BULLETIN

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PLANT SCIENCE

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

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Periodically we've tried to highlight some of the botanical "hidden gems" that can be found around the country. These may be facilities of general public interest, botanical resources for formal or informal teaching and/or institutions to facilitate research on a variety of botanical topics. This month we're pleased to feature two such "gems."

Throughout the years I've had an opportunity to visit a number of "teaching greenhouses" located at colleges and universities throughout the country. Occasionally there is a real stand out. One of these was the new facility on the Hamilton campus of Miami University that was featured two issues ago [PSB 52(4)]. Another is the more "mature" facility at the University of Northern Iowa (UNI) that leads this issue. This is an older range that has grown in stages but always with the mission of showcasing plant diversity while providing space for student and faculty research. UNI has done a particularly good job of involving students in the operation. Those of you who oversee the greenhouse on your campus will want to read this with pen and notebook in hand - - and feel free to contact Jean for further information.

My other usual "entertainment" when visiting other campuses is to browse the library stacks in the botany and agriculture sections. It's always a treat when a rare books collection includes some botanical works. Given my bibliophile bias, what could be better than to share one of my recent discoveries – the Lloyd Library and Museum in Cincinnati. Anyone driving to the Chicago meeting from the southeastern part of the country this year will want to schedule a stop in Cincinnati along the way. If you're not one of those, you'll have to be satisfied with reading about it in this issue.

Finally, a real treat! As many of you know we've just marked the 300th anniversary of Linnaeus' birth. Classicist Stephen Freer has prepared a brief biography for us. Enjoy

-Editor

The University of Northern Iowa Botanical Center–70 years of Progress

Next year the University of Northern Iowa (UNI) Botanical Center, located near the center of campus, will host an Open House to celebrate the completion of renovations that will give us nearly 7000 square feet of greenhouse space with new benches and mechanicals, and a new Head House with adjacent cold storage facilities, garage, and biotechnology research lab with attached greenhouse. This complements the 2003 addition of a botany classroom, two offices, a reception foyer, and a tunnel to McCollum Science Hall, where the majority of the Biology Department at UNI resides. The collection consists of just over 800 different species and varieties of plants, many arranged in ecological plantings. I keep asking myself, "How did it happen that a mainly undergraduate, state-funded school known for its education and business faculties has created and fostered one of the best greenhouse teaching collections in the region?"

When I interviewed for a faculty position in 1994 the greenhouse had such low priority that my tour was scheduled after hours. Clearly no one on the search committee was very interested in the facilities. There was an air of despondency, exemplified by the hideous pink trim in the halls and Head House. However, once I'd settled in at UNI I realized that we had a very good staff, a number of dedicated student workers, and the basis of a good plant collection. The staff, though, felt under siege from the upper administration, the department was just emerging from a long period of upheaval, and the words "parking garage" hovered in the background.

The UNI greenhouse was built in 1938 to serve the Science Department as it was known then, and as a headquarters for the groundskeepers. "Serving the Science Department" meant establishing and

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caring for a plant collection for class use, but it also meant caring for a variety of animals (including overwintering the City of Cedar Falls Parks Department monkeys) and providing up to 250 white rats/semester for dissection. In 1968, at about the time the Biology Department was established, Ronald Camarata was hired as the greenhouse manager, and it was largely due to his efforts that the Botanical Center has survived and flourished.

Three houses on south side of range

The Biology Research Complex was built in the 1970's across the road from the main campus, and included new animal care facilities and a research greenhouses. At the same time a number of on- and off-campus properties were folded into a newly-established UNI Preserves system, and they required managing. A second full time staff person was hired whose duties were to focus on the Preserves during the summer and the greenhouse during the rest of the year. During this period the greenhouses were updated and the wooden frames were replaced with aluminum.

The 1980's were difficult for Iowa and for the Biology department. Maintenance funding was very hard to come by. However, Ron persevered and kept the operation running by salvaging old parts for repair from wherever he could, by being a strong advocate for the greenhouse both within the university and the community, and by refusing to accept "no" as an answer. At a time when other universities moved towards a research focus, UNI did not, and so the teaching collection remained.

The 1990's marked a change in administration in the Biology department and an influx of new faculty. Ron seized the opportunity, and with support from the new Head, Barbara Hetrick, he began a campaign to expand the role and importance of his greenhouses. He worked very hard to make sure that plants were correctly labelled, and established a searchable species database and greenhouse website. He consulted with the faculty and increased the collection so that the previously dominant *Coleus* and *Tradescantia* benches became just part of the mix. He encouraged volunteers to help at the greenhouse. He strengthened the student training program by initiating two greenhouse internships each year. He supported the establishment of the student Botany Club in 1996, especially their main fundraising activity, the Spring Plant Sale. This is now a major campus event and each April the students sell the hundreds of plants they have propagated. Proceeds are divided with the greenhouse, which uses its share to enhance the plant collection.

The greenhouse plantings have always been mainly in-ground, arranged more or less according to horticultural requirements. Thus, the Tropical House has always had its banana, papaya, sugar cane, bamboo, *Monstera, Ficus* and coffee tree, if rather overgrown. In 1997 a new horticulturist, Billie Hemmer, began to refurbish this area, with the result that it now has a more convincing tropical ambience. My need for gymnosperms has meant we now have some quite large *Araucaria*, *Cedrus*, *Sequoia*, and *Podocarpus* scattered around the plantings.

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Orchid House

Ron and Billie created an Aquatic House to replace the unused fish tanks. Ron had no special funding for this project, but the Physical Plant plumbers and masons volunteered their time (in exchange for morning coffee and baked goods) and local businesses donated supplies (including a massive amount of concrete). The Aquatic Learning Center opened early in 1999. A large pond and waterfall featuring a number of aquatic plants, a fine collection of donated koi and some resident turtles dominate the room. The projected creek has morphed into a fern collection used in my plant diversity course. For me, the highlight of this room is the *Sphagnum* bog; easily the largest one in Iowa. Currently we are watching the Venus fly traps bloom, as well as *Pinguicula* and of course many species of *Drosera* and *Sarracenia*.

In 1996 we documented the fact that nearly one quarter of UNI students (including all 600 Biology majors) visit or use the greenhouse as part of their classroom activities. This and the fact that the "plant" classes make heavy use of the greenhouse allowed us to reclaim adjacent Physical Plant space for a classroom. School tours, community classes and garden club meetings increased the Botanical Center's profile. Ron continued to press for a foyer for tours to gather, a proper botany classroom, offices with windows and bathrooms that would meet code, and in 2002 these were all realized as part of a McCollum Science Hall addition.

Pond

Sadly, ill health forced Ron to retire in late 2002. The new classroom was named in his honor in 2003. In early 2003 Billie Hemmer took over as greenhouse manager and Stephanie Witte replaced Billie as horticulturist. Billie and Stephanie have continued to focus on increasing the plant collection and have also added class material to the plantings around the greenhouse. They work more closely with the Grounds Department in landscape planning, but continue to be responsible for managing the campus Preserves. In addition they have taken on a larger role in supporting faculty research. As funding for school tours has been reduced, they have begun to take the greenhouse to the community by presenting talks and activities at local area schools.

McCollum Science Hall is again undergoing renovation, and the Head House, mechanicals, research lab and greenhouse are included in this project. When complete, we will truly possess a Botanical Center, of which the greenhouses will continue to be the focus. The "parking garage" still floats around administration minds, but the greenhouses are no longer considered a viable site. There is talk of adding a 4th floor to McCollum Science Hall, with new research greenhouses. Regardless, the UNI Botanical Center and greenhouses are a wonderful place to visit, full of enthusiastic, dedicated staff and students, and combining the ambience of a conservatory with a high quality plant collection.

Jean Gerrath, Department of Biological Sciences, University of Northern Iowa.

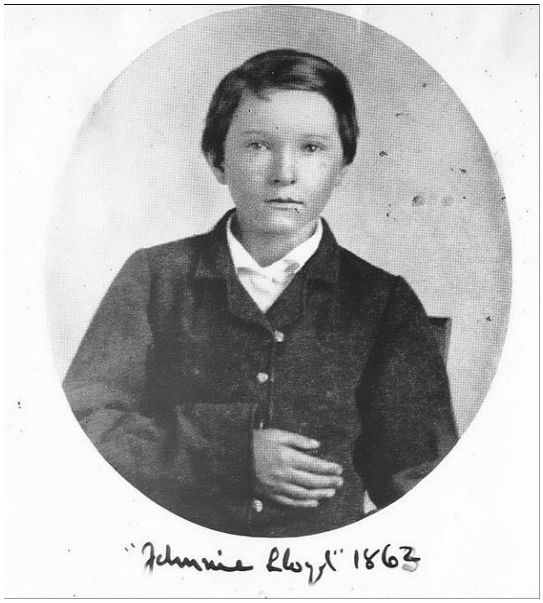
The Lloyd Library and Museum Cincinnati, Ohio

Maggie Heran, MLS, Director

(This is a revised version of an article that appeared in the *Council on Botanical and Horticultural Libraries Newsletter*, Number 105, May 2007)

The Lloyd Library and Museum, a privately-funded independent research library, is consulted and visited by both the national and international scientific community as well as the general public. Although it is a non-circulating, closed stacks collection, the library serves its clientele through holding, identifying, acquiring, preserving, and providing access to its historic and current books and journals, as well as archival materials, on a wide variety of disciplines that fall under the broad subject areas of natural history, botany, pharmacy, and medicine. The Lloyd's resources are, in fact, an eclectic blend of a host of related sciences and their history, including, but not limited to, chemistry, zoology, forestry, pharmacognosy, phytomedicine, ethnobotany, folk and traditional medicine, and alternative healing practices. In addition, the library holds materials on gardening, gardening history, horticulture, agriculture, cosmetics, perfumery, eclectic and sectarian medicine, and alchemy. Despite the scientific focus, the collections have relevance to the humanities, such as visual arts and foreign languages, through resources that feature botanical illustrations, original artworks, and travel and exploration literature. With over 200,000 volumes and nearly 1000 linear feet of archives (including papers of herbalists, pharmacists, chemists, pharmacognosists, and materials related to the founders of the library) the Lloyd Library's coverage of the works in its collection areas continues to be nearly comprehensive.

The library is a product of the endeavors of three men—John Uri, Nelson Ashley, and Curtis Gates Lloyd—brothers who were all apprenticed as pharmacists in the latter half of the 19th century. Tradition holds that the nucleus of the library can be found in the two books John Uri, the oldest Lloyd brother, brought with him to Cincinnati in 1864 when he began his apprenticeship with druggists W. J. M Gordon and Brother. The books were Edward Parrish's 1864 edition of *A Treatise on Pharmacy* and George Fownes' 1864 edition of *A Manual of Elementary Chemistry, Theoretical and Practical*. As Lloyd's career grew, so too did his book collection. By 1885, the Lloyds owned their own pharmaceutical business—Lloyd Brothers, Pharmacists, Inc., where a portion of their manufacturing facility was dedicated to the growing library. The Lloyds became avid book collectors because they wanted the best resources



Young John Uri Lloyd

close to hand (in what we might today call a corporate library) in order to produce the highest quality Eclectic medicines, the products in which they specialized. Eclecticism was one of many healing philosophies of the 19th century opposed to what was then called Regular Medicine whose practitioners adhered to a very harsh regimen of purging, bleeding, and blistering. While Eclecticism is not easily defined, its therapeutics relied heavily upon medicinal plant treatments which differed from other botanical preparations of the era by being more highly concentrated, using fresh rather than dried specimens, and emphasizing use of native American plants rather than the diverse materials used by other pharmacists.

Fourth home of the Lloyd Library and Museum, 1908-1969

By 1901, Lloyds' research collection outgrew its space in the manufacturing facility; then, rapidly, outgrew two other buildings before 1908 when a new building was erected near the pharmacy. This structure housed the library for nearly 75 years. It was 22 by 72 feet, with room initially for over 6200 linear feet of shelving. By the end of its usefulness, it held some 11,500 linear feet of shelving containing about 98,000 volumes. The current building, designed with expansion in mind, was erected in 1970 with four floors and a basement equaling over 30,000 square feet of space.

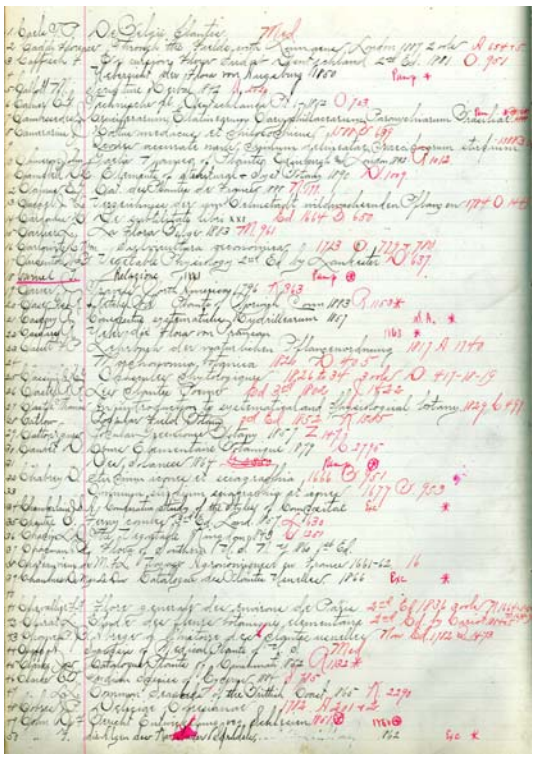
Medicine bottles from Lloyd Brothers, Pharmacists, Inc.

Curtis Gates Lloyd, Mycologist

The museum aspect of the Library was an outgrowth of the herbarium created by Curtis Gates Lloyd, who, in addition to being a trained pharmacist, became a well-known botanist and mycologist. The herbarium was divided and dispersed after Curtis' death, with the botanical specimens transferred to the University of Cincinnati and the mycological specimens transferred to the U.S. Department of Agriculture, where it is now part of the U. S. National Fungus Collections. Although these collections are no longer at the Lloyd, the library maintains its museum aspect by providing access to historic pharmacy implements, original artwork, book and art exhibitions, photographs, and artifacts, such as bottled preparations from Lloyd Brothers, Pharmacists, Inc.

The library is indeed one of the Lloyds' most enduring legacies. And, as it grew, the Lloyds provided for its future. In 1898, John Uri Lloyd drew up Articles of Incorporation to insure the library's legal standing and establish its mission "to collect and maintain a library on botanical, medical, pharmaceutical, and scientific books and periodicals and works of allied sciences"; and in 1917, Curtis Gates Lloyd established the trust under which the library continues to operate.

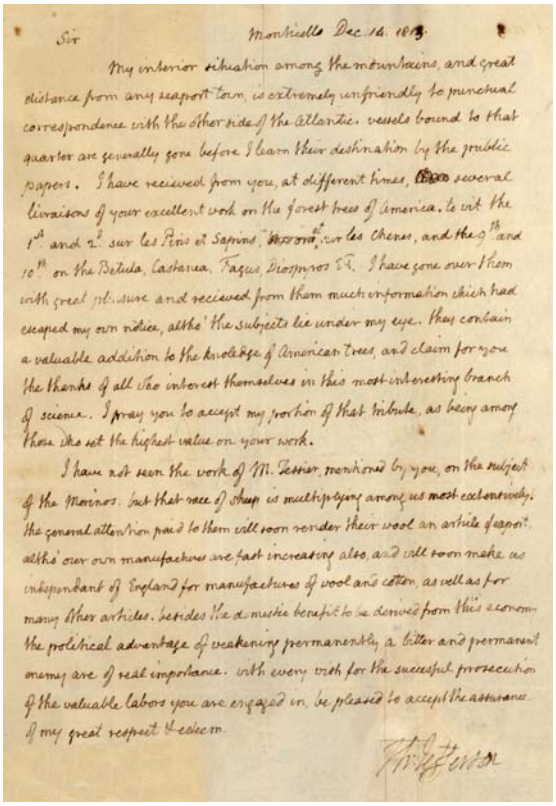
The Lloyds' collected a significant number of important fundamental resources upon which to build. They developed "want lists" and made



Page from the Lloyd's 1893 handwritten book catalog

purchases based on a keen knowledge of the key literature, both historical and contemporary, in their subjects of interest. The earliest catalog in the Lloyd's archives is handwritten by Curtis and dated 1893. [PHOTO #5] A short list of the titles in the library at that time demonstrates that they collected with purpose and expertise: Bigelow's *American Medical Botany* and three editions of his *Florula Bostoniensis*; two editions of Benjamin Smith Barton's *Elements of Botany*; several titles and editions by both Alphonse de Candolle and Augustin Pyramus de Candolle; Dominique Chabrey's *Omnium Stirpium Sciagraphia et Icones* (a book once owned and annotated by Jean-Jacques Rousseau); several titles by Albrecht von Haller; several titles by both Joseph Dalton Hooker and William Jackson Hooker; a full page of the catalog lists titles by Linnaeus; Leonhard Fuchs' *De Historia Stirpium Commentarii Insignes* and *Historia Generale des Plantes*; titles by Herman Boerhaave and Hieronymus Bock; William Woodville's *Medical Botany*; and, one of the original 25 copies of Sibthorp's *Flora Graeca*, for which there is also evidence that Curtis had this on his "want list" and was tracking prices at auction houses, such as Christie's. The Lloyd will feature books from this catalog in the exhibition "Seeds of a Great Library: Selections from Lloyd's 1893 Book Catalog" scheduled for June 1 through September 30, 2007.

With such an exemplary foundation, subsequent librarians ably followed the precedent set and continued to acquire rare, unique, and important resources to add to the collection. Among the hundreds of thousands of books and items acquired since 1893, a few deserve special mention. The Lloyd acquired its oldest book in 1937. Commonly known as *Mesue Vulgare*, this edition of the *Antidotarium* of Mesue was printed in Venice in 1493. It is a list of drugs compiled by an Arabic physician who wrote the original manuscript sometime around the 10th century. It was the most popular compendium of drugs in medieval Europe and is considered the very first important pharmaceutical work ever printed. In 1927, the Lloyd purchased the 1857 English edition of François André Michaux's *North American Sylva* from Paris. Upon examining the book, a letter from Thomas Jefferson to Michaux was found within its pages. The letter is dated from Monticello December 14, 1813 and bears the signature of Jefferson. In it, he praises Michaux's latest publication on North American trees and discusses exporting of wool and cotton. One last unique item worth noting is a handwritten manuscript by French botanist Joseph Pitton de Tournefort. Written in 1708, Tournefort describes the plants in the Jardin du Roi.



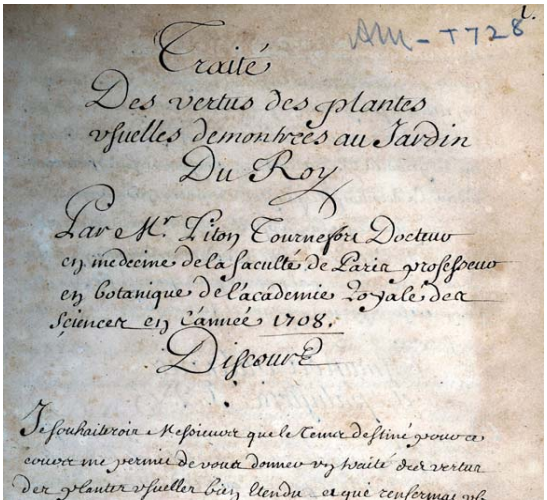
Sir Monticello Dec. 14. 1813.

