, which may be at the geographical margin of a species' range." Peripheral and disjunct isolates are important foci for the emergence of evolutionary novelty. The breeding system of populations influences their genetic variation and immigration rates (Levin, 2000). Predominantly selfing species ha ve less genetic variation per population than outcrossing species.

The emergence of new species via chromosome doubling initially involves a few individuals, which form a subpopulation reproductively isolated from their diploid progenitors (Harlan & De Wet, 1975; Lewis, 1980). The novelty may place an organism beyond the prescribed limits of the diploid progenitors. Polyploids generally have different ecological requirements than their diploid parents (De Wet, 1971) and commonly extend into different climatic zones.

The differentiation of populations might lead to the formation of ecological races (or ecotypes) and geographical races (or varieties or subspecies) (Levin, 2000: 110). Their distributions will be interwoven with or append the range of their progenitors. Ecological races often are not morphologically well defined. There may be several ecological races in the same area as long as there is a mosaic habitat. Geographical races occupy somewhat broader and more widely distributed habitat patches than ecological races, and are allopatric or disjunct. "They sometimes are equated to climatic races when plants are distributed along elevational gradients or to subspecies. Geographical races are morphologically distinct and have different ecological tolerances" (Levin, 2000: 110). Speciation in plants often is associated with chromosomal change. Chromosomal races may differ either in chromosome arrangement or number (exclusive of polyploidy) from the source population (Levin, 2000: 111).

This first book length treatment of speciation in many years is very welcome because it brings together a widely scattered literature. It seems to be an expansion of an earlier article (Coyne & Orr, 1998) and offers not only a compilation of much theoretical work on the subject, but has practical utility, e.g. for plant genetic resource management (Bretting & Widrlechner, 1995). It will be valuable to researchers in evolutionary biology and ideal for a graduate level course, since the literature on speciation is enormous, and has become increasingly more technical, as can be seen by perusing these 49 pages of bibliographical references. A handy Appendix: Catalogue and Critique of eight Species Concepts describes and evaluates species concepts that the authors consider serious competitors to the Biological Species Concept. The Author Index is also a useful search tool, but the Subject Index is less thorough. I had hoped to find an expanded discussion about ecological speciation and the role of disturbance (Levin, 2003a, 2003b, 2004) but details about this subject are few. - Dorothea Bedigian, Washington University and Missouri Botanical Garden, St. Louis.

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Dogwoods. Cappiello, Paul and Don Shadow. 2005. ISBN 0-88192-679-5 (Cloth US$39.95). 224 pp. Timber Press, 133 S.W. Second Avenue, Suite 450, Portland, OR 97204-3527.

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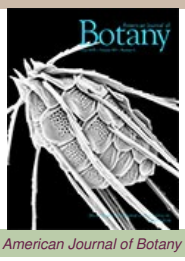

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See more of Botanical Research Institute of Texas on Facebook. Log In. or. Create New Account. See more of Botanical Research Institute of Texas on Facebook. Log In. Forgot account?Â Places Fort Worth, Texas Community OrganizationEnvironmental Conservation Organization Botanical Research Institute of Texas. English (US) Â· EspaÃ±ol Â· PortuguÃªs (Brasil) Â· FranÃ§ais (France) Â· Deutsch. Privacy Â· Terms Â· Advertising Â· Ad Choices Â· Cookies Â·. H3 has designed a new headquarters for the Botanical Research Institute of Texas (BRIT). Founded in 1987, BRIT is an internationally recognized non-profit research and conservation organization whose collection of more than one million dried plants represents many of the earthâ€™s plant families. Once complete, BRIT will hold more than two million plant specimens, making it one of the largest such repositories in the country. Further, as a demonstration of the clientâ€™s commitment to environmentalism and energy-efficient design, H3 and BRIT will seek a LEED Gold certification. Serving as both mus Weâ€™re the Botanical Research Institute of Texas, an international scientific research and learning center focused on conservation and knowledge sharing. Become A Member. Upcoming Events. View All >. Adult Education: Classes & Workshops. Botanical Arts and Crafts. Creative by nature.Â The BRIT herbarium has acquired a unique collection of wood specimens (a xylarium) that curators have been organizing over the past few months to make it accessible to researchers and the public. These specimens come in all shapes, cuts, sizes, and varieties of woody plants from across the world! Seven of these specimens that bore no labels or data were brought to curatorsâ€™ attention and were a complete mystery until more investigating and research was done.