My interior situation among the mountains, and great distance from any seaport town, is extremely unfriendly to punctual correspondence with the other side of the Atlantic. vessels bound to that quarter are generally gone before I learn their destination by the publick papers. I have received from you, at different times, several livraisons of your excellent work on the forest trees of America. to wit the 1st and 2d sur les Pins et Sapins, the 3d sur les Chenes, and the 9th and 10th on the Betula, Castanea, Fagus, Diospyros &c. I have gone over them with great pleasure and received from them much information which had escaped my own notice, altho' the subjects lie under my eye. they contain a valuable addition to the knolidge of American trees, and claim for you the thanks of all who interest themselves in this most interesting branch of science. I pray you to accept my portion of that tribute, as being among those who set the highest value on your work.

I have not seen the work of M. Pictet, mentioned by you, on the subject of the Merinos. but that race of sheep is multiplying among us most extraordy. the general attention paid to them will soon render their wool an article of export. altho' our own manufactures are fast increasing also, and will soon make us independant of England for manufactures of wool and cotton, as well as for many other articles. besides the immediate benefit to be derived from this economy the political advantage of weakening permanently a bitter and permanent enemy are of great importance. with every wish for the successful prosecution of the valuable labors you are engaged in, be pleased to accept the assurance of my great respect & esteem.

Th: Jefferson

Letter from Thomas Jeffereson to Francois Andre Michaux



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Traité
Des vertus des plantes
vsuelles demonbrées au Jardin
Du Roy

Par Mr. Pitton Tournefort Docteur
en medecine de la faculté de Paris professeur
en botanique de l'academie Royale des
Sciences en l'année 1708.

Discours

Je souhaiterois Messieurs que le temps destiné pour ce
cours me permit de vous donner vn traité des vertus
des plantes vsuelles dont il est question que renfermat plus
d'vtiles observations de pratique, mais comme nous
n'auons que six semaines a trauailler sur cette matiere,
vous me permettrez de me reduire au moins mal qu'il
y a de plus connu et de mieux authorisé touchant l'vsa
ge des plantes vsuelles et de leur plus commune
De la Fougere
De Couper les especes de Fougeres en ordonnee ordinairement
la Fougere male et la femelle; Dioscoride recommande
L'vsage de leur racines pour faire mourir les vers, celles

Title page from Tournefort's 1708 handwritten manuscript describing the plants in the Jardin du Roi

Throughout the Lloyd's collections, one can find many more examples demonstrating the significance and uniqueness of its resources.

Today the Lloyd continues to add to these resources through purchase and donations of both contemporary and historic materials. Some recent acquisitions of note include the papers of Dr. George Rieveschl, Jr., the chemist who developed the well-known antihistamine Benadryl; several medicinal recipe manuscript books from apothecaries, both foreign and domestic, living in the 18th and 19th centuries; a scarce practical pharmacology handbook for physicians and surgeons published in 1783 by Johann Essich; Jean Prevost's 1666 *Hortulus Medicus Selectioribus Remediis*; a first edition (1801) of *L'Art du Parfumeur* by Jean Louis Fargeon, Marie-Antoinette's personal perfumer; Edward Tuckerman's 1854 *Lichenes Americae Septentrionalis exsiccati* consisting of approximately 100 plates of mounted specimens; and, a one-of-a-kind book titled *Hemerocallis* by a local book artist.

Hemerocallis, 2003, by book artist carolyn Whitesel

Although the Lloyd does not have a natural constituency, such as institutionally connected faculty, students, or researchers, it serves a wide variety of clients, locally, nationally, and internationally. From historians and philosophers of medicine and science to contemporary practicing herbalists, many rely on the depth of the Lloyd collection for both scholarly research and practical applications. Through its rich resources, one is able to trace the development of phytomedicine from its earliest beginnings to today's research on naturopathic healing, complementary medicine, and alternative therapies, as well as herbal preparations and natural products. In addition, its collections provide one of few places where researchers can study the integral relationship of the history of botany and pharmacy through complementary and contextual materials.

In recent years, the Lloyd has instituted programming to appeal to all segments of the general public. The Changing Exhibits program often features works of botanical illustrations, other visual arts, and on the history of natural sciences, frequently accompanied by a related lecture. Through a renovation in 2006, the library now has space for a small gallery available for art exhibitions. Several area colleges and universities bring classes for orientation and special projects. The library also offers meeting space and group visits, as well as off-site presentations on the Lloyd's history and collections. In addition, the library now has two children's programs: Budding Artists for children ages 6-10; and, Mother Nature's Story Time for children ages 3-6. These new programs, along with increased emphasis on publicity and advertising, as well as a newly designed website with enhanced content, are reaching people in new ways. We invite you to explore the Lloyd and join those making use of its remarkable resources.

All photos courtesy of the Lloyd Library and Museum, Cincinnati, Ohio.

For more information about the Lloyd Library and Museum, please visit our website at www.lloydlibrary.org.

LINNAEUS

by Stephen Freer

Carl Linnaeus was born on the 23rd May 1707, at the small hamlet of Råshult in theremote rural province of Småland in southern Sweden. His father, Nils Linnaeus, a clergyman, worked as assistant to his father-in-law, the parish priest of Stenbrohult, whom he soon succeeded in that living; so it was in the parsonage of Stenbrohult that Carl's early years were spent. The situation was idyllic, with a church on the shore of a lake, surrounded by meadows full of wild flowers, and with distant views of mountains and woods.

From the beginning, Carl loved nature, and had a special interest in flowers, whether in the fields or in his parents' garden, the finest in the neighbourhood. Nils was an accomplished Latinist as well as an amateur botanist, and habitually conversed with his son in Latin; and so Carl learnt Latin at home as well as Swedish, and was familiar with all the technical terms used by botanists at that time. But at school, he did not do well at book-work, and was regarded as more suitable for manual work than for training as a pastor; this was a grave

disappointment to his parents. Eventually, it was decided that he should study medicine at Lund, in the south-western province of Skåne, which had been part of Denmark until 1658. And, so, in 1727 he entered the university, where he lodged with Dr Kilian Stobaeus, a physician who possessed a large library and collections relating to natural history, including a herbarium.

But the medical course at Lund was not satisfactory, and in the following year Carl moved to Uppsala in central Sweden, where he met some of the most learned men in the country, including Olof Rudbeck the younger, professor of medicine, and Olof Celsius the elder, professor of theology and dean of the cathedral. He was invited to lodge with Celsius, and so had access to an academic library, as he had at Lund. Later, he transferred his abode to Rudbeck's house, where he acted as tutor to his host's young sons. He was appointed demonstrator at the Uppsala Botanic Garden, and began his career as a lecturer. Among his fellow-students, his closest friend was Peter Artedi, a medical student who shared his interest in natural history, and especially in the classification of plants and animals. Artedi's career was cut short by premature death, but his influence on the development of Linnaeus' own ideas was considerable, especially in the field of zoology.

At that time, Linnaeus' interests were by no means confined to botany. He made a short journey to Dannemora, where he observed the operation of a primitive steam-engine in an iron-mine, and collected mineral specimens; and he went to Stockholm to see the dissection of a corpse. In 1732, he went on a longer and more adventurous expedition to Lapland in the extreme north, to study not only the flora and fauna of the region, but also its climatical and geographical features, and the habits and customs of the people, whose life-style differed so conspicuously from that of most Europeans.

Soon after his return to Uppsala, Carl was invited to a Christmas holiday with a friend, Claes Sohlberg, whose home was at the mining town of Falun, and took the opportunity to visit silver and copper mines, and to lean about the processes of smelting and assaying. In 1734, he became informally engaged to Sara Lisa Moraea, a daughter of Dr Johan Moraeus, the physician of Falun. Dr Moraeus insisted that the marriage should not take place until Linnaeus had more experience, and had achieved a doctor's degree, which he had not done either at Lund or at Uppsala. Accordingly, Linnaeus decided to travel abroad, and went in the company of Sohlberg first to Hamburg, and from there to Amsterdam. In the event, Carl was to remain in the Netherlands for 3 years, and to become internationally famous for the works which he published during his time there.

From Amsterdam, he crossed the Zuiderzee to the small town of Harderwijk in the Dutch province of Gelderland, where there was a university which granted degrees on the strength of a thesis alone, without requiring the keeping of terms or attendance at lectures; the whole process took only a few days. Carl submitted a medical thesis, which he had written previously, on the cause of intermittent fevers, and duly obtained a doctor's degree which would be recognised elsewhere, and which qualified him to practise and teach medicine.

After returning to Holland, he settled for a time at Leiden, where he made the acquaintance of two very distinguished physicians and botanists, Herman Boerhaave and Jan Fredrik Gronovius the younger, and of a younger man, soon to be famous, Adriaan van Royen, who was in charge of the university's botanic garden. Sohlberg had returned to Sweden, but at about that time, Linnaeus encountered his old friend Artedi, who had just returned from England, where he had been making a special study of ichthyology. Both young men moved to Amsterdam, where Artedi was employed by the German-born apothecary, Albert Seba, and Linnaeus by Jan Burman, the young professor of botany. Not long afterwards, Artedi was accidentally drowned in a canal; and Linnaeus was induced to accept a post with George Clifford, a banker of English aristocratic descent who was a director of the Dutch East India Company, and the proprietor of a country estate called the Hartenkamp, situated between Leiden and Haarlem. There he was employed as medical adviser and curator of the extensive garden and park; and he had the opportunity to study the strange animals in the menagerie, and to cultivate exotic plants, including bananas – the first to be grown successfully in Europe.

In 1736, Linnaeus made a brief excursion to England, where he met Sir Hans Sloane, the president of the Royal Society, and Jacob Dillenius, a botanist of German origin who was in charge of the Oxford Botanical Garden.

Linnaeus remained at the Hartenkamp until 1738, when he returned to Sweden by a devious route through Paris; there he was entertained by the Jussieu brothers, and became a corresponding member of the Academy of Sciences. After a short stay at Stenborhult, he proceeded to Falun, where he became formally engaged to Sara Lisa. Since at this stage he could see no opportunity of earning a living as a botanist, he established a practise as a physician in Stockholm; and the wedding was

solemnised in 1739; in the following years a son, Carl Linnaeus junior, and four daughters were born. But Carl was not happy in his occupation; and in 1741 he was glad to succeed Lars Roberg as professor of medicine at Uppsala; there he was to stay for the remaining 36 years of his life. Later, he was able to exchange the chair of medicine for that of botany; the duties included the charge of the university botanic garden, and at last he had found a job that was truly satisfying. In addition to his house in the town, he bought a country property at the neighbouring village of Hammarby, where he had his own garden, and kept a menagerie of exotic animals, including a pet racoon named Sjupp and a monkey named Grinn.

His early thesis on the sexuality of plants was dedicated to Rudbeck. The basic idea was not entirely new, as it had occurred to Vaillant and others; but Linnaeus developed it, and based his system of classification on it. This was never intended as a substitute for a truly natural system, which would show the actual affinities of the various genera and species. It was simply one of many systems, designed as a key to identify the species. It was adopted with enthusiasm by Erasmus Darwin, the physician of Lichfield, who celebrated it somewhat eccentrically in memorable verse; and it was used extensively by professional and amateur botanists for many years. It has now been superseded by classification more in accordance with nature: in this Linnaeus' own hopes and aspirations have been largely realised. The idea of evolution was quite foreign to him, as he believed that each species was separately created and substantially unalterable; but in his awareness of the close affinity of mankind with apes, he was in a sense a predecessor of Erasmus' more famous grandson, Charles.

Linnaeus recognised Cesalpino as the first true systematist; he owed much to the influence of Ray; but it was Tournefort who provided him with the largest number of generic names. The custom of describing a genus by a single word was already firmly established in his time; but species were often differentiated by long descriptions of 12 or more words, in which an attempt was made to include every distinctive feature of the species. Linnaeus' great contribution was to limit the specific name to a single word that adequately distinguished the species from others of the same genus. Thus the nomenclature became binominal. [1] Linnaeus' *Philosophia Botanica*, which appeared in 1751, marked a crucial stage in the development of this method, and the single words, formerly dismissed as 'trivial', became an essential part of the system. This work had a wide influence with some of the greatest minds of the 18th century, including Rousseau and Goethe. It was followed two years later by *Species Plantarum*, Linnaeus' crowning achievement, and the starting point of all modern classification of plants. Similarly, the tenth edition (1758) of his *Systema Naturae* (first published in 1735) is taken as the foundation of zoological classification.

His principal works are in Latin, the *lingua franca* of his time; his style is simple and matter-of-fact, for the most part free of oratorical extravagance. His own copies of his books are sometimes annotated with corrections and additions in his own hand-writing which is small, but very neat and clearly legible. He also wrote more popular works in his native language, such as accounts of journeys to some of the provinces of Sweden, and the Baltic islands of Öland and Gotland. In Swedish, he attained a style of almost poetic simplicity and beauty.

From his early days as a demonstrator in the Botanical Garden, Linnaeus' lectures had always been very popular, and not only with botanists; many of the townspeople of Uppsala came to hear him discourse in Swedish, with a Småland accent; and later, botanists came from all over Europe to hear his more formal lectures in Latin. Some of his published works are clearly based on lecture notes; and some rhetorical passages immediately remind us of the intonation and gestures of a demonstrator rather than the habits of a writer. The same is true of his meticulous descriptions of minute parts of plants and animals. The world at large now regards him primarily as a taxonomist, but in Sweden he is still remembered as a great teacher. He worked very closely with his pupils, and organised expeditions into the countryside and woods, to study the environment and collect specimens. The manner of proceeding was carefully regulated, and the clothes and equipment required were prescribed in detail.

Here it may be mentioned that Linnaeus was the inventor of the centigrade thermometer in common use today. It is generally attributed to Anders Celsius (a nephew of Olof); but Celsius made zero the boiling-point of water, and 100 the freezing point. It was Linnaeus who overturned this somewhat perverse arrangement.

Linnaeus' concerns were not purely scientific and academic; he described the medical and household uses of the various plants, as well as their physical characteristics. In his study of exotic vegetables, he considered the possibility of adapting them, by selective breeding, to the Swedish climate, thus helping the economy of a relatively poor country to be more self-sufficient.

Linnaeus' relations with his colleagues were not always easy, and in later life he was inclined to be touchy, and resentful of real or imagined slights. His rivalry with Nils Rosén, Rudbeck's successor as professor of medicine, lasted for many years. He was sometimes at odds with other botanists, such as Siegesbeck and Haller. He had great confidence in his own judgement, and believed that he was specially chosen by God to explain the mysteries of the natural world. He had a firm belief in God as creator and provider, but his works do not show signs of any explicitly Christian belief.

Eventually, Linnaeus became a figure of national importance. He enjoyed the patronage of the influential politician, Count Tessin, and was presented to the King and Queen; his catalogues of the royal collections were published in 1754 and 1764. He was a Knight of the Order of the Polar Star, and in 1761 he was ennobled as Carl von Linné (a vernacular version of his learned Latin name), and this is the name by which he is generally known in Sweden and elsewhere. He never moved far from his roots at Stenbrohult. In his younger days, he travelled in Europe, but rejected opportunities to visit Surinam and South Africa. As professor at Uppsala, he encouraged his pupils – called 'apostles' – to undertake voyages all over the world in search of specimens, but stayed at home himself. Though tempted at times to settle permanently in foreign parts – Holland, Germany, England, France and even Spain – he was faithful to his own country, where the experience of observing the onset of the short but glorious Swedish summer was like no other in the world. He remained the typical, essential Swede.

Footnote No 1
The form *binominal* is preferable to *binomial*, as it is more in accordance with the Latin derivation of the term; and *binomial* is used by the mathematicians in a quite different sense.

[Stephen Freer is a Cambridge classicist, who worked for the Foreign Office at Bletchley Park in the war, and then for many years for the Historical Manuscripts Commission in London. He is the translator of Linnaeus' *Philosophia Botanica* (OUP paperback 2005) and Linnaeus' *Musa Cliffortiana* (IAPT, due out in November 2007)]
www.stephenfreer.co.uk

CITES and the Herbarium Voucher

CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) Secretary-General Willem Wijnstekers, from the international office in Geneva, Switzerland, gave a plenary session address on the status of CITES oversight of timber harvesting and lumber export at the 3rd Global Botanic Gardens Congress convened recently in Wuhan, China1. Regulatory labeling is required for sustainably harvested plants and particularly important for tropical timber tree species that are used in international trade. According to Mr. Wijnstekers, many tropical tree species are being logged illegally, entering the world market through the back door. The most memorable remark he made in his speech is that we, as gardeners, should be sure that our tropical wood garden furniture is sustainably produced. Properly certified goods should carry a valid CITES-approved label. We, as green gardeners, should certainly be considering the impact of all the materials we use.

However, the Secretary-General missed an opportunity to connect with the audience on an issue of more immediate concern to botanists and horticulturists: CITES regulation of the shipping and exchange of herbarium specimens of CITES-listed plant species. Seated next to Mr. Wijnstekers prior to his remarks, I asked "Is there any progress on changing the regulations that control the status of herbarium specimens in CITES?" He looked at me blankly. Having heard many difficult stories and complaints about how CITES was impeding legitimate taxonomic research in certain respects, I mistakenly presumed that this subject was already under review. Surely if CITES, as the regulations are written today, actually reduces serious scientific study of the very plants it is intended to protect, one would want to find ways to remedy this situation. After a moment of thought, Mr. Wijnstekers said, "There is no need. The current regulations and permits are suitable for all situations."

Again, this answer didn't match the anecdotal evidence I have heard as to the bureaucratic difficulties encountered by many scientists, particularly those working with orchids. This entire plant family is protected by the CITES umbrella and requires specific CITES documentation for herbarium specimen exchange. Specimen transfer with Certificate of Scientific Exchange (COSE) permits is restricted to only those research institutes with CITES registration. It was this, in part, which led to such serious legal problems as those experienced at Marie Selby Botanical Garden2.

The next evening, after asking for more input from various colleagues, I had the opportunity, again, to ask Secretary-General Wijnstekers about transfer of herbarium vouchers, he repeated, "Just get a permit."

Is Mr. Wijnstekers' answer an oversimplification? Or is the concern about the bureaucratic red tape and potential liability (personal, professional and institutional) really changing the direction of taxonomic work in favor of plant groups that fall outside of the jurisdiction of CITES? In other words, is CITES impeding the study of the very plant taxa that it was designed to protect?

The movement of herbarium materials from one country to another is controlled by several layers of governance and CITES constitutes only one of the considerations in pursuing the legal transport of endangered plant parts or products. Current CITES regulations prohibit the movement of listed plants (living or dead) into or out of the countries where they occur without a CITES permit, even though they may have been collected legally, with the full cooperation and approval of the local government. The differing laws or requirements of individual countries and their scientific institutions are not being considered in this dialogue, nor are the issues about the transport of living plant material or for genetic property rights and DNA. These elements further complicate any movement of herbarium specimens. The CITES permitting process, which seems to be simple in theory, has often proved to be very difficult in practice. In a prime example today, many orchid species which face extinction and are desperately in need of taxonomic study, cataloguing and conservation, go unstudied because the hands of botanists all over the world are tied with red tape.

Peter Wyse Jackson3, former Secretary General of BGCI and author of the BGCI handbook on CITES regulations for botanical gardens4, contributed his thoughts on this matter. He indicated that botanical institutions are taking one of three routes: trading CITES-documented vouchers when possible, trading vouchers with no documents quietly behind the scenes or making no exchanges at all. Simply put, many institutions are breaking the law to study certain plants or they have stopped research on CITES-listed plants entirely.

David Roberts5, at the Orchid Herbarium of the Royal Botanic Gardens, Kew and ecological statistician Andrew Solow, Director of the Marine Policy Center at the Woods Hole Oceanographic Institution are collaborating on statistical studies to identify the impact of CITES on botanical research. Based on a sample of the numbers of herbarium specimens of orchids (CITES listed) and bromeliads (a comparable group of mainly epiphytic plants which are not CITES regulated) collected in Brazil and Costa Rica, they have compared the relative collecting rates of each family. While the number of new herbarium specimens of bromeliads has increased, the number of new collections of orchids has decreased. They have calculated that the rate of collecting orchids for scientific study is significantly lower than it would have been if CITES had not come into force in 1975. This analysis supports the notion that the scientific study of some plant groups is being seriously impaired by the existence of CITES.

The work of Roberts and Solow may indicate that botanists have moved their research focus to plant groups other than orchids, essentially taking the path of least regulatory resistance. Peter Jørgensen6, at the Missouri Botanical Garden, states clearly "Nobody wants to touch the organisms in the appendices; they have become taboo, which means that we have also lost any means of monitoring these large plants groups with many apparently endemic species." Current orchid taxonomic work now relies on older specimens collected prior to the establishment of CITES.

In support of this theory, *Flora of China* contributor Mark Watson7, on the staff of the Royal Botanic Garden in Edinburgh, Scotland, commented about orchid species in China and Nepal in that "we just don't collect them or if we do, we don't take them home." He continued by describing the monumental difficulties in getting CITES permits in Nepal and attributed it to the unstable political situation. Watson indicated that if orchids are collected, the specimens are deposited with botanical institutions within the country of origin. When permits for the transport of herbarium specimens are not obtainable, the scientist *must* go to this country, making research very costly and time-consuming. Many botanical institutions lack the financial resources to use this avenue of study and it is much more expensive than simply mailing a set of vouchers.

At a breakout session later in the Wuhan Congress, with Mr. Wijnstekers in the audience, several scientists raised the issue of CITES impediments to research more directly. A draft resolution8 recommending the exemption of orchid herbarium specimens from CITES regulation was read by Gloria Siu Lai Ping, the Senior Conservation Officer at Kadoorie Farm and Botanic Garden in Hong Kong. She is a member of the Orchid Specialists Group (OSG) of the Species Survival Commission of IUCN, the World Conservation Union. The resolution was drafted during the III International

Orchid Conservation Congress held in March 2007 in San José, Costa Rica. One of the major items on the agenda of this conference was to analyze all the factors threatening orchid populations. Other botanists at Wuhan, including Irawati9, of the Bogor Botanic Garden, Indonesia, also voiced concerns about the negative effects of CITES regulation on legitimate botanical research. Mr. Wijnstekers heard them all. If this issue was not on the horizon before the Wuhan Congress, it must be now.

According to Secretary General Wijnstekers10, more than 170 participating countries are CITES signatories and these countries must register their individual scientific institutions (SIs) with CITES. After registration, the SIs have the authority to issue labels for herbarium specimen export.11 The COSE permit is restricted to exchanges *only* between two such registered scientific authorities. Notably, what Mr. Wijnstekers failed to mention is that only one-third of these countries12 actually have CITES-registered scientific institutions. Most of these SIs are focused on sciences other than botany.

In cases where a country has no registered scientific institution, all CITES permits are processed through that country's Ministry of Environment or other similar department designated as the CITES Managing Authority. This elevated level of review results in a very tangled, slow, political, difficult and frequently unsuccessful and expensive permit process. Unlike peer-to-peer communication between SIs, the control of permits has been passed to bureaucrats with little or no technical understanding as to the significance of taxonomic study in understanding global biodiversity. Botanists are now being reviewed by regulators skeptically, in the same bad light as pharmaceutical companies known for exploiting genetic patrimony and live plant collectors who are notorious for flaunting the laws.

Voicing other concerns about CITES impacts on botanical research, Paul Kessler13, Prefect of the University of Leiden, has commented that the paperwork and expense for CITES compliance can be considerable. While the process varies by country, the Netherlands rules allow only five specimens per form. If 100 specimens are shipped, it requires twenty forms, each with an attached processing fee and the cumulative cost can be substantial. About his work on Asian tropical trees, Kessler no longer collects CITES-listed plants because of the headaches of permit procurement. He strongly stated, "greedy plant collectors for living collections are spoiling it for the rest of us. The point *is* identification because the loss rate of orchid species to extinction each year is huge. We do not even know what we are losing."

Kessler's students, working in South East Asia, have also run into permit difficulties with their field research in plot studies. They survey precisely measured areas and collect every plant species in the quadrant. They don't know what will be there until the survey is done, yet they are required to list all plants, to species level, to be collected prior to commencement of the field work.14 It is an impossible task.

Nicely summing it all up, Tim Entwisle15, Executive Director of Botanic Gardens Trust Sydney said, "While Australian botanic gardens are strong supporters of the regulation of plant trade to protect the rights of local communities and to preserve rare and threatened flora, we also understand the great importance of scientific research. Reasonable access to herbarium specimens from around the world is critical to good science, and good science is critical to good conservation. If CITES cannot help herbaria, then they are not doing their job properly!"

Finally, I would question, "are researchers running into real roadblocks that reduce their effectiveness in studying critically-endangered plant species?" What are some of the actual field experiences of those of you who are working on CITES-listed plants? Is the difficulty of obtaining permits burdensome enough to cause you to change your research direction (or is this just idle chatter)? What do you know about the situation of others working on CITES protected plant species? I would welcome your comments.

If you have had or know of any research experiences in this area, please let me know. If you think the importance of this subject is being overemphasized, comments to that effect would also be helpful.

Pat Duncan Raven, Ph.D.
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(Endnotes)

1 3GBGC was convened by Botanic Gardens Conservation International (BGCI), April 16-20, 2007

2 Marie Selby Botanical Garden and individual members of the garden's administrative staff were charged with CITES violations after handling Appendix I orchid specimens brought to them by a collector. In addition to accepting plants with flawed import permits, Selby was cited for returning an herbarium specimen made from this orchid to the University of San Marcos, in Peru. While Peru was the country of origin, the Peruvian university does not have CITES registration and could not repatriate the specimen according to current CITES

regulations. In fact, there is no CITES registered scientific institution in Peru. This element is only one part of a much more complex legal situation and is included here only for illustrative purposes.

3 3GBGC conference participant

4 *A Review of International Conventions which Affect the Work of Botanical Gardens,* BGCNews, Vol.3 No.2, 1999. This article is based on a presentation by Peter Wise Jackson and may be viewed at http://www.bgci.org/worldwide/article/0176/

5 David L. Roberts and A.R. Solow, unpublished

6 Personal communication

7 3GBGC conference participant

8 The resolution from the III International Orchid Conservation Congress (March, 2007): "The Orchid Specialist Group of the Species Survival Commission notes that the inclusion under CITES of dried herbarium specimens, flowers fixed in spirit and silica-gel dried tissues of orchids for research purposes is seriously impeding the gathering of information such as plant identification and genetic variability that is fundamental to the conservation of the orchid species in question. The Orchid Specialist Group would wholeheartedly support the removal of these types of material from CITES control."

9 3GBGC conference participant

10 Personal communication

11 CITES, 1979 amended, Article VII – Section 6. The provisions of Articles III, IV and V shall not apply to the non-commercial loan, donation or exchange between scientists or scientific institutions registered by a Management Authority of their State, of herbarium specimens, other preserved, dried or embedded museum specimens, and live plant materials which carry a label issued or approved by a Management Authority.

12 Fifty-seven countries out of 171 countries listed. The register of the scientific institutions entitled to the CITES exemption provided by Article VII, paragraph 6, of the Convention may be found at a link from http://www.cites.org/common/reg/si/e-si-beg.shtml. The absence of a reference to any Party means that it has not registered any scientific institution with the Secretariat

13 Personal communication

14 This is probably due to the particular laws of each host country rather than CITES requirements. For example, Andean countries are governed by both CITES and the more complicated laws of the *Acuerdo de Cartagena.*

15 3GBGC conference participant

The Last of the Virgin Sod

We broke today on the homestead
The last of the virgin sod,
And a hounting feeling oppressed me
THat we'd marred a work of God.

A fragrance rose from the furrow,
A fragrance both fresh and old:
It was fresh with the dew of morning,
Yet aged with time untold.

The creak of leather and clevis,
The rip of the coulter blade,
And we wreck what God with the labor
Of a million years had made.

I thought, while laying the last land,
Of the jungles, glaciers and oceans
Which had helped to make these plains

Of monsters, horrid and fearful,
WHich reigned in the land we plow,
And it seemed to me so presumptuous
Of man to claim it now.

So when, today on the homestead,
We finished the virgin sod,
Is it strange I almost regretted
To have marred that work of God.

-Rudolph Ruste

Prior to the Annual Meeting

Student Research in Plant Biology and Conservation

http://chicagobotanic.org/school/symposia_SRPBC

The Chicago Botanic Garden is pleased to host the first ever Plant Biology and Conservation Symposium especially for graduate and undergraduate students and postdocs. We are accepting abstracts for either posters or 15-minute oral presentations. Registration is open to anyone interested in plant biology and conservation and related areas. For program updates and abstract submission guidelines, http://chicagobotanic.org/school/symposia_SRPBC_guidelines.php please call Beth Pinargote, Symposium Coordinator, at 847-835-8278.

The deadline for receipt of abstracts is MAY 15, 2007. Authors will be notified in late May regarding acceptance of their poster.

Friday, July 6, 2007

BSA Contact Information

All inquiries for the BSA Business Office should be directed to:

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Administrative Coordinator: Wanda Lovan

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http://www.botany.org/

President: Christopher H. Haufler
E-mail: vulgare@ku.edu

All inquiries about the Botany 2004 meeting (and any other future meeting) should be directed to:

Mrs. Johanne Stogran, Meetings Manager.
Email: johanne@botany.org or
meetings@botany.org
Voice: 614-292-3519 Fax: 614-247-6444
http://www.botanyconference.org/

News from the Society

Note from the Office

The Botany 2007 Conference is fast approaching. This is an important time for your BSA staff team, as we have the opportunity for direct person-to-person contact with you, the Society members. If you have ideas on how we might improve services, outreach programs or the promotion of botany in general, please take some time to talk with us. We want to hear what you have to say.

Communications:
Over the past few years the Society has done a great deal to ensure you are up-to-date with BSA issues. We have moved more and more of its communications online via the BSA website at www.botany.org. We also use email in place of printed mail wherever possible. We send important items out via US Post to those without email to make sure everyone receives what they need. In the main, this seems to be a very efficient way to communicate.

As a backup system, we place all communications on the BSA web site at www.botany.org/news/. You will find a link on that page to the BSA & Sectional Newsletters & e-Mails, Announcements and Botany in the News.

If you are not receiving emails from me, wdahl@botany.org, please let me know and we'll see if we can find out why not and fix the problem. We suggest you let your systems administrator know you'd like communications from the BSA, and place my email on your institution's "white list."

Jobs, Post-docs Opportunities, Internships and Announcements
By the time this issues gets to you, the BSA web site will be updated to better receive and display all job/post-doc and intern opportunities. We will also have an updated announcement system, including both national and international plant conference updates. Please look to the BSA web site for details. We look forward to serving you with these new features.

BSA Web Site Committee
I'm sure you've noticed a few changes on the BSA website over the past year. Thank you to the members of the Web Committee and the staff who have made this possible. The site will continue to evolve as a means of serving the Society's mission. We look at three things when making changes to the BSA website - #1 service for BSA members, #2 educational value, and #3 promoting botany to the general public. We'd love to hear your ideas on how we might improve in all three areas. The Web

Committee will meet on Sunday morning, July 8th, 9:30 am, in Chicago. If you'd like to become involved, check the meeting schedule for more details.

BSA Membership Committee
Being a member of the Botanical Society of America is a great idea! Membership is at the highest level in many years. More importantly, student participation has never been higher! Thanks go out to the Membership Committee for some innovative ideas. I'm sure you'll see more from this group as the year progresses. Thank you also to others who have put forward ideas in this area - they are working. The Membership Committee will meet on Sunday morning, July 8th, 11:00 am, in Chicago. If you'd like to become involved, check the meeting schedule for more details.

BSA Education & Outreach Committee
Thank you to the Education Committee for your efforts over the past year. I'd also like to extend a big thank you to the PlantingScience committee, and the scientists who have acted as mentors for the program. I can't tell you enough how important this one venture has been in establishing the BSA as a scientific society with a significant and innovative outreach initiative. The Education Committee will meet on Sunday morning, July 8th, 10:30 am, in Chicago. If you'd like to become involved, check the meeting schedule for more details.

There will be other committee and topical meetings during the conference. We will let you know about these via email. If you are interested, please get involved. Working together, we are making a difference!

PlantingScience
I encourage you all to take a look at the developing outreach program PlantingScience (www.PlantingScience.org). It behooves us all to take educational outreach that directly links the development of research skills to the joys of doing science. Thank you to the Advisory Committee and the BSA Educational Director, Claire Hemingway for keeping this program moving forward!

We'd love to have you, your labs and your students participate in the program. We are currently exploring ways to use Planting Science as a means of enhancing your "Broader Impact" requirements in NSF grants. If you are retired and would like to become involved… please contact me to discuss how this might work. Please take the time to look at the site and consider how you might become involved.

Thank you for your time!
Bill Dahl
BSA Executive Director

BSA Awards

Karling Award

Pamela Steele, University of Texas at Austin – Advisor, Robert K. Jansen, Systematics and Biogeography of the Neotropical Genus *Psiguria* (Cucurbitaceae).

BSA Graduate Student Research Awards:

Natalie Feliciano, University of Massachusetts, Amherst - Advisor, Jill S. Miller, Isolation of the Pollen SLF Self-Incompatibility Gene in *Lycium*

Laura Burkle, Dartmouth College - Advisor, Dr. Rebecca E. Irwin , The Effects of Nitrogen on Plant-Pollinator Mutualisms

Rob Baker, University of Colorado, Boulder - Advisor, Dr. Pamela Diggle, The Microevolution of Plant Architectural Development: Cloning and Sequencing Monkeyflower Branching Genes

Valerie Soza, University of Washington - Advisor, Richard Olmstead, Molecular Systematics and Evolution of Breeding Systems in *Galium* (Rubiaceae)

Gilberto Ocampo, Rancho Santa Ana Botanic Garden, Claremont CA - Advisor, J. Travis Columbus, "Systematics of *Portulaca* L. (Portulacaceae), including its position within the higher Caryophyllales"

Patricia Ryberg, University of Kansas - Advisor, Edith L. Taylor, Permineralized *Glossopteris* ovules and ovulate organs from the Permian of Antarctica and Australia

Tracy Misiewicz, Northwestern University - Advisor, Nyree Zerega, Investigating the Evolutionary History and Pollination Biology of the genus *Dorstenia* (Moraceae)

Janelle Burke, Cornell University - Advisor, Melissa Luckow , The systematics of the Neotropical genus *Antigonon* (Polygonaceae) and its application to the study of invasiveness in *Antigonon leptopus*

Cheng-Chiang Wu, Harvard University - Dr. Elena M. Kramer, Gene Duplication and Functional Evolution of Floral Homeotic Genes in Eudicots

Young Botanist of the Year Awards
Kathryn J. Antony , Barnard College, Columbia University, New York, NY – Advisor, Hilary Callahan

Erica A. Fishel , University of Kansas, Lawrence, KS – Advisor, Helen Alexander

George Hickman, Eastern Illinois University,

Charleston, IL - Advisor, Janice M. Coons

Kelli Johnson , Ohio University, Athens, OH – Advisor, Gar W. Rothwell

Nathan Jud , Ohio University, Athens, OH – Advisor, Gar W. Rothwell

Elizabeth Kolar , Salisbury University, Salisbury, MD – Advisor, Kimberly Hunter

Katherine LaJeunesse, Miami University, Oxford, OH – Advisor, Martin H. Stevens

Jessica Lawrence, University of Cincinnati, Cincinnati, OH, - Advisor, Guy N. Cameron

Elizabeth Levenda, Eastern Illinois University, Charleston, IL - Advisor, Nancy Coutant

Meredith Mertz , Truman State University, Kirksville, MO - Advisor, Jeffrey M. Osborn

Kyle Meyer, University of Wisconsin, Milwaukee, WI – Advisor, Sara Hoot

T. Ryan O'Leary, University of Kansas, Lawrence, KS – Advisor, Mark Mort

Sarah Owens, Miami University, Oxford, OH – Advisor, Richard C. Moore

Richard Tate, Humboldt State University, Arcata, CA – Advisor, Alexandru M.F. Tomescu

Emily R. Treadaway, James Madison University, Harrisonburg, VA - Advisor, Conley K. McMullen

Michael Shane Woolf , James Madison University, Harrisonburg, VA - Advisor, Conley K. McMullen

Vernon I. Cheadle Awards
Madelaine Bartlett, University of California, Berkeley
Patricia Ryberg, University of Kansas
Julia Nowak, University of Guelph
John Snider, University of Central Arkansas

Developmental & Structural Student Travel Awards
Tatiana Arias, University of Tennessee
Natalia Pabon Mora, CUNY/New York Botanical Garden
Maria Aurineide Rodrigues, Universidade de Sao Paulo
Yannick Staedler, University of Zurich
Renate Wuersig, Purdue University

Mycological Section Student Travel Awards
Sarah Carrino-Kyker, Case Western Reserve University, Advisor - Andrew Swanson

Dear Fellow BSA Members

I bring you greetings on behalf of the Executive Committee of the BSA and will take this opportunity to update you about ongoing activities and future goals of your society. The note can be found on the BSA web site at http://botany.org/news/newsletters/President070430.php.

Plans for the Annual Meeting in Chicago are very exciting. With nearly 1000 abstracts submitted, this year's meeting is proving to be even larger than the one held in Chico, CA last year (that year there were 838, which was a record number). Our Plenary Speaker will be Judge John E. Jones, who presided over the trial in Dover, Pennsylvania and whose legal decision was a model of clear presentation in support of science and evolution, and a stunning defeat for intelligent design. I know Program Director Karen Renzaglia and the BSA staff are working hard to make sure that our meeting will proceed smoothly and all participants will benefit from and enjoy the meeting. I look forward to seeing you all there in July!

The BSA is making progress on many fronts. Our membership numbers have increased considerably, with a strong surge in student members, and we are approaching 2700 members, up from about 2300 only two years ago. The BSA endowment has crested $3.5 million and has contributed more than $225,000 to BSA activities over the past four years. Interest in our web site continues to be strong, with about 200,000 visits each month. The American Journal of Botany has a healthy impact factor in excess of 2.4, and, guided by Editor-in-Chief Judy Jernstedt, Electronic Editor Scott Russell, Managing Editor Amy McPherson, and Production Editor Beth E. Hazen, continues to be one of the more widely cited outlets for publishing papers on plant biology. Your society is thriving and working for you on behalf of botany worldwide.

The Botanical Society of America has accomplished most of its current strategic plan. In August 2001, a strategic planning session (cleverly named "Deep Thought") established a set of objectives for the BSA. The major goals included: (1) hiring an Executive Director and a staff to manage membership services and enhance the public image of the BSA, (2) spearheading educational outreach, (3) building coalitions with other professional organizations, (4) expanding our international activities, (5) recruiting future botanists, and (6) raising endowment funds.

Since that session (as reviewed above) a green glow of success has risen over the BSA image, the trajectory of our membership, and our endowment funding. These outcomes have been made possible

in large part because of changes that were initiated following the 2001 planning session. In 2002, Bill Dahl was hired as our Executive Director, and we now have a fully operational office that includes a technology manager (Rob Brandt), an administrative coordinator (Wanda Lovan), and an education director (Claire Hemmingway). With this staff, the BSA has been able to make advances that both streamline our operations and expand our outreach. For example, most of our business functions are online and our use of paper has dropped dramatically. Electronic membership renewal rose from 30% in 2003 to more than 85% in 2007, and our response times to inquiries are extremely fast relative to peer organizations. In the realm of education outreach, PlantingScience has taken plants and plant biologists into 19 schools, 26 classrooms, and involved over 1500 students in plant experiments. PlantingScience sessions average three weeks – expanding science experiences for students whose experiments normally last one class period or less. Botanists donate approximately 1.5 hours per session, twice a year, to create an incredibly wide reaching and high impact outreach program. We have maintained and deepened our relationships with other organizations. The American Fern Society, The American Society of Plant Taxonomists, The American Bryological and Lichenological Society, and The American Institute of Biological Sciences have long and valued histories with the BSA, and we have broadened our association with the international community of botanists, as well as with Mycologists and Phycologists. This year's annual meeting is being held in conjunction with the American Society of Plant Biologists, next year we'll be meeting with the Canadian Botanical Association/ Association Botanique du Canada,
and in 2009, we'll be meeting with the Mycological Society of America. In addition, we are reaching out to provide membership and other services to societies including the American Fern Society and the Society for Economic Botany.

We are embarking on a new strategic planning process. Building on the "deep thought" plan that has been driving our activities over the past five years, we seek input from the membership as we move the BSA into the future. The past five years have established a strong foundation on which to build, and opened many new doors for the coming years. We need your guidance as we make recommendations for the BSA to propel our activities and agendas.

• What do you think should be some of the goals for the BSA in the next 5-10 years?
• What emerging issues, opportunities, or responsibilities should the BSA address?
• How should the BSA manage its endowment to best advantage for the future of botany?
• Are there ways that the BSA should become involved in political agendas, educational initiatives, and emerging research opportunities?

We value your perspectives and opinions and seek your guidance as we generate a forward-thinking plan that will carry the mission of the BSA forward. Please send any ideas you have to me, to other members of the Executive Committee (listed below), or to members of the BSA Council. Soon we will form a Strategic Planning Committee and charge it with the challenge of developing a document that will help us become an even more effective voice for research and education about plants. We encourage you to become partners in crafting the future of the BSA.

Sincerely,

Christopher Haufler
President

Members of the Executive Committee include:
President, Christopher H. Haufler
E-mail: vulgare@ku.edu
President Elect, Pamela Soltis
E-mail: psoltis@flmnh.ufl.edu
Past President, Edward L. Schneider
E-mail: eschneider@sbbg.org
Secretary, Stephen G. Weller
E-mail: sgweller@uci.edu
Treasurer, Kent Holsinger
E-mail: kent@darwin.eeb.uconn.edu
Program Director, Karen S. Renzaglia
E-mail: renzaglia@plant.siu.edu
Council Representative, Pamela K. Diggle
E-Mail: Pamela.Diggle@colorado.edu
Graduate Student, Mackenzie Taylor
E-Mail: mtaylo37@utk.edu

Botanical Society of America
4475 Castleman Avenue
St. Louis, MO 63110

Mission: The Botanical Society of America exists to promote botany, the field of basic science dealing with the study and inquiry into the form, function, development, diversity, reproduction, evolution, and uses of plants and their interactions within the biosphere.

The objectives of The Society are to: sustain and provide improved formal and informal education about plants; encourage basic plant research; provide expertise, direction, and position statements concerning plants and ecosystems; and foster communication within the professional botanical community, and between botanists and the rest of humankind through publications, meetings, and committees.

BSA Science Education News and Notes

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

PlantingScience—BSA-led student research and science mentoring program

Another exciting session recently wrapped up in the PlantingScience program. The spring session included a case study of Carol Packard's classroom at Sisters Middle School, as well as a pilot of inter-collegiate peer-mentoring between Emporia State University and Nazareth College. We are looking forward to learning how to better serve learners at various levels in the program.

As always, we thank you for contributing to education reform efforts. The teachers participating in PlantingScience greatly appreciate your efforts too. Below is a note of thanks that we recently received:

I must tell you that this is one of the [best] projects I have ever done with my students. They are really taking to the experience and have gained valuable insight into germination. The best part for me is the contact that they have with their mentors and the excellent advice they received. It seems to have much more merit when it comes from someone other than the teacher all of the time. I have enjoyed letting my students freely explore how science works and even if they learn very little about plants, the experience of understanding how a real scientist would approach an experiment has been invaluable. I want to thank you and all of the mentors for a wonderful project and very useful and well organized website. I hope you will allow us the opportunity again.

Sincerely,
Todd Johnson, George Washington High School, Chicago, IL

Check out the following websites that have recently profiled PlantingScience:

Coalition on the Public Understanding of Science (COPUS)
http://www.ucmp.berkeley.edu/COPUS/index.php

Kid's Garden News of the National Garden Association
http://www.kidsgardening.com/2007.kids.garden.news/current.html - res

Spotlight on BSA Member Contributions to Science Education

And the **BSA Education Booth Exhibit Competition Winner** is…

Bruce K. Kirchoff, Associate Professor of Biology Department of Biology at University of North Carolina Greensboro

The Botanical Society of America is pleased to announce Bruce Kirchoff won the 2007 BSA Education Booth Exhibit Competition Award. During the upcoming Botany and Plant Biology 2007 meetings, be sure to visit the Education Booth in the Exhibit Hall. Bruce and winners of the ASPB Booth Competition will showcase their education and outreach activities. We are delighted to support Bruce's highly innovative ***Image Quiz***, an active visual learning approach to plant identification.

"Programs in the *Image Quiz* family are designed to rapidly and efficiently help users become visual experts. Unlike novices, visual experts are able to quickly recognize patterns. This allows chess masters to recognize meaningful chess configurations, and plant systematists to identify plants from a glimpse out the window of a moving vehicle. The *Image Quiz* programs help users achieve this mastery in a fraction of the time that is normally required. They do this by adapting learning techniques from areas of cognitive psychology concerned with expertise. The programs are designed to promote holistic processing, the visual processing mode used by experts. They do so through a series of active learning activities. Active learning engages brain areas associated with visual expertise, while passive learning does not. The training techniques are based on research protocols that were used to define holistic processing. *Image Quiz* adapts these protocols to a variety of visual domains."

The central program is *Woody Plants of the Southeast: A Field Course on the Computer*. It will be published this summer by Missouri Botanical Garden Press. Prototypes of the following programs will also be available on demonstration computers at the Education Booth: *Amino* – A program to teach chemical intuition through the three dimensional structure of the amino acids; *WholeMath* – A visual introduction to mathematical equations and graphs. This program is intended to supplement high school algebra; *Ovary* – An application I use to teach ovary anatomy to students entering my laboratory; *Lupinus* – A research application that uses the same display engine as *Woody Plants of the Southeast*. It is being developed in collaboration with Dr. Ellen Simms (UC Berkeley) as a means of character discovery in *Lupinus* seed coats.

At the Education Booth, you will have informal opportunities to try Image Quiz and talk with Bruce about it. Bruce will also offer a Sunday morning workshop on Image Quiz for lucky 25 registrants. Learn more about Image Quiz at http://www.uncg.edu/~kirchoff/

Science Education Bits and Bobs

Faculty salaries decrease 1% in 2005-2006—Faculty salaries failed to keep pace with inflation for the third straight year, according to the 2007 NEA Higher Education Almanac and summarized in *Advocate*. Data in this review of full-time faculty salary and benefits across the nation's colleges and universities are taken from the National Center for Education Statistics at the US Department of Education. Delving into the detailed salary comparisons (state-by-state, institution type, gender, and unionization effects) is enlightening if not uplifting in all cases.

http://www.nea.org/he

NSTA updates stance on laboratory investigations—The National Science Teachers Association's new position statement on lab investigations reflects current findings on science laboratory instruction and heightened safety standards. Guidelines for college and K-12 levels are provided in the *Integral Role of Laboratory Investigations in Science Instruction*. A few of the college level recommendations include: all student should have opportunities to experience inquiry-based science laboratory investigations; all introductory courses should include labs; labs should correlate closely with lectures; and labs should help students learn to work independently and collaboratively. The revised NSTA statement was influenced heavily by the National Research Council's *America's Lab Report*. BSA-member **Susan Singer** was lead author on this comprehensive survey of high school laboratory experiences. To learn more, download the NSTA position statement and access *America's Lab Report* through the National Academies Press website through the links below.

http://www.nsta.org/positionstatement&psid=16

http://www.nap.edu/catalog.php?record_id=11311

What do contemporary college graduates need to know and be able to do?—*The Association of American Colleges and Universities seeks to focus discussion on these questions through its Liberal Education and America's Promise (LEAP) program and publications. "Every student will need wide-ranging and cross-disciplinary knowledge, higher-level skills, an active sense of personal and social responsibility, and a demonstrated ability to apply knowledge to complex problems," states the* College Learning for the New Global Century. *This report includes survey results of what business leaders seek in college-educated employees and recommendations for high school to college planning. Classroom practitioners and college presidents alike will find The Principals of Excellence useful guides.*

http://www.aacu.org/advocacy/leap/documents/GlobalCentury_final.pdf

What do your students know or think they know about natural selection —

Comparing knowledge gains and misconceptions related to natural selection among college biology students, Nehem and Reily found students in active-learning classes held fewer misconceptions and better grasp of key concepts than students in traditional classes. Most (94 and 83%) of the students in each class reported previously covering natural selection in school. In both classes of second-semester biology majors, however, the level of understanding of evolution was alarmingly poor. The authors note, "It should be of great concern that only 30 percent of biology majors in the active-learning group (and 14 percent in the postcourse comparison group) lacked misconceptions postcourse." Student preconceptions of goal-directed evolution were particularly resistant to change. The authors used five open-response essay questions to elicit student understanding (See Box 1 in the article). None of these questions focused specifically on plant examples.

Do you use a series of open- or closed-response questions to gauge pre- and post-course understanding of plant evolution? If so, we would love to hear what you have found!

Nehm, R. H. and L. Reilly. 2007. Biology majors' knowledge and misconceptions of natural selection. *BioScience* 57(3): 263-272.

New evolution education journal in 2008 —On Darwin's 198th birthday, Spinger announced a forthcoming new quarterly, peer-reviewed journal to be called *Evolution: Education and Outreach*. The editors-in-chief will be the father and son team of Niles and Greg Eldredge, who combine their experience as a paleontologist at the American Museum of Natural History and a high school science teacher to support evolution education in formal and informal learning environments. There is no question that such a journal is needed to confront the confusion over evolution students demonstrate and the attacks by proponents of

Intelligent Design and such ilk. Look for the first issue in March 2008.
http://www.springer-sbm.com/index.php?id=291&backPID=131&swords=evolutioneducationoutreach&L=0&tx_tnc_news=3145&cHash=8415869a28

Editor's Choice. Botany in Science Education Journals

Lau, J.M. and R.W. Korn 2007. **Clustered stomates in *Begonia*: An exercise in data collection and statistical analysis of biological space**. *The American Biology Teacher* 69(2): 106-108. The authors illustrate how to use an investigation of the spatial arrangement of stomates on Begonia leaves to hone student skills in collecting and analyzing data.

Segnew, S. and K. G. Scholthof 2007. **Environmental microbiology: Bacteria and fungi on the foods we eat.** *The American Biology Teacher* 69(3): 149-157. Microbiology and botany converge in this laboratory investigation of the relationship between plant pathogens and environmental/food safety issues.

Fagen, A.P., R. Schoen and J.B. Labov 2007. **Leadership summit to effect change in teaching and learning: Undergraduate education in agriculture.** *CBE-Life Sciences Education* 6: 25-26. This feature summarizes the summit meeting of 300+ leaders from food science and agriculture hosted by the National Academy of Sciences in October 2006. A full report is expected fall or winter 2007.

Littlehohn, Patty 2007. **Building leaves and an understanding of photosynthesis**. *Science Scope* April/May : 22-25. The author presents a hands-on leaf model building activity for middle school students and assessment ideas.

Bednarski, Marsha and Fenn Holt 2007. **The DEP saves the beans: A performance assessment task for acid rain**. *Science Scope* April/May : 50-54. Focusing on experiments to test the effects of acid rain on bean seedlings, the authors describes a template for performance assessment tasks and a scoring rubric.

Wandersee, James H. and Renee M. Clary. 2007 **Learning on the Trail: A Content Analysis of a University Arboretum's Exemplary Interpretive Science Signage System**. . *The American Biology Teacher* 69(1): 16-23. Do you have an outdoor nature center or trail system that is open to students or the general public? If so you'll want to study this article for advice on how to create effective signage to promote learning on the trail.

Sánchez, José and Maria José Quiles. 2007**. Studying Photosynthesis by Measuring Fluorescence.** *Journal of Biological Education* 41(1): 34-37. This paper, for upper division plant biochemistry or plant physiology students, describes an experiment to plot the absorption and action spectrum of photosynthesis and to investigate the inhibitory effect of heat, light light intensity and a herbicide on photosynthesis.

G. Bowen, Wolff-Michael Roth. 2007. **The Practice of Field Ecology: Insights for Science Education.** . *Research in Science Education* 37(2):171-187. "In the past several years a number of authors have suggested that science education could benefit from insights gained by research in the social studies of science that documents and theorises science as it is actually done. There currently exist two gaps in the literature. First, most research in science studies are concerned with the practices enacted in male-dominated scientific disciplines including physics and chemistry; there is little research concerning field ecology, where there are many female graduate students. Second, little work has been done in translating findings from science studies to science education. In this paper, we present findings from our own ethnographic work in field ecology. Our research shows that many traditional claims about the nature of scientific research are not consistent with how ecological understandings are actually constructed. These practices are perhaps more accessible to female students because of how the work and community are constructed. Field ecology may be the one science discipline with features that make it particularly attractive for enculturating a diverse student population currently not enrolling in science."

Announcements

Personalia

Peter H. Raven to receive World Ecology Award from UMSL

Peter H. Raven, president of the Missouri Botanical Garden, will receive the 2007 World Ecology Award from the Whitney R. Harris World Ecology Center at the University of Missouri-St. Louis.

The award will be presented during a gala dinner at 6:30 p.m. May 4 at the Missouri Botanical Garden, 4344 Shaw Blvd. in St. Louis. The dinner is $250 per person. Call (314) 516-5442 for reservation information.

The World Ecology Award is presented to an eminent individual who has raised public awareness about global ecology and made significant contributions to environmental protection and biodiversity conservation. Past award recipients include Jane Goodall, Harrison Ford, Richard Leakey, Teresa Heinz Kerry, Ted Turner, Jacques Cousteau and John Denver.

"Dr. Raven's support of UMSL, the Harris Center and his renown as a world leader in botany, ecology and biodiversity conservation make him an obvious choice for this honor," said UMSL Chancellor Tom George. "His commitment to education, conservation and botanical research serves as an inspiration to us all."

Raven is a world leader in botany and ecology for global biodiversity conservation. For over 35 years, he has guided the Missouri Botanical Garden to become a world-class center for botanical research, conservation, education and horticultural display.

Raven said "I am greatly honored to receive this fine award. It brings back memories of founding the center in 1989 with then Chancellor Marguerite Ross Barnett, an inspiring academic leader and a delightful friend and colleague. She would be very pleased with the strides that have been made over the years in developing such a strong program in world ecology, and the Missouri Botanical Garden is delighted to be associated with it."

The garden is a leader in botanical research in Latin America, Africa and Asia, with strong programs in North America as well. Education programs at the garden reach more than 100,000 students in St. Louis each year and provide professional development for teachers. More than 750,000 people visit the garden annually.

Described by Time magazine as a "hero for the planet," Raven champions research around the world to preserve endangered plants and promotes the cause for biodiversity conservation and sustainable development. He is the recipient of numerous prizes and awards, including the prestigious International Prize for Biology from the government of Japan and the Volvo Environment Prize. Raven has held Guggenheim and John D. and Catherine T. MacArthur Foundation Fellowships.

He has written numerous books and scientific publications. Raven is the Engelmann Professor of Botany at Washington University in St. Louis. Raven earned his doctoral degree from the University of California-Los Angeles in 1960.

The Whitney R. Harris World Ecology Center has become, through its partnerships with the Missouri Botanical Garden and the Saint Louis Zoo, the premier institution for graduate studies in tropical ecology and biodiversity conservation. With graduate students from over 20 countries working throughout the tropics, the center supports the largest group of tropical biologists in the world.

For more information on the Whitney R. Harris World Ecology Center, call (314) 516-5219 or visit http://www.umsl.edu/~biology/hwec/.

UW-M EMERITUS PROFESSOR IS AWARDED *HONORIS CAUSA* PH.D. DEGREE FROM MEXICO'S SECOND LARGEST PUBLIC UNIVERSITY

Hugh H. Iltis, Emeritus Professor and Director of the Wisconsin State Herbarium at the Department of Botany of the University of Wisconsin-Madison was awarded this past Wednesday 28 February 2007, an *Honoris causa* Ph.D. degree form the University of Guadalajara, in the state of Jalisco, Mexico. With close to 180,000 students, the University of Guadalajara system is the second largest education institution in Mexico and one of the largest in Latin America. Participants in the event where the Rector General, José Trinidad Padilla López, Executive Vice-Rector, Raúl Vargas, the Secretary General Carlos Briseño and the Rector of the Centro Universitario de la Costa Sur campus, Mtro. Enrique Solorzano. During the same ceremony Dr. Gonzalo Halffter one of the historic leaders of UNESCO's Biosphere Reserve program was also awarded an honorary doctorate.

Hugh H. Iltis was born in Brno, Czechoslovakia, emigrated to the United States in 1939, and received his Ph.D. from the Missouri Botanical Garden-Washington University, St. Louis, in 1952. He has devoted his life to the study of the flora of Wisconsin, the Neotropical species of the Caper Family (Capparaceae), and *Zea*, the genus of the cultivated maize and the ancestral teosintes. As co-describer of the fourth known species of *Zea*, namely Z.

Gonzalo Halffter y Hugh H. Iltis flanquean al rector de la UdeG durante la ceremonia de reconocimiento

Iltis on left of photo

diploperennis, Iltis became godfather to the establishment of the Sierra de Manantlán Biosphere Reserve in Western Mexico. A strong advocate of Biophilia, the gene-based human need for contact with nature and natural patterns, and a well-known fighter for nature preservation and population control, he was a professor of botany at the University of Wisconsin-Madison and the director of the herbarium from 1955 to 1993. Now emeritus, he is still active in the herbarium. For his contributions in the fields of plant taxonomy and nature conservation Dr. Iltis has received numerous awards including the Presidential Certificate of Merit (1987, Mexico); recognition by Conservation Council of Hawaii (1990); Sol Feinstone Environmental Award (1990); National Wildlfe Federation Merit Award (1992), Society for Conservation Biology Service Award (1994); University of Guadalajara's Luz María Villareal de Puga Medal (1994); Asa Gray Award (1994); and Merit Award from the Botanical Society of American (1996), among others.

Dr. Iltis was the initiator in 1979 of the academic cooperation program between the University of Wisconsin-Madison and the University of Guadalajara, first through his botanical research initiatives and later, in 1988, by promoting a formal institutional cooperative agreement. This collaboration later grew with the participation of the Gaylord Nelson Institute for Environmental Studies and the Department of Wildlife Ecology. More recently, on March 2005 UW System President Kevin P. Reilly and Wisconsin Governor Jim Doyle, signed a memorandum of understanding for implementing the "Jalisco-Wisconsin Consortium" promoted by UW-Madison's Global Health program, through the School of Medicine, the Animal Sciences program, and the University of Guadalajara's Centro Universitario de los Altos led by Dr. Armando Macías. Wisconsin and Jalisco formally maintain a "sister state" relation since 1990. More than 35 students and 20 faculty members from over 12 departments and institutes of the University of Wisconsin have participated for the past two decades in this successful international academic cooperation program.

AIBS EDUCATION AWARD

Carol A. Brewer is the 2007 recipient of the Education Award, American Institute of Biological Sciences, which is presented to an individual (or group) who has made significant contributions to education in the biological sciences, at any level of formal or informal education. Brewer is associate dean of the College of Arts and Sciences at the University of Montana. Her efforts to improve scientific literacy reach diverse audiences through projects that interconnect the general public, educators, and scientists. Especially noteworthy in this regard is her work heading the educational initiatives of the National Ecological Observatory Network. She encourages collaboration between scientists and educators, trains teachers to use their schoolyards for ecological investigations with students, and practices new assessment strategies to clearly connect teaching and learning.

THE RUPERT BARNEBY AWARD

The New York Botanical Garden is pleased to announce that **Valquiria Ferreira Dutra**, of the Universidade Federal de Viçosa is the recipient of the **Rupert Barneby Award** for the year 2007. She will be studying the genus *Mimosa* in the "campos rupestres" in Eastern Brazil.

The New York Botanical Garden now invites applications for the **Rupert Barneby Award** for the year 2008. 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, how a visit to the NYBG would help accomplish the goals of the project, and the names of 3 referees. Travel to the NYBG should be planned for sometime in the year 2008. The application should be addressed to Dr. Fabián A. Michelangeli, (e-mail: fabian@nybg.org <mailto:fabian@nybg.org>). 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, 2007. Electronic applications are preferred. 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. Michelangeli.

Symposia, Conferences, Meetings

Visiting Field Museum's Collections

The Field Museum's John G. Searle Herbarium has recently undergone a major space renovation with 15,000 sq. ft of new, compactorized storage, bringing the entire collection into a state-of-the-art, motorized facility. The renovation included the completion of a new Botany Library and Reading Room. The Botany Department's holdings also include extensive collections of fungi, lichens, mosses, liverworts, ferns, and the Economic Botany Collection dating from the Columbian World Fair held in 1893. This year, Chicago will be the location of two major meetings; the first, the 48th Annual Meeting of the Society for Economic Botany to be held at the Chicago Botanic Garden, 4-7 June 2007, and the second, Botany & Plant Biology 2007 joint congress to be held at the Chicago Hilton, 7-11 July 2007. Anyone wishing to visit Field Museum's botanical collections during these dates should make advance arrangements with Christine Niezgoda cniezgoda@fieldmuseum.org, Economic Botany and Flowering Plant Collection Manager; Robert Lucking rlucking@fieldmuseum.org, Cryptogamic Collection Manager; or Matt von Konrat mvonkonrat@fieldmuseum.org, Bryophyte Collection Manager.

- Michael O. Dillon, Chair & Curator of Flowering Plants, Botany Department, The Field Museum, 1400 South Lake Shore Drive, Chicago, IL 60605 dillon@fieldmuseum.org

An invitation to the 2007 annual Joint Field Meeting of theBotanical Society of America — Northeastern Section,Torrey Botanical Society, and Philadelphia Botanical Club:

The 2007 Joint Botanical Field Meeting will meet on the campus of Davis and Elkins College in Elkins, West Virginia, from Sunday, June 17 to Thursday, June 21. Our program will include three all-day field trips plus four evening lectures on pertinent topics.

Elkins is a gateway to the high Allegheny Mountains of West Virginia. Much of this magnificent, scenic region is conserved within the Monongahela National Forest. Our field trips will visit Canaan Valley State Park, Dolly Sods Wilderness Area, and other interesting botanical sites. Canaan (pronounced kin-naine) is a high, cool valley at about 3000 ft. above sea level, with an average growing season of less than 100 days. It supports a varied flora, with plants such as balsam fir (*Abies balsamea*) and bunchberry (*Cornus canadensis*) growing near the southern extreme of their range. Dolly Sods features spectacular rock outcrops in addition to its remarkable flora. We will examine some of the characteristic plant communities of this part of West Virginia, including spruce forests, heath barrens, and sphagnum glades. There will be plenty of ferns and fern allies, and this should be the blooming time for several native orchids. If you visited the area before, come back and see how your favorite plants are surviving in the 21st century!

The price for the meeting is $250 based on double-occupancy. It includes lodging for 4 nights, 4 breakfasts, box lunches on 3 field trips, and 4 dinners, including our traditional Wednesday night banquet. Our lodging accommodation is a college dormitory with double-occupancy rooms (two twin beds) and communal bathrooms. A few single-occupancy accommodations are also possible ($290), and reduced rates are available for commuters ($55 or $185).

For further information or a registration form please contact:
Larry Klotz, chairperson
lhklot@ship.edu
717-477-1402

REGISTRATION FOR 2007 JOINT BOTANICAL FIELD MEETING

Registration deadline: May 15, 2007.
Thirty (30) dormitory rooms (double occupancy) are reserved. Early registration ensures availability. Double occupancy is strongly encouraged in order to maximize attendance.

Name(s) (Mr. Ms.) _____

Address _____

Phone(s) day: ____ - _____- _____ evening: ____ - ____ - _____ Email: _____

Registration options:

Full registration (**double** occupancy) ____ @ $250.00 = $ _____
— same without bed linen (bring your own bedding) ___ @ $226.00 = $ _____

Specify a **roommate**: _____ (Otherwise we can assign.)

Full registration (**single** occupancy) ____ @ $290.00 = $ _____

— same without bed linen (bring your own bedding) ____ @ $266.00 = $ _____

Commuter without lodging ____ @ $185.00 = $ _____

Commuter without lodging, meals, and transportation ____ @ $ 55.00 = $ _____

Total: **$** _____

Send your check with full payment (to "Botanical Society of America") plus this registration form to:

Karl Anderson
46 North Childs Street
Woodbury, NJ 08096

Please indicate a person to notify in case of emergency: _____

Phone(s) day: ____ - ____ - _____ evening: ____ - ____ - _____

In making this application, participants affirm that they are in good health, are physically able to keep up with the group in the ordinary course of field activities, accept as their personal risk the hazards inherent in any outdoor activity, and will not hold the Botanical Society of America, or other sponsoring organizations, or the trip leaders responsible for the same.

Signature(s): _____, _____ Date: _____

(Date received: _____)

Positions Available

DEPARTMENT HEAD OF EDUCATION

LONGWOOD GARDENS, INC.

www.longwoodgardens.org
Kennett Square, Pennsylvania

MISSION STATEMENT

Longwood Gardens Inc., a tax-exempt charitable organization, is dedicated to preserving the spirit and beauty of the early twentieth-century gardens of Pierre S. du Pont. Longwood is a display garden promoting the art and enjoyment of horticulture for the public, while providing opportunities for research and learning. We are committed to excellence, good management and fiscal responsibility.

ABOUT LONGWOOD GARDENS

Longwood is one of the world's largest and among the most well recognized display gardens. It consists of a complex system of more than 200 buildings and other structures exceeding 540,000 square feet, linked by more than 104 miles of utility and communications infrastructure, all located on 1,058 acres near Kennett Square, PA, 25 miles south of Philadelphia. It is a self-contained community supported by its own water, sewer and emergency electrical generating systems. Consistent with its core mission as a display garden, it collects, propagates and makes available for the enjoyment of the general public a unique display from worldwide origins. It strives to maintain the highest standard of quality and excellence in all aspects of its work to emulate the vision of its founder.

Longwood employs approximately 160 full time employees. Currently it also receives the benefit of work by more than 170 part time employees, 30 instructors, 50 students, and 483 volunteers engaged in every aspect of its operations. Its current annual operating budget exceeds $29 million. The education budget is $2.4 million and is staffed by 11 full time and 17 part time employees. On average during the past ten years, Longwood's on-site earned income has covered approximately 54% of its annual operating expenses. The remainder of the operating income is derived from the earnings and capital gains from the Gardens' endowment.

HISTORICAL BRIEF

Pierre S. du Pont (1870-1954) – industrialist, conservationist, farmer, designer, engineer, impresario and philanthropist – was the great-grandson of Eleuthere Irenee du Pont who arrived from France in 1800 and founded a gunpowder company two years later. Pierre turned the family business into a corporate empire, the E. I. duPont de Nemours & Company, and used his resulting fortune to develop Longwood Gardens.

His vision for the future was built on a few sound principles, allowing those who followed to have the freedom to adapt to changing conditions without distorting the founder's stated intention that it be "for the sole use of the public for purposes of exhibition, instruction, education and enjoyment". The first principle was Preservation. Following his deep personal beliefs, he once proposed that historic trees become semi-public property, that they be registered and that even the owners be restricted from cutting, trimming or injuring them. Today, Longwood goes to great lengths to preserve and replant trees as well as care for the gardens, woodlands, meadows and wetlands that comprise this extensive estate.

The second principle was Horticulture. Pierre was fascinated with growing ordinary plants extraordinarily well for display purposes. His visits to more than 20 Italian villas and 50 French chateaux focused his attention on architectural qualities and water effects. He built his gardens feature by feature; the scale was grand, the accessories unforgettably theatrical, including an Open Air Theatre with secret fountains shooting out of and around the stage floor; a massive Conservatory and Main Fountain Garden; a 10,000-pipe Aeolian Skinner organ and a 30 x 36-foot analemmatic sundial.

The third principle was Education. Creating perhaps Longwood's farthest-reaching legacy, Pierre directed that an educational program be established to educate the citizenry in the science and art of horticulture and gardening. The educational programs came into being with international students in 1956 and quickly expanded to summer laboratories for college students, the Professional Gardener Training Program, college internships and a high school grounds keeping program. In addition, for more than 40 years Longwood has helped underwrite and its staff participates in a graduate program in arboretum/botanical garden management at the University of Delaware.

EDUCATION PROGRAMS AT LONGWOOD

The adult programs at Longwood include the Longwood Graduate Program in conjunction with the University of Delaware, the Professional

Gardener Program, internships and courses in core horticultural education.

Adult continuing education program have two components. First, the continuing education program offers college-level professional certificate courses. The Certificate Courses include 20 different specialties such as perennials, annuals, bulbs, conifers, botany and vines. The adult continuing education program also includes non-certificate education courses, lectures and workshops that connect to Longwood's seasonal public programs and special exhibitions. Additional continuing education courses are offered in garden design, botanical art and floral design.

The Professional Gardener Program is a two-year, tuition-free program that is offered every other year to approximately sixteen individuals who have obtained at least a high school diploma and have one year of garden work experience. Students work in all horticultural areas of the garden and receive classroom instruction from Longwood staff and outside instructors. Graduates are sought by public gardens, commercial horticultural enterprises and estate gardens.

The internship program includes the College Internship Program, International Gardener Training Program and High School Summer Internship Program. The internships are hands-on experiences to prepare individuals for careers in horticulture and related arts and sciences.

This spring, the Garden's K-12 Education Program is set to debut a new initiative that incorporates the opening of the new Children's Garden and focuses on curriculum-based programs useful for classroom instruction. Kennett Consolidated School District is partnering with Longwood for ten such programs as a pilot project and is providing a Teacher Advisory Board beginning in March at its inaugural Educator's Open House. The K-12 program will officially be offered to all public schools in the region in October 2007.

Longwood's library and archives includes 20,000 holdings that currently serve as an educational resource center for Longwood's staff, interns, professional gardeners and volunteers. The archives include over 100,000 documents, images (slides and photos), maps and other artifacts that are a part of Longwood's rich history.

THE POSITION

Reporting to the Director of Longwood Gardens, the Department Head of Education, (equivalent to Director level position at other institutions) assures the effective operation of the Education Department comprised of Student Programs (internships, professional gardening program), Continuing Education (certification courses and general continuing education to support programs) and Library and Archives. Leadership of staff, budget administration, and the coordination of department functions within the Gardens are critical functions of this senior level management position.

Duties and Responsibilities:

1. Support Longwood's mission and principles through learning opportunities for all age groups.

2. Provide strategic guidance and planning for the advancement of Longwood's educational programs.

3. Develop, administer and control operating and capital project budgets for department functions.

4. Lead professional staff in their performance and development.

5. Lead planning and program development for the department and communication education throughout the Gardens.

6. Lead and participate in committees and task forces that research, plan and implement changes and development at Longwood.

7. Serve on outside professional and community groups that plan and coordinate educational and promotional opportunities in the region.

8. Provide teaching and instruction for educational programming as needed.

CANDIDATE PROFILE

We seek a proven leader of public education programs whose background includes a successful track record of innovation and growth. Ideally this person would have experience creating and implementing programs ranging from K-12 to college level adult education. The use of collections (museums, botanic gardens, zoos and science centers) as a central medium for designing educational experiences is highly desired.

The qualified candidate will be able to demonstrate a solid knowledge of and ability to develop professional dynamic relationships with teachers, faculty, administration and others in the public school sector in order to create a positive and productive partnership. At the higher education

level, it is expected that this person would participate in the coordination of certificate and degree-oriented program strategies to grow new initiatives and strengthen current offerings. Experience in adult education program expansion, particularly the creation of innovative offerings that may be considered eclectic or cutting-edge, is desired.

This person must have at least five years of management-level responsibility for professional staff supervision, budgetary accountability at a large program or departmental level, external relations including outreach, and working with committees of board of directors or program advisory groups. A bachelor's degree from an accredited college or university is required; an academic degree at the masters or doctorate level is highly preferred. Leadership and recognition in professional membership organizations at the local, regional and national level would be a plus. Evidence of continuing professional education in such areas as collections-based educational programming, marketing, teacher training and related topics is desirable.

For more information, please contact:

S. Ross Hechinger
Principal, Eastern Region
Kittleman & Associates
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Longwood Gardens, Inc. is an equal opportunity/affirmative action employer. Applications from members of historically underrepresented groups are especially encouraged.

Other

Women Pioneers in Plant Biology

From Lee Kass:
The bio's I was invited to submit about Barbara McClintock and Harriet Creighton are now posted on the Women Pioneers in Plant Biology, American Society of Plant Biologists webpage:

http://www.aspb.org/committees/women/pioneers.cfm#McClintock

http://www.aspb.org/committees/women/pioneers.cfm#Creighton

Countryman Family Gift to Pringle Herbarium

The University of Vermont's Pringle Herbarium received a valued addition to its permanent collection this year with the donation of the private herbarium collection of the late William Douglas Countryman, who died in 2005 at the age of 84.

Countryman, a member of the biology faculty at Norwich University from 1948 to 1974 and chair of its Biology Department from 1961 to 1969, was an expert in the flora and fauna of Vermont, particularly aquatic plants and rare, threatened, and endangered species. His interest in the collection and preparation of diagnostic specimens led him to build a major personal herbarium collection, some 10,000 specimen sheets of which will be available to students, faculty, and the public in the Pringle Herbarium in UVM's Torrey Hall.

David Barrington, director of the University of Vermont Pringle Herbarium, left, honored the William D. Countryman family recently with a reception marking the family's donation of Countryman's personal herbarium to UVM. Beside Barrington are Chris Countryman, Anne Countryman and William Countryman, Jr.
PHOTO CREDIT : Cheryl Dorschner

The Countryman collection joins over 270,000 sheets of mounted and accessioned plants which make the Pringle Herbarium the third largest in New England. Central to the herbarium are the extensive Mexican collections of its namesake, Cyrus G. Pringle (1838-1911), whose aggressive exchange program with a suite of approximately two dozen international and national herbaria between 1885 and 1911 brought a large geographically and taxonomically diverse representation of the orld flora to the herbarium. At the same time, the herbarium is the definitive

repository for the flora of Vermont, including the largest Vermont flora collection in the world.

Countryman's widow Anne and sons William, Jr., and Chris formally resented the gift to the Pringle Herbarium at a ceremony and reception on December 12, 2006. Anne Countryman said the family decided the collection belonged at the University of Vermont, where is would be accessible to as many students as possible. "He wanted this material to be available to inspire students," she said. "That's what he wanted more than anything else."

Pringle Herbarium director David Barrington said the gift from the Countryman family "brings one of the most important private collections in Vermont here where it belongs." He said he was privileged to know Dr. Countryman well over many years and singled out his "extraordinarily deep and broad understanding of natural history — and his sense of humor" as the personal traits for which he will be remembered most. With the donation of the Countryman collection to the Pringle Herbarium, he said, Dr. Countryman solidifies his place among "the greats of Vermont botanists."

Call for Nominations
Editor of *Chinquapin*
The Newsletter for the Southern Appalachian Botanical Society

The Southern Appalachian Botanical Society (SABS) is seeking nominations (including self-nominations) for the position of editor of the society's quarterly newsletter, *Chinquapin*. *Chinquapin* provides members with news of plants in the east, society news, book reviews, and other topical information of interest to people in the SABS, and to people who are interested in plants in general. We wish an editor who can generate both a hard copy for mailing and an online version for our website (www.newberrynet.com/SABS). The editor also becomes a member of the Executive Council of the SABS.

Qualifications include membership in SABS and a background in plant research, with a minimum of at least a Masters degree in the botanical sciences, or, equivalent experience working with plants for a number of years. Successful candidates should also have extensive word processing skills, including WORD and/or WordPerfect, and good organizational and communication skills. Knowledge of Microsoft Publisher is also desirable, but not required.

Nominations may be sent via email or regular mail to:

Dr. Howard S. Neufeld, President
SABS
Department of Biology
572 Rivers St.
Appalachian State University
Boone, NC 28608
email: neufeldhs@appstate.edu
Tel: 828-262-2683

Nominations should be received by March 31, 2007, but the position will remain open until filled. For further information on the position, please contact Dr. Howard Neufeld.

Call for Papers
CBE—Life Sciences Education Announces a Special Issue:

Issues in Developmental Biology Education

Exciting new discoveries in the field of developmental biology—from findings about the molecular mechanisms of axis specification and induction, to new insights into the pluripotency of cells in the early embryo, to powerful new imaging techniques for the dynamic analysis of development—present abundant opportunities to engage students of all ages in understanding how mature organisms arise from a fertilized egg. Unlocking the mysteries of their own development is an inherently engaging topic for most students, and the societal implications of research in developmental biology are enormous. Nevertheless, few students have had the opportunity to delve into the cellular and molecular insights that have emerged in the field of developmental biology in the last two decades. As such, the developmental biology community is increasingly exploring innovative strategies to teach developmental biology to students at all levels, to forge educational collaborations across institutional boundaries, and to translate knowledge emerging from developmental biology research into engaging educational materials.

CBE—Life Sciences Education (CBE-LSE) will publish a special issue devoted to these topics, titled *Issues in Developmental Biology Education.*

The special issue will highlight innovative approaches to the teaching and learning of developmental biology. Authors are encouraged to submit research articles and essays on topics including, but not limited to, the following areas of interest in developmental biology education:

· Undergraduate laboratory activities
· Partnership and outreach in developmental biology education
· Developmental biology resources on the Internet
· Innovative approaches to developmental biology lecture courses
· Revision of undergraduate developmental biology curriculum
· The role of developmental biology in undergraduate/K–12 education
· Involving developmental biologists in K–12 education
· The interface of developmental biology and bioethics

In addition, this special issue will include invited commentaries on the potential implications of our knowledge of embryonic development for general approaches to teaching and learning.

Issues in Developmental Biology Education will be published online in Winter 2007. Submissions must be received by **July 1, 2007**. All manuscripts will be subjected to peer review. For author instructions and details about the online submission process, please visit: http://www.lifescied.org/preview_misc/ifora.dtl. For more information, contact Thea Clarke at cbe@ascb.org.

CBE-LSE (www.lifescied.org.) is an online, innovative, quarterly journal owned and published by the American Society for Cell Biology. *CBE-LSE* publishes original, previously unpublished, peer-reviewed articles on life science education at the K–12 outreach, undergraduate, and graduate levels. The journal places a strong emphasis on the assessment of educational techniques; see the instructions for authors for more information. The target audience includes those involved in K–12 outreach; community college, comprehensive college, and university teachers; and graduate students, postdocs, and students in teacher training at any level. All published articles are available freely online without subscription. In addition, more than 7,100 readers have signed up to receive quarterly e-mail alerts of new content. Articles are indexed in PubMed and available through PubMed Central.

Jeff Hardin, PhD
Issue Editor

An Ancient Tree Now Grows in Brooklyn: Brooklyn Botanic Garden Debuts The Wollemi Pine "Living Fossil" Is Added to the Garden's Trail of Evolution Exhibit

As part of its mission to share with the public information on plant conservation, Brooklyn Botanic Garden (BBG) announced it has secured a specimen of the extremely rare Wollemi pine (*Wollemia nobilis*), which will be added to the Garden's permanent plant collections and featured on public display beginning Friday, January 19, 2007. Referred to as a "major botanical find of the century," the Wollemi pine was believed to be extinct for 2 million years. But in 1994 a small grove of trees was discovered in Australia's Blue Mountains by New South Wales National Parks and Wildlife Service Officer David Noble, setting off worldwide excitement for a majestic plant that managed to survive through 17 ice ages over the past millennia.

Wolle - in - a - pot

Since its rediscovery, scientists and horticulturists have studied the Wollemi pine to learn how this ancient species was able to survive. At the same time, because fewer than 100 trees exist in the wild, a burgeoning plant-propagation and commercialization initiative has been launched-the cornerstone of the conservation strategy to preserve these trees in their native habitat. Royalties from the sale of cultivated Wollemi pines will go toward conservation efforts. Brooklyn Botanic Garden is offering a limited number of the trees so that visitors will be able to participate in the

conservation effort by purchasing this ancient and rare tree to take home. All trees sold in the U.S. are sold under the National Geographic brand.

BBG's own Wollemi pine will be displayed in the Steinhardt Conservatory's Trail of Evolution, which traces the development of plant life from its origin four billion years ago to the present day. The Wollemi pine belongs to the ancient coniferous family Araucariaceae, whose fossil record dates back over 200 million years to the time of the dinosaurs. The intrepretive information for the Garden's Trail of Evolution presents data on the evolution of plants, and one of the panels emphasizes the living-fossil characteristic of the family. Visitors can see the beauty of the tree itself that, at maturity, showcases bark that looks like bubbling chocolate and multiple trunks with fernlike foliage.

"The discovery of a plant long thought to be extinct and only known through fossils is an exciting and remarkable story that fires the imagination," said Scot Medbury, president of Brooklyn Botanic Garden. "Plants that have outlived the dinosaurs present a thrilling tale for children and collectors alike, and Brooklyn Botanic Garden is delighted to be able to showcase the Wollemi pine for our visitors. We look forward to nurturing these young plants so that future generations will be able to enjoy them," Medbury added.

"The addition of the Wollemi pine to BBG's plant collections also offers us an important opportunity to demonstrate the Garden's extensive plant conservation efforts and the excellent environmental stewardship initiatives that we have been working on with Botanic Gardens Conservation International (BGCI) and the Center for Plant Conservation (CPC)," explained Medbury. "Through this exhibit, the Garden can communicate the alarming rate at which far too many plants are facing extinction."

Young visitors

The Garden's Education Department will offer fun, instructional activities for children and their families in order to spark the thrill of discovery and offer a chance to be part of the living history of the Wollemi and other ancient endangered plants, as well as to inspire a plant conservation commitment. On weekends, there will be interactive Wollemi pine Discovery Carts in the Steinhardt Conservatory. Children can investigate modern-day plants that were part of the landscape when dinosaurs roamed the earth and make a leaf rubbing from one of these "living fossils."

The Garden will provide comprehensive and informative material on the award-winning BBG.org website, and the volunteer Garden Guides will provide visitors with a compelling tour of the Trail of Evolution in the Steinhardt Conservatory.

The Wollemi pine exhibit in the Steinhardt Conservatory will be on display beginning January 19.

WEB LIBRARY OF BOTANICAL REFERENCE, RARE BOOKS NOW AT +500,000 PAGES

Three years ago, the creators of Botanicus.org set out to build one of the world's largest digital libraries to allow free and improved access to historic scientific literature.

And they have certainly succeeded. The Missouri Botanical Garden-based Web encyclopedia recently surpassed the 500,000-page milestone, encompassing over 1,000 volumes online, and counting.

Botanists, researchers, students, and anyone interested in natural history and beautiful rare books can search this digitized library of books that date from 1480 to 1980, including important botanical literature by Charles Darwin and Carl Linnaeus. Users can search by title or author, and volumes are fully text searchable as well. New technology allows zooming in for close up views of illustrations and text, and new tools have been implemented for locating scientific data within the texts themselves, such as plant names and geographic locations.

"We've used emerging technologies to digitize and present these historic titles online, letting users interact with them in ways impossible with a bound, paper-based book sitting on a library shelf," said Chris Freeland, application development manager.

The Garden has been digitizing its research library materials since 1995, focusing primarily on

beautifully illustrated volumes from its fine rare book collection. The Botanicus project was funded by a $950,000, three-year grant in 2004 from the W.M. Keck Foundation. The project team used the Garden's TROPICOS database to identify 500 of the most heavily cited botanical journals and books, and prioritized them for digitization.

"We wanted to build a highly interactive and searchable digital library of rare legacy botanical literature essential for research in plant biodiversity, and make it freely accessible to any researcher in the world," said Doug Holland, curator of library services and technology.

Digitizing, indexing, and annotating historical scientific literature is vital to future research in systematic botany, the science of plant identification. Like other natural history disciplines - but unlike the physical sciences - systematic botany is built upon and requires frequent reference to the literature of its past. To conduct carefully documented and authenticated research, botanists must spend weeks in the library searching the published botanical literature for data to develop a new project or substantiate their recent observations.

Comprehensive collections of botanical literature are only available in a handful of libraries, and all of them are in North America and Europe. Over 67,000 systematic botanical publications exist, but only those most recently published are in digitized form.

"For botanical researchers, these library-centered literature searches can delay hypothesis development or recognition and publication of their new plant discoveries," said Holland. "For those traveling in remote parts of North America or stationed overseas, a lack of access to library resources compounds these difficulties. Further, no matter how scrupulous the search, when scientists must work manually through an array of journals and books it is impossible to be sure that all historical facts have been located and all published observations have been seen."

Botanicus is being used as a model for use in the emerging Biodiversity Heritage Library Project, said Freeland. The project is a collaboration by 10 of the world's largest natural history libraries to scan and make all botanical and zoological descriptive literature freely available.

PLANTS OF MERIT ARE THE FOCUS OF A PHOTO CONTEST

(ST. LOUIS): The Plants of Merit will be "ready for their close up" this spring and summer! If you like to take photographs in the garden, consider focusing on these exceptional plants when the Missouri Botanical Garden's Plants of Merit program holds its first-ever, six-month photography contest beginning Mar. 1.

Plants of Merit are chosen for their easy-to-grow, disease resistant qualities and outstanding ornamental value; however, they are not widely planted in lower Midwestern landscapes. The Missouri Botanical Garden in St. Louis partners with Powell Gardens in Kansas City, Mizzou Botanic Garden in Columbia, and the University of Missouri Extension in this regional program that selects various annuals, perennials, shrubs, vines and trees each year for recognition. The purpose is to increase home gardeners' success and promote regional horticultural diversity, explained Mary Ann Fink, Plants of Merit coordinator.

For a complete list of all eligible plants, search www.plantsofmerit.org <http://www.plantsofmerit.org/> and click on the link to "view just a list of all the Plants of Merit."

"We're offering photographers a chance to have their work reproduced and displayed at the Garden," said Fink. "We also hope to expand our Plants of Merit image library with all of the photographs we expect toreceive."

Winning photographs from the contest will be reproduced as note cards and exhibited at the Kemper Center for Home Gardening in late 2007. Winners will be selected by a panel of judges that includes members of the Plants of Merit Advisory Committee, Garden staff, and a professional photographer.

Photographers of any age, both amateur and professional, are eligible to enter at no charge. Simply submit an eight-by-ten inch printed color photograph of any Plant of Merit, either current or emeritus status. A compact disk must also accompany the printed photograph. One person may submit more than one photograph, but only photograph per Plant of Merit. Photos must not contain people. E-mailed files will not be accepted. Submitted photos and compact disk will not be returned.

The Plants of Merit program will retain all copyrights to submitted entries for its image library. Photos may be reproduced in brochures or other printed materials, online, or in the media.

Entries must be postmarked from Mar. 1 through Aug. 31, 2007. Mail to Plants of Merit Photo Contest, c/o Kemper Center for Home Gardening, Missouri Botanical Garden, P.O. Box 299, St. Louis, MO 63266-0299.

Complete contest rules are online at www.plantsofmerit.org . No purchase is necessary to enter. Void where prohibited by law. Terms of the contest are governed by official rules; see official contest rules for details. For questions, call (314) 577-9443.

Books Reviewed

Deforesting the Earth: From Prehistory to Global Crisis: An Abridgement. Williams, Michael. 2006. ISBN: 0-226-89947-0. (Paper, U.S $25.00) 543 pp. The University of Chicago Press, Chicago, Illinois USA 60637.

Reading this book is akin to reading the history of humans on planet earth from 10,000 bp to the present — but with the singular focus on how we have dealt with our forest resources over time. As such "Deforesting the Earth" provides ample grist for anthropologists to activists, botanists to boatbuilders, historians to hemispheric planners, theologians to theoreticians. As the author states in the preface: "perhaps more of the earth's surface has been affected by this process than by any other single human activity". This is a big-picture book that the author deems "an essay in both landscape history and environmental change" – and, I might add, builds this chronicle on a wealth of detail.

If the heft of this thick paper-back book is intimidating, chill out – this is just the abridged version of the full-length tome published in 2002 (which I have not seen). Fortunately the writing is fluid and, as noted on the back cover, "accessible to a general

readership". The organization is logically chronological, so a reader can temporarily skip sections and focus on certain time periods – but with the risk that he will be drawn backward rather than forward to assuage his curiosity.

The book begins with a short chapter on the post-glacial era. As someone interested in paleoecology I could have wished for more information here – but then the book might have approached 1,000 pages. The next two chapters focus on the early shaping of the forest, first with fire and then with agriculture. This first section on "Clearing in the Deep Past" concludes with a chapter each on the classical world (focused on Rome and Greece) and the medieval world (mostly Europe, but with a nod to China). It is here that we begin to see the devastating effect on forests from the rapidly growing enterprises of shipbuilding, metal smelting and urbanization. Williams concludes this section with an interesting comparison between China, where a rapidly expanding peasant population was devastating indigenous natural resources, and Europe, that "broke out of its vicious circle of subsistence when it was able to reach out and garner the resources of the wider world". One can readily see parallels with the United States as it protected its forest resource during the past century by importing its wood from the forests of Southeast Asia, Africa and Latin America.

Part II expands outward from Europe and covers the period of about 1500 to 1920, beginning with the "age of discovery". New European technology (printing presses gobble paper), population growth (the plagues subside) and a fascination for new products (coffee and tea become Europe's "soft drugs") all lead to deforestation and population disruptions in the wider world of the tropics. As one observer noted: "these two vegetables [coffee and tea] have brought wretchedness and misery upon America and Africa".

One of the more cogent sections in the book for plant ecologists and conservation biologists is part III, The Global Forest – where the author deals with changes since 1900. As grim as we may portray tropical forest destruction today, it pales in comparison to the devastation wrought in post-colonial America – a period that culminates in Teddy Roosevelt's "timber famine" speech of 1905. The formation of the U.S. Forest Service under Gifford Pinchot's direction begins the turnaround of this trend as abandoned and degraded agricultural land in the eastern U.S. gives way to restored forests. While this is happening, however, the situation grows worse in other parts of the world, driven to a large extent by increasing wood demands from the developed world. But history has a way of returning to haunt us. Current U.S. admonitions about tropical forest destruction are countered in places like Brazil by citing the past U.S. forest destruction as their role model!

The book ends with an epilogue: Backward and Forward Glances. Here the author loosens his belt a bit and provides a more personal perspective — and critiques other books on the subject. Among a number of references, he frequently cites FAO (Food and Agriculture Organization of the United Nations) publications. Having recently spent three months on a consultancy in the forestry division at FAO headquarters in Rome, I can attest to the immensely valuable global perspective of FAO documents. Check out their website (www.fao.org.). A weakness I found in this section was the absence of any meaningful discussion of global climate change – but perhaps Williams is holding that for a sequel.

In summary, if you are looking for a book that focuses on the deep biological consequences of deforestation, this is not the treatise for you. But if you wish to broaden your biological background to include cultural and historical perspectives this book is your ticket.

-Richard Jagels, Forest Biology, University of Maine.

Emerging Threats to Tropical Forests. Laurance, William F. and Carlos A. Peres (eds.). 2006. ISBN 0-226-47022-9 (PaperUS$40.00) 563 pp. The University of Chicago Press, 1427 E. 60th Street, Chicago, IL 60637.

Despite numerous publications and a high profile in terms of environmental issues, losses of tropical forests and their associated biological diversity continue. This edited book examines the various threats arrayed against tropical biodiversity, providing an updated and global perspective, while striving to stress poorly known and complex drivers of change. It is fairly well balanced geographically, nicely produced and edited, and referenced with a joint listing of about 1300 citations to the relevant literature.

The editors, William Laurance and Carlos Peres are tropical biologists dedicated to conservation-relevant research on tropical forests and biota. They have facilitated the involvement of 49 contributors with this book project, and have had the chapters peer reviewed and then organized into six sections. They identify four areas of concern, namely 1) change caused by atmospheric and climate processes, 2) synergistic effects of interacting change processes, 3) pathogens and invasives, and 4) cryptic threats.

These respective sections are then bundled between an introductory essay and two concluding sections that evaluate possible solutions and outline what should be done in terms of both research and conservation efforts.

Given future global climate change, it is likely that the most threatened tropical environments are on islands and coasts that will be affected by sea level rise, and also in tropical highlands, where some species distributions will shift upward while other species will find their environmental requirements no longer satisfied. Only one chapter, by Williams and Hilbert on Australian rain forests, looks at the alarming case for upland species facing compressed potential ranges, while none look at tropical mangroves or other coastal environments. This research void is recognized by the editors in the conclusions; they suggest that a "land and sea" approach would help link terrestrial changes to concurrent effects offshore. Most of the chapters that examine climate do so for tropical rain forests that are being altered by changed ecohydrological conditions or fire regimes, and apparently also by increased growth and turnover of some plant life forms due to higher carbon dioxide concentrations in the atmosphere. Shugart and colleagues evaluate the case for tropical savannas, pointing out that the lessened rainfall expected by many climate models for the lowland tropics will increase fire-caused shifts to nonwoody vegetation while also interacting in complex ways with human land use systems associated with the grazing of livestock.

Synergies are of concern because two (or more) interacting processes can produce nonlinear or otherwise hard-to-predict changes. The authors in this section mention how forest patches are exposed to increased fires on their edges and are much more likely to be overhunted, in addition to losing species because the surface area of habitat is reduced. Like other sections in the book, this one offers some chapters that are data papers and others that serve as literature reviews. Peres and Michalski use spatial and regression analyses to assess forest fragmentation effects in Brazil, while Olupot and Chapman quantify the length of the human-caused edge effect that alters conditions into Bwindi Impenetrable National Park in Uganda. Increased pathogen activity and diseases can be due to climate change altering distributions and biophysical conditions, while human-caused changes are increasing the spread of fungi, microbes, and vectors. Both Cunningham et al. and Walsh provide useful perspectives, especially on the sobering spread of Ebola among the remnant populations of African apes. Synergies have created novel circumstances that threaten primates, amphibians, and plants, among others. In many cases, human health and/or economic interests are also directly threatened.

The section on "cryptic" threats is somewhat less cohesive given their ambiguous nature and the poor level of current understanding. Examples explored include the effects of surface fires in rain forests, of roads, and of illegal logging. Terborgh and Nuñez-Iturri predict large spatial changes among forest trees resulting from altered seed dispersal caused by loss of certain vertebrates due to hunting and habitat fragmentation. Develey and Metzger use landscape metrics to analyze quantitatively how fragmentation affects bird species diversity and composition among the remaining patches of Atlantic rain forest in Brazil. These authors and others in this section show that altered landscape patterns in turn change population processes such as recruitment, mortality, and persistence, but often with consequences that are subtle or species specific.

The section on solutions for these emerging threats includes six chapters that contain much wisdom acquired from considering financial aspects of funding conservation and protection programs, from planning for climate change mitigation, and from implementing integrated conservation and development projects. Fagan et al. propose =increasing the stakes by asking the global environmental community to lobby for the protectionof 50% of the world's tropical forests, rather than settling for a fraction of that amount. There are ssessments by Niesten and Rice of the use of various conservation incentives and by Turton and Stork of the promise and limitations of using tourism to foment forest conservation. These chapters do not repeat truisms or generalities found in some pleas for tropical forest conservation, but rather are based on the experiences and research of the authors, avoiding oversimplification and also defeatism.

Overlooked in this otherwise splendid collection, are some of the utilized landscapes of the tropics that also contain biodiversity of concern. For example, tropical agricultural and forestry systems are not considered in depth, and the rather different concerns of indigenous people are not elucidated. The cover photograph of the book showing a recently burned tropical forest, for example, is in fact somebody's garden or agricultural field—beware of blaming the victims when it comes to tropical deforestation. In their chapter, Whitten and Balmford provide a means to evaluate the magnitude of opportunity costs borne by local people living nearby a protected tropical forest. For that matter, some habitat fragmentation of tropical forests exists independently of human effects, for example in

savanna-forest ecotones and in many mountainous areas. As a result, a longer term perspective on forest fragmentation would be useful, distinguishing consequences in ecological time frames, as is done in this volume, from the different results of fragmentation that have played out over evolutionary time in terms of diversification.

This edited collection will provide a thought provoking and current overview of the sources of risk to the biodiversity of tropical forests. It would make for a useful volume for a graduate or advanced undergraduate seminar class. Its summaries of emerging threats constitute a report card on how well scientists and conservationists are doing in grasping the magnitude and complexity of human-caused changes in the tropics.

-Kenneth R. Young, Department of Geography and the Environment, University of Texas, Austin, TX 78712

Native Treasures: Gardening with the Plants of California. Smith, M. Nevin. 2006. ISBN 0-520-24426-5 (paperback, US $24.95). 278pp. University of California Press. Berkeley and Los Angeles, California, USA.

As a native plant enthusiast and a life-long East Coast resident, I've grown very comfortable in the realm of eastern deciduous woodland natives. So the prospect of reading through M. Nevin Smith's **Native Treasures: Gardening with the Plants of California** was like being awarded a virtual field trip to learn about "native" plants that are mostly exotic to my experience.

Smith prefaces his work with a disclaimer of sorts – the book is neither a "how-to" guide nor an encyclopedia of California natives, but more of a gentle introduction to gardening in California with interjections of the author's musings on various local conditions and groups of valued plants. The format of the book compliments these goals. First, Smith tells the readers what they need to know about gardening in California using its native botanical bounty, and then he tells us what he wants us to appreciate about that menu of plants that is available horticulturally.

The first fifth of the work is dedicated to general gardening principles and how to apply them to the plants of California. The Introduction is really an overview of the Golden State in all its ecological diversity. The variation in habitat throughout the state is linked with differences in topography, soils, underlying geology and patterns of rainfall, temperature and fire. The interaction of these influences leads to vast differences in the ecological parameters of regions within the state – coastal, near-coastal, basin, mountain, desert – and to great diversity in the plants that grow in each of these areas. I was very pleased to see Smith point out that "Californian" does not necessarily mean "Native" since the habitats are more important than the political boundaries. He revisits these regions in his discussions of design and site considerations, and there may have been less repetition in the text if he had tackled the issues region by region from the onset.

The author spends a bit of space sharing his rationale for growing natives: they are a celebration of local origins, they handle the environmental extremes that California offers, and they "capture an impression" of the natural landscape. He is not a purist about using natives nor does he advocate constructing little "plant zoos" in our gardens while the habitats of origin are destroyed.

The remainder of the basic information focuses on design considerations, the importance of educating oneself about local conditions and suitable plants, and lastly, how to propagate plants both sexually and asexually. These chapters serve as a review about gardening challenges – soils, irrigation, pests and diseases – and seem to best meet the needs of individuals with some gardening experience, but, as a review, clearly not those needs of novices. For many of the points he makes, Smith suggests a California native plant solution. The chapter on propagation does a more complete job as a crash course in plant multiplication. Smith covers the pros and cons of seed versus vegetative propagation as well as the methodology for each, and he evens remembers to discuss an important consideration for many natives – seed pretreatment.

Smith devotes the remaining four-fifths of **Native Treasures** to those plants that hold special places in his treasury. This section, entitled "A Few of My Favorite Things", is subdivided into chapters on trees, shrubs, "two genera' (sages and buckwheats), subshrubs and herbaceous perennials, bulbs and corms, and finally annuals. The breadth of coverage within each chapter varies widely. Only oaks and madrones are explored in the Trees chapter, while thirteen shrub genera and over fifteen annuals are described in their respective chapters. With each plant group, Smith presents

their "Common Features", their "Uses and Culture", propagation information, and details on multiple taxa in the group. The consistent format makes each chapter easy to browse for information and the accompanying photographs of selected plants make that browsing a visual treat.

It is abundantly clear that Smith in enamored of his plants! The poetry and enthusiasm of his description of the seasonal aspects of oaks is usually reserved for showier groups like roses and orchids. Not only does he seduce the readers into the need for an oak in their yards, the author also provides them with a wealth of information about siting and mycorrhizae to ensure the survival of that majestic genus. He spends pages expounding on the wild lilacs (*Ceanothus*) despite the fact that only a few of them have achieved true popularity in the nursery trade. He warns of their "wandering tendencies and certain cultural quirks" while extolling the ease with which they blend with other plants in the garden. In "Two Genera", Smith confesses to his ongoing love affair with the genus *Salvia* and his "long friendship" with the buckwheats. And, happily, in "Small Matters", Smith addresses the challenges and rewards of growing some of those annual species that have made their way into the seed trade – California poppies, *Phacelia*, *Nemophila*, and Lupines, among others.

Smith finishes up with a Resources section that clearly underlines his commitment to education about natives. In addition to other horticultural books on California's natives, Smith includes a listing of appropriate floras, journals, and places to visit to see these plants in action. Also, as one would anticipate, he includes numerous internet sources for seeds, plants, and native plant organizations.

The introductory materials of the book served as a wonderful reminder as to why anyone anywhere gardens with native plants – to create a sense of place for both the human and non-human inhabitants, to celebrate the treasure that is the local flora and the fauna that it draws, and to meet basic environmental needs – erosion control, privacy, shade – using a palette of native species. As a horticulturist, I appreciated Smith's collection of his "Favorite Things" to remind me how many plants in the horticultural trade originate on this continent and how different the floras of the two coasts are. Smith's book serves as an educational tool for those non-Californians among us and as an inspiring resource for those challenged with gardening in the Golden State.

- Linda MK Johnson, Department of Biology, Chemistry and Environmental Science, Christopher Newport University, Newport News, VA, 23606, USA.

Natural Enemies – an introduction to biological control. Hajek Ann, 2004. ISBN 0-521-65385-1 (Paper US$50.00) 378 pp. Cambridge University Press, 40 West 20th St, New York, NY 10011-4211.

This book includes every kind of natural enemy used to control insects and plants that are problems for human beings. Ann Hajek first makes the case for biological control, as an environmentally sound alternative to chemical control (to which most organisms evolve resistance). She takes us through a brief history of the development of biological control, including the standard experimental protocols used in the different lines of research. She first reviews successes in classical biological control, then presents two newer forms of control jointly termed augmentation (inundative and inoculative biological control) and discusses how products are made available for commercial use. My interests in tritrophic interactions led me to appreciate her chapter on conservation and enhancement of natural enemies, especially her general review of methods of enhancement of insect carnivore populations, providing a basis for more detailed compendia (e.g., Wackers, Van Rijn, and Bruin 2005).

Hajek uses many examples and includes many suggestions for further reading after each chapter. The book is richly illustrated with very nice drawings and figures from a variety of talented artists. Fascinating and horrific parasitoids, strange nematodes, and virus-stricken caterpillars are all brought to life (or maybe I should say, death!) in pictures as well as in Hajek's descriptions of the natural history and science of these interactions.

I expect that this book could be well utilized in a course on the topic of Biological Control in a department of Entomology or Agriculture, but also it can help any botanist or ecologist understand this complex topic with ease. My students and I have learned a lot to help us in our own studies of biotic plant defense, especially when we encounter an unexpected twist in an interaction we are studying. I recommend this very fine compendium to anyone interested in species interactions, community ecology, invasion biology, or conservation biology

-Suzanne Koptur, Professor of Biological Sciences, Florida International University.

Deuternomy 11:15

I will provide GRASS in the fields for your cattle, and you will eat and be satisfied.

The Organ Pipe Cactus. Yetman, David A. 2006. University of Arizona Press. $9.95 (USD) paperbound, 70 pages. ISBN 978-0-8165-2541-6.

This short book provides a sound and succinct account of the organ pipe cactus (*Stenocereus thurberi*), especially its interactions with humans (and to a much lesser extent, interactions with the lesser long-nosed bat). Yetman discusses this charismatic cactus species as though he knows it personally, which – after almost a half century acquaintance – he undoubtedly does know intimately. The organ pipe is a 1-10 metre tall cactus that branches profusely from the base and is probably the most characteristic plant species of the Sonoran Desert.

At first blush, this appears to be a pretty picture book with cursory factoids about the organ pipe cactus that one could readily compile from a litany of sources. But appearances are deceiving. Yetman has written a rich yet accessible book from his perspective as an ethnobotanist. He clearly knows and has worked with many of the experts in the field.

The organ pipe population of El Pitayal (named for the organ pipe cactus, whose common name in Mexico is *pitaya*), located in southernmost Sonora, provides several fascinating conundrums. Why does this southern population flower and fruit much later than more northern populations? In virtually all other plant species, we see the opposite pattern, probably due to temperature gradients. The El Pitayal population is of extremely high density, with huge plants, but essentially no seedlings. Why this peculiar demography? Is this an example of negative density dependent selection? What determines regeneration rates, especially of such long lived perennials? Yetman shows that there is no seedling recruitment in El Pitayal, even in areas where livestock are excluded. However, he describes nearby areas lacking livestock exclosures where seedlings abound. Organ pipe cacti at El Pitayal could provide several fascinating research projects, if not research careers.

This book is peppered with many interesting and unexpected pieces of information, of which I list a small sample of three. First, organ pipe cacti in the Pinacate Volcanic Region (immediately south of Organ Pipe Cactus National Monument) grow extensively along the routes that bats take from their roosts to their feeding sites. The organ pipe cacti effectively map the bat's routes, almost certainly due to the bats dispersing seeds in their feces. Unfortunately this observation by Bill Peachey appears to have never been published, other than possibly in a meeting abstract. Second, for most species of cacti, cuttings are best taken in warm weather when plants are actively growing. Yetman's work in a Mayo village shows that the opposite is true for organ pipes, where antithetically cuttings taken in the cold of late winter root far better than those taken in late spring or early summer. Third, "many Mayo reported that the scorched peel of the fruit is applied directly to the anus for hemorrhoids, rightly cautioning that it must first be scorched enough to burn off the spines." I know organ pipe cacti fairly well, having lived in southern Arizona for several years and traveled in Sonora, but never knew these tidbits.

This is wonderful natural history and human history book, but does lack the precision of most biological science books. Lots of the data is either anecdotal or with very small sample sizes. Some things are stated by Yetman without question, such as that organ pipes have only been part of the Sonoran Desert flora for the last few million years. This is a bit misleading insofar as the Sonoran Desert has only been around for a few million years. Plus, there are no fossil cacti, except for in packrat middens that are no older than 40,000 years old. These are not complaints, but just reminders of the context in which this book was written.

The only faults with this book are in details of production of the figures and references. Except for the front and back covers, no photo credits are given. I suspect the author took all remaining photos, but this was never stated. At the start of each chapter is a pair of photos that are repeats of photos appearing elsewhere in the book. The book would have been approximately five pages shorter without these repeated images, which is about ten percent of the length of text. Format of references varies, e.g. author's first names are only sometimes abbreviated. Even one of Yetman's own citations is incorrect: Yetman and Van Devender was published in 2001, not 1991. But these are small complaints.

This is lively, entertaining, and informative reading from someone who truly understands this plant and its roles in people's lives. The photos are all in colour, of good quality, and beautifully integrated with the text. This book sells for just under $10 (US), so there is hardly an excuse not to purchase it.

-Root Gorelick, Department of Biology, Carleton University, Ottawa, Ontario K1S 5B6 Canada.

Psalm 104:14
As for man, his days are lige GRASS; he flourishes like a FLOWER of the field.

Plant Exploration for Longwood Gardens. Anisko, Tomasz. 2006. ISBN-13: 978-0-88192-738-2. 334 pages. Timber Press, Portland Oregon.

This book is an "armchair" tourist guide for anyone who has ever felt the excitement of searching for plants worldwide or even locally, or who has simply wondered how some of the unbelievably colorful nursery plants such as New Guinea *Impateins* have come to appear in local gardens. The title doesn't begin to capture the excitement documented in this very interesting and extremely well-illustrated book.

The author, Tomasz Anisko, is plant curator at the Longwood Gardens, a well-known botanical garden in Pennsylvania. He has written a book to celebrate the 50th anniversary of Longwood's opening to the public by describing 50 different plant exploring trips that Longwood explorers have been involved in since 1956. Such emphasis on exploration has resulted in the expansion of Longwood Gardens' collection from about 3,000 taxa to over 10,000. It is a long, but fascinating book which takes the reader around the world, starting with a 10-month trip to the Himalayas with professional plant collector Kingdom Ward and his wife Jean Kingdon Ward in 1956 and ends with a three-week trip to Chile by the author and Tim Thibault, a curator of the Rancho Santa Ana Botanic Garden in 2003. In between are accounts of 48 other explorations by various groups of horticultural explorers to all six continents in search of seeds, cuttings and even whole plants of display or research material. Just reading the book is a fascinating journey.

What makes this book so readable is its style of presentation. There are excellent color relief maps throughout with each stop named and highlighted in red. Each trip account is concise (average 6 pages) and describes the purpose, planning, participants, route and a sample of plant material encountered. There are excellent (mostly color) photos of habitats, scenery, people and plants on almost every page.

What really makes it all come alive are the incredibly literate excerpts from the field notes and letters of the explorers. The archives of Longwood Gardens, USDA and others have provided vivid descriptions of the excitement of discovery as well as the discomforts and disappointments inevitable in such undertakings. The text is made even more lively through the use of intriguing subtitles for sections describing the segments of each trip. Examples include "Sleeping on dynamite" (in Kashmir), "Surrounded by reminders of war" (in Korea), "Silver goes to Longwood" (in Australia), "Holy week in Madrid" (in Europe) and "Keeping ahead of the dust" (in Central America).

Russell Seibert, the first director of Longwood Gardens was the moving force behind many of the earlier trips which usually involved collaboration with other organizations such as the New Crops Research Branch of the US Department of Agriculture. He recognized the importance of discovering new material, but was also interested in expanding the ranges of existing horticultural plant groups such as Camellias and Rhododendrons through enhanced breeding programs using collections from the colder limits of their ranges. He emphasized the importance of connecting with staff and educators at various horticulture-related institutions and nurseries throughout the world.

Later groups of diverse collaborators often returned to the same general areas explored earlier, but with a more direct focus based on earlier findings. Through the chronological sequence of collecting over a fifty-year period, one becomes aware of the changing conditions in various parts of the world as well as the effects of improvements in travel and communication. Collaboration with faraway colleagues becomes easier through cell phones and the internet. Earlier logistic difficulties often involved getting permission to get into remote sites, while later explorers deal with the challenges of getting permits to bring plant material back into the United States.

One does not have to be a taxonomic expert to enjoy this book. The author limits the plant names to a select few of those collected and many of the scientific names mentioned describe genera that are very common in the garden. There are excellent photos of some of the more beautiful or obscure finds. I would recommend this book to anyone with an interest in garden plants.

-Joanne Sharpe, Coastal Maine Botanical Gardens, Boothbay Maine

Saffron (*Crocus sativus*) Production and Processing. M. Kafi, A. Koocheki, M. H. Rashed, and M. Nassiri, editors. 2006 Enfield, New Hampshire: Science Press.244 pages + viii. Illustrated. ISBN 1-57808-427-X. No price given.

I was drawn to this volume because of my research on Bible plants (Musselman, 2007) which took me to the saffron harvest in the Andulacia region of Spain and consequently to growing saffron in my home garden where, each first week of November, the beautiful, heavily scented flowers appear with their massive stigmata drooping between the purple petals. As soon as the flowers open, I remove the crimson stigmata and dry them gently to produce the threads which constitute the spice saffron. My experience as a saffron farmer is limited so I am keen to learn more about growing this Bible plant, a sterile triploid propagated only by corms. I thought this book might help.

A more accurate title for this book would be Saffron Production and Processing in Iran as all the work reported here is based largely on the saffron industry in that country. According to the authors, Iran is the largest producer of this valuable spice, the most expensive spice, even more costly than cocaine. Because of demand, production is spreading to new areas and at least one international organization has advocated increased production in areas where few other crops can grow. Its requirement of little water makes it a promising crop in many parts of the arid world. While there are undoubtedly applications that can be made in other saffron growing regions, this small well produced book would be of greater value if it were more inclusive. The recent (2005) I International Symposium on Saffron Biology and Biotechnology (International Society of Horticultural Science, Leuven, Belgium) is a better investment for the reader looking for a more global treatment of saffron culture. The CD contains numerous contributions from Iranian scientists as well.

Saffron (*Crocus sativus*) Production and Processing gives an overview of the saffron industry and a review of some related species in the genus *Crocus* with pictures of varying quality. Other chapters deal with overall agronomic practices, micropropagation, indigenous knowledge (meaning how different farmers cultivate their crop and treat the product rather than ethnobotany per se) and physiology. Two chapters that I found particularly interesting were those dealing with pests and a chapter on processing, composition, and standards. I would never have envisioned porcupines and bandicoots as pests of saffron but in Iran they seriously damage the plants, digging and eating the corms—remarkable considering the toxicity the corms and leaves. Because saffron is such a high value crop, the threads are often contaminated with stamens or other materials. There are strict standards imposed by Spain on saffron production and the authors refer to the requirements of Britain and the United States regulating saffron quality. In top quality saffron, for example, using the British standard, in the majority of the threads the stigma must be longer than the style.

Saffron is a strikingly beautiful plant, a highly desired spice, and a crop with considerable lore and a promising future. This volume contributes towards understanding the plant and its culture.

-Lytton John Musselman, Department of Biological Sciences, Old Dominion University, Norfolk, Virginia 23529-0266

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Musselman, L. J. 2007. Figs and Dates, Laurel and Myrrh: Plants of the Bible and the Qu'ran. Portland: Timber Press. In press.

Flowers: How They Changed the World. William C. Burger. 2006. ISBN: 1-59102-407-2: cloth (US$23). 337 pp. Prometheus Books, Amherst, New York, USA.

Do we take enough time to smell the roses? Botanists do not write enough articles or books about botany for a general audience. Botanists write lots of books and articles for other botanists, and the scientific prose is often pretty dense and dry even for us, and we speak the language. Botanists also write dully thorough and thoroughly dull textbooks, although they are not alone in this. But then botanists wonder why more people are not interested in botany. Botanists manage to make botany a dull subject even for people who enjoy gardening and landscaping as a pastime or hobby, and that is nearly one-half of the adult population. Even physicists have done a better job of popularizing than botanists. Perhaps the scholarly demands of being a professional academic or the priorities that arise from our academic reward system prevent botanists from presenting their knowledge in a form palatable to the general public, but thankfully some botanists decide to turn over a new leaf once they retire.

William Burger's book, *Flowers: how they changed the world* provides a welcome exception to the botany-is-dull rule. The author manages to pack a lot of botany, ecology, paleontology, systematics, and evolutionary biology into this little volume, and yet it remains eminently readable and accessible to an interested amateur for whom it was written. Since the conceptual forest is not hidden among factual trees, students of all ages will learn more biology and botany from this book than most textbooks. Any introductory botany textbook will tell you what deciduous leaves and endosperm are, but I have never ever seen any explain the significance of these innovations after defining the terms. And considering that human life depends upon endosperm for some 50-70% of their calories, this seems a pretty big omission. This illustrates the primary difference between *Flowers* and so many botany books, which dutifully present the facts bereft of concept.

To be sure all the nitty-gritty botanical details are not presented in *Flowers*, but the reader will come away with an understanding of what we know, how we know it, and in the process gain an appreciation for those fascinating creatures that we study. *Flowers* reminds me of Paul Colinvaux's *Why big fierce animals are rare* (Princeton University Press, 1978). This classic little volume explained clearly much more ecology than the title would or could suggest. The same is true for *Flowers*. Although the author does deliver on his title and explain how we humans owe our biology and very existence to flowering plants, so much more is covered that one is tempted to list, but the main topics will have to suffice.

What exactly is a flower? Several answers are provided. The detailed examinations might make you want to head out into your garden and begin dissecting flowers yourself. Of course, a lot of traditional botany was learned just that way. Floral diversity results in a diversity of fruit that function to protect and disperse seeds in a variety of ways. Plants have enemies and they defend themselves. Plants interact with some animals and fungi in a mutually beneficial manner, and flowering plants have taken these interactions much further than other plants. Plants have a long history traceable to cyanobacteria that today reside within plant cells as chloroplasts.

Flowering plants have features that allowed them nudge aside gymnosperms and seed ferns, and some of these same features produced a diversification of pollinators and seed dispersers as flowering plants themselves rapidly diversified, and all of this took place over 100 million years ago, which is still recent history in a geological sense. Ultimately some of these features shaped the minds and bodies of fruit-foraging primates setting them upon the road to the appearance of humans. I knew that the shoulder rotation and limb flexibility that allows us to throw spears and baseballs so well developed among brachiating arboreal ancestors, but I never considered its relationship to angiosperm tree architecture. The advent of agriculture changed things for humans and flowering plants, and as a society, as a species, we certainly do not act as if we understand anything at all about this most important of biotic interactions. And although we tend our domesticated lawns, nobody would ever suspect that the evolution of grasses and grass dominated communities may have had a big impact on the Earth's climate.

The book I received was an uncorrected, shoddily-bound, and rather crudely illustrated pre-publication review copy; the final version must be an improvement and I hope the author and publisher take the time to do this well. *Flowers* is not perfect. Lots of botanical jargon was purposefully avoided to an overall advantage. Some attempts to sit on the general reader-botanical fence produced awkward phrases like "in the grasses Poaceae or Gramineae family" and "in the grass family (Poaceae or Gramineae)". Clearly these are unnecessary because simply saying the grass family certainly suffices [recommendation: delete]. In describing aroids the phrase "enveloping leaf-like structure called the spathe" was used, but why not just say "enveloping bract" since bracts were introduced previously? A small section on sex, sex cells, and meiosis is an exception to the rest of the book. These topics are not well explained and will leave the general reader wondering about the utility of sex and concept of chromosome repair.

Here and there I question some of the explanations. Is the long proboscis of hawkmoths really to keep moth wings at a distance from the corolla? I thought depth of the nectar in the corolla tube or nectar spur and the positioning of the pollinia were the selection pressures on proboscis length. The seed habit did not "get rid of the two stage life cycle", but it did alter it greatly. Kingdoms are referred to in a very outdated manner. *Flowers* badly needs an index as a means of directly accessing the many diverse topics. Each chapter is supplied with end notes that direct readers to other well chosen bits of botanical literature, and sometimes to specific scientific articles. In other places you will find yourself wondering where specific information came from, and without citations you cannot find out, but then for most readers it will suffice to know the information came from a botanical authority passing along the understanding and knowledge accumulated over a long scientific career.

People who love plants, but are not botanists, should enjoy and benefit from this book. *Flowers* may not be as breezy a read as Pollan's *The botany of desire*, but although Pollan does a good job for an amateur, he doesn't deliver the depth of scientific and botanical understanding that Burger does. *Flowers* can change the way people look at flowers, plants, and maybe botany. Maybe by example *Flowers* can even change the way botanists communicate to others about what they know and how they know it.

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The Leaf, Jensen, L. 2002. Imation Enterprises Corp., Oakdale. MN DVD, ISBN 5112241181. Available from Wards Biological, $34.95

As more attention is paid to diverse learning styles, more resources are becoming available for aural, visual, and kinesthetic learners. Jensen's animations are a welcome contribution to plant biology education in this category. Previously he authored a series of animations of lifecycles of moss, ferns, gymnosperms and angiosperms, which presents detailed information on these life cycles. The Leaf DVD is 11:30 minutes long, but packs an incredible amount of information into that time period. The movie is a 3D animation divided into four parts: Part One: Organization of the Leaf (2:30 min.), Part Two: The Guard Cells (2:00 min.), Part Three: Mesophyll and Veins (3:00 min.), and Part Four: Examples of Leaf Variations (4:00 min.).

Part One introduces the basic organization of the leaf with a tour through of the structure and function of the epidermis, spongy and palisade mesophyll, bundle sheaths, xylem, phloem, lower epidermis, trichomes, and guard cells. Part Two covers the structure and function of the guard cells with a particularly nice sequence explaining how and why guard cells open and close. Part Three reviews the basic structure of the mesophyll, gives an overview of photosynthesis, and illustrates the pressure flow hypothesis. Oxygen, water, carbon dioxide, and carbohydrates are represented by uniquely colored, relatively-sized spheres with the exception of the carbohydrates. These are in the form of flesh-colored oblong shapes and reminded me strongly of diplobacilli, which I found distracting. Part Four discusses leaf morphology, structure of shade versus sun leaves, and leaf adaptations to dry and wet environments, doing an admirable job of linking environmental characteristics to leaf adaptations. The illustrations of compound leaves are particularly helpful in clarifying terms such as palmate and pinnate.

The topics covered are the essential terms needed to discuss leaves as organs, their structure, and their functions. The colors are vivid; the audio is crisp. The overall content level would be suitable to middle school through non-majors college biology. I would consider using it for a brief introduction in a majors course, possibly by turning the sound off and doing my own narration, and/or using the pause feature to elaborate as necessary. Since all the functionality of a DVD movie is built in to the interface this would be relatively easy using either a mouse or a remote control.

I have used these animations in classes of both majors and non-majors. Typically I would discuss any questions the students have from the text, then show the appropriate section of the animation. Repeatedly I have observed an "Aha!" look on students' faces and written feedback from the students stresses the helpfulness of this type of succinct, colorful animation. While the pace may be a bit quick, using the pause feature can compensate as desirable for the particular group of students. This is an excellent teaching resource and I will continue to use this DVD in courses. I hope that Dr. Jensen can secure funding to expand this type of resource to other topics in plant biology.

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The Intelligibility of Nature: How Science Makes Sense of the World. Peter Robert Dear. The University of Chicago. 2006. ISBN 0-226-13948-4. 242 pp.

Science and scientists throughout history have tried to understand and describe our world and nature. Moreover, science tries to construct not only a picture of the world and life processes but also a sense of their existence and gradually discover

clear logical chains of facts and processes in our chaotic world. Scientists living in different times and societies constructed numerous theories of nature, often not only controversial but contradictory as well. The historical process of the intelligibility of nature is therefore teeming with human intellectual products: theories, models, formulas and definitions. Although the basic task of science is to reveal the truth, not all intellectual production by scientists has been and is the truth. Therefore, a systematic ordering of the candid explanation of nature is one basis for science development from ignorance to knowledge. Sometimes it is difficult to make a clear differentiation between the two. In the history of science many revolutions occurred which resulted in rejecting the validity of many theories accepted as knowledge by the previous generation. The development of science is connected with logical criticism and a desire for new discoveries. Although this development is observable in the time continuum from past to present, it is a never-ending process. Following each new discovery there is continuing pressure to find a single absolute truth. Today this can be understood by the fact that some scientific theories will be corrected in the future and in spite of the oceanic waves of scientific papers published each year, there is no guarantee that the truth these papers espouse will also be the truth in the future. Such conclusions should be kept in mind when considering Professor Peter Dear's *The Intelligibility of Nature*, which is a solidly perceived critical work. Although the text is a work on science history and logic as a process of science development, it also looks at the present and future of science. The rapid development of molecular biology and the interaction between species is a good example of this perspective. Scientists were certainly wise in the past, as they are today and will in the future be. Science continuously corrects itself. Examples of these historical self-corrections are presented in Dear's book. Moreover, relations between realism and instrumentalism in science are described as well as those between natural philosophy and practical techniques as components of science.

The Intelligibility of Nature is an excellent treatise on the dualistic character of science in history and especially on the scientific revolution from the seventeenth to twentieth centuries. Science is described by the author as natural philosophy, on one hand, and as instrumentality, on the other. Furthermore, Dear clearly states that science also has power over matter and even people. Scientists and their science make theoretical and practical discoveries. Science has two faces, one purely theoretical and the other applied when theory is constructed for practical purposes. These faces do not contradict and are the result of the historical development of science.

Peter Dear's book is a concise treatise profoundly presenting knowledgeable insights into the historical intelligibility of nature from the birth of modern science in the seventeenth century to the 1950s. The intelligibility of nature proceeds in a similar direction in the process of scientific development. One example is the progression from the work of Galileo to that of Newton, the so-called mechanical understanding of the universe, in which the world and nature are depicted as a machine. A second direction is presented by Dear as a period of understanding nature and our world as a classified unit, in which everything has own place. The period starts both from and with Newton. Such an intelligibility of nature was developed by E.F. Geoffrey in France, J. Ray in England, the Swedish physician C. Linnaeus and many others. This was followed by the chemical revolution, beginning with the works of A. Libations and G.E. Stahl in Germany and ending with the discovery of the atom by J. Dalton, who was not a chemist. The following step in this intelligibility was the period of C. Darwin and G. Mendel, with its understanding of the origin of species and its further experimentation with the understanding of natural dynamic forces. This period was initiated by the works of Faraday, Joule and other Victorian physicists. The modern model for understanding nature was presented in the works of Albert Einstein, Bohr and quantum mechanics. The process of the intelligibility of nature historically revolutionized science and at the same time opened new horizons and perspectives for philosophy, instrumentality and application. This historical process has made it possible to comprehend science and eliminate any nonsense in it. This is the main conclusion drawn by Dear in his synthesized analysis of the intelligibility of nature from Galileo and Copernicus to the understanding of the human being in the universe as presented by John Barrow and Frank Tipler in 1986.

Peter Dear's book is fascinating. It presents the subject concisely, objectively and interestingly. It attracts a large circle of readers and raises intriguing points for discussion. For the biologist and the botanist, nature is more than just forces, structures, spaces, forms, construction units, material, atoms and the exchange of energy and quanta. Nature is impossible to understand without cells, the nuclear phenomena of cell division, the vital activity of organisms and respiration. Though this point of view is given only a cursory glance in the book, the reader can be certain that biology, botany and the other life sciences make sense of nature and the world. On the other hand, the sense made by the biology can be better understood after a reading of this book.

-Prof. Dr. Tadeusz Aniszewski, University of Joensuu, Finland.

Dictionary of Plant Tissue Culture. Cassells, A. C. and P. B. Gahan. 2006. ISBN 13: 978-1-56022-919-3 (paper US$29.95) 265 pp. Food Products Press, an imprint of The Haworth Press, Inc. 10 Alice Street, Binghamton, NY 13904.

To begin this review, Alan Cassells and Peter Gahan should be commended for compiling and creating a very valuable reference book for the ever-widening field of Plant Tissue Culture (PTC). This book should be a staple in every laboratory involved in basic or applied research on the culture of plant cells, tissues, and/or organs *in vitro*.

As a graduate student in the early to mid-eighties, I observed the expansion of PTC techniques, set into play three decades earlier, to have applications to a broad array of botanical areas of study, including plant physiology, morphology, anatomy, biochemistry, pathology, breeding, cell biology, molecular biology, development, propagation, germplasm preservation, and genetic manipulation. As such, PTC had become more than a collection of several techniques; it had become a *technology* in its own right. All of these sub-disciplines are represented in a balanced fashion in the authors' compilation. Thus, researchers involved in any of these fields would benefit from this reference.

As PTC technologies have progressed, like other disciplines within biology, their terminology increases. In many instances, terms used in other disciplines are redefined in their new context. "Cloning" is but one example of a term that has several different meanings depending on the context in which it is used. In *Dictionary of Plant Tissue Culture,* the authors define "clone" as a population of cells or plants with identical genotypes and "cloning" as a multiplication of clones. They note further, however, that "In micropropagation genetic stability may be dependent on the in vitro cloning strategy used" and provide three citations for further information and also refer the reader to "see somaclonal variation". Another example of a term with different definitions depending on its context is "callus". In other reference books, I have seen this term incorrectly defined as an undifferentiated mass of cells. Cassells and Gahan define it as "a growth of nonspecialized plant cells". The cells, however, may well be differentiated at the cell or tissue level, but have not organized themselves into a functioning organ, such as a root or shoot axis. Perhaps a more accurate description would be "a growth of unorganized cells".

Over four hundred references to primary research studies or compilations of PTC techniques are included in the bibliography, but also cited under individual terms in this dictionary, making it especially valuable to researchers who may be investigating a technique or topic which is new to them, but also to students or lab technicians who are interested in assembling their own library of PTC publications. Although almost one in seven of the references are by one of the two authors, it represents a considerable number of researchers and research laboratories.

The terms are frequently cross-listed to aid the reader. In addition, three dozen figures or tables are included to illustrate, or provide additional details about, a number of techniques or topics, such as sterile filtration, culture medium components, plant growth regulators, explant sources, bioreactor designs, and pathogen indexing procedures. I would encourage the authors to increase the number of illustrations in the next edition of their dictionary, even to the degree of making it an "encyclopedic" dictionary. The authors could even provide contact information (with an email address) in their second edition to request suggestions for additional terms, tables, illustrations, and references from other PTC scientists.

In summary, I will be referring to this text in my Plant Tissue Culture graduate course syllabus and lecture outlines and, as such, it is a very valuable addition to my "laboratory reference library". I would encourage all PTC labs to include it in their reference collections as well.

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Plant Hormone Signaling (Annual Plant Reviews), Volume 24. Peter Hedden and Stephen Thomas (eds). Blackwell Publishing Ltd., Oxford, United Kingdom. 2006.

A number of seminal advances have been made in field of plant hormone biology in recent years. These advances have included the identification and characterization of a number of plant hormone receptors. This timely, highly relevant book reviews recent progress in our understanding of hormone synthesis, perception and action in plants. Hormones covered range from the classical plant hormones abscisic acid, auxin, cytokinin, ethylene and gibberellin to more recently discovered compounds that exhibit hormonal functions in plants including brassinolides, jasmonates and salicylic acid. In addition to exploring the biosynthesis and molecular actions of plant hormones, the book includes chapters that cover the developmental processes regulated by hormones in plants. In this regard, the text provides a comprehensive overview

of hormone biology in plants from hormone perception to cellular and organismal hormone responses.

"Plant Hormone Signaling" opens with a preface that places the subsequent chapters in a historical context as the editors give a brief chronological overview of plant hormones and what is known about their biological activities. General themes addressed in the text include hormone metabolism (i.e. biosynthesis, degradation or catabolism, and conjugation), receptor isolation and identification, hormone-regulated signaling and ubiquitin-dependent proteosomal degradation, hormone regulation of gene expression, interactions between hormone signaling and other signaling pathways, hormone transport and hormone actions (i.e. hormone regulation of reproductive development, seed germination and dormancy).

The biosynthetic pathways of many of the classic plant hormones are well understood. As detailed in this volume, a great deal is known about the synthesis of abscisic acid, a carotenoid derivative; both tryptophan-dependent and tryptophan-independent auxin biosynthetic pathways; regulation of the levels of brassinosteroids through transcriptional control of brassinosteroid metabolism genes; biosynthesis of ethylene, a methionine derivative; and gibberellin biosynthesis. Synthesis of other hormones including jasmonates and salicylic acid are also well studied. In addition to reviewing the biosynthetic pathways of each of these compounds, authors of included book chapters also address the metabolism of these hormones through conjugation and catabolism. Together with synthesis, both conjugation and catabolism are reviewed in detail as is their roles in the regulation of hormone signaling pathways.

Receptors for a number of plant hormones have been identified recently. Among hormone receptors reported in recent literature and discussed in this volume are the following: a nuclear ABA receptor; auxin receptor TIR1, which is an F-box protein involved in ubiquitin-dependent degradation of repressors of auxin-dependent signaling; brassinosteroid-binding membrane-bound leucine rich repeat receptor-like kinase receptors; membrane-bound histidine kinase cytokinin receptors; a number of ethylene receptors, which include ER-membrane localized hybrid histidine kinases; and a soluble, nuclear gibberellin receptor, which also is linked to ubiquitination and protein degradation responses. Although receptors for other plant hormones remain to be definitively characterized, a number of other putative receptors are being investigated as detailed in this volume. For example, a protein involved in JA signaling that has significant similarity to bona fide auxin receptor TIR1 may be a good JA receptor candidate. Also, salicylic acid-binding proteins (SABPs) have been reported. In addition to hormone receptors, a number of downstream components of hormone signaling pathways have been identified and are discussed. Notably, as introduced above for auxins and gibberellins, ubiquitin-dependent proteasomal degradation has been implicated as important for hormone signal at a number of steps in different hormone pathways from degradation of hormone-binding receptors to degradation of transcriptional regulators.

In addition to reviewing the most recent knowledge about hormone synthesis, perception and signaling, this volume reviews past and current findings about hormone action. This coverage includes the role of specific hormones in particular physiological processes and provides extensive information about classic and emerging plant hormones. Hormone action depends on hormone localization in plants. Distribution of plant hormones can depend up concentration gradients, diffusion (e.g. ethylene) or active transport (e.g. auxins). Of the plant hormones investigated, the most is known about the active transport of auxins, including a number of the components involved its uptake, efflux and unidirectional transport. This volume provides up-to-date information on auxin transport and the transport of other hormones including ABA and GA. Information about other plant hormones, such as BR, that do not appear to be transported and how they are regulated locally is also addressed in satisfying detail. Furthermore, a review of the roles of plant hormones in specific aspects of plant growth and development and in regulating reproductive development in plants is included. This review includes a thorough examination of the roles of specific hormones in these processes, as well as an assessment of the relevance of interactions between signaling pathways in the regulation of specific aspects of plant growth and development.

"Plant Hormone Signaling" concludes with an extensive index that adds significantly to the usefulness of this volume as a reference text for the plant biochemistry researchers and professionals to whom the book is targeted. In summary, this volume compiles the latest information on plant hormone signaling from hormone synthesis to action. The abundant details incorporated about components in plants with hormonal functions from classic to recently identified molecules results in a noteworthy text that will be a rich resource for plant biologists for years to come.

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Plant Roots: Growth, Activity and Interaction with Soils. Gregory, Peter. 2006. ISBN 1-4051-1906-3 (Cloth US$199.99) 498 pp. Blackwell Publishing Professional, 2121 State Avenue, Ames, IA. 50014-8300.

Underground and hidden from view, plant roots are often forgotten even by botanists, who focus instead on foliage leaves, frilly flowers, harvested fruit and the finale, and/or starting point, seeds. A new contribution to the botanical literature focuses exclusively on roots. Author Peter Gregory, Director of the Scottish Crop Research Institute, is a root specialist. Between 1988 and 1993, he worked as a research scientist for CSIRO in Perth, Western Australia, returning to Reading as Head of the Department of Soil Science from 1994 to 1996, and Dean of the Faculty of Agriculture and Food there from 1996 to 1998. His research interests concern the interaction of plant roots with soil and the production of food crops. These interests have provided him with work opportunities for extended periods in Australia, Syria, India, Nepal and West Africa.

Root anatomy and function are the subjects of this book. Chapter titles reveal the extent of coverage: Plants, roots and the soil; Roots and the architecture of root systems; Development and growth of root systems; The functioning root systems; Roots and the physico-chemical environment; Roots and the biological environment; The rhizosphere; Genetic control of root system properties, and Root systems as management tools. Each chapter provides numerous references, diagrams, graphs and tables, and one includes a series of color photographs.

Gregory accents rhizosphere biology and genetics, with less about responses to tillage, reflecting the growth in research in those areas over the past three decades. Most detailed root research is devoted to crops. However, some primarily ecological studies are also included. This book will be a useful reference tool for plant, crop and soil scientists, plant physiologists, and ecologists. It serves one function well, describing the roots as biological organs. It will benefit libraries in universities, agricultural colleges and plant research institutes.

For me, the book has some drawbacks. The Index is very incomplete, hence not very useful; many species included in the book are absent from the Index. Additionally, terms the Index lack include: medicine, root bark and woody. There is no mention whatsoever, in Plant Roots, about the special contribution to plant medicines found in roots, especially, root bark. A few examples that could have been mentioned include literature by Ameyaw et al. (2005); Balick and Mendelsohn (1992); Brown (1995); Dalziel 1955; Duke, (1992); Graham et al. (2000); Levingston and Zamora (1983); Macphillamy (1963); Ogwal-Okeng, Obua and Anokbonggo (2003); Watt and Breyer-Brandwyk (1962). One clear example is that of *Rauwolfia* roots. The pharmaceutical derivatives are used mainly as antihypertensives and as sedatives. Folk medicinal uses of the root bark and roots are extensive, particularly for their aphrodisiac, emetic, purgative, antipsoric, dysenteric, sedative, abortive and insecticidal properties. In India, *R. serpentina* root preparations have been used for centuries in the relief of disorders of the central nervous system, as an anthelmintic and for the treatment of intestinal disorders as well as the stimulation of uterine contractions (Levingston and Zamora, 1983).
Important specialties such as phytoremediation, receive only brief mention, at the end of the book, covered in only a single page, with the closing comment that "this remains a topic to be researched," presumably by the author. There is already considerable literature that documents such use (e.g., major research contributions by L. V. Kochian at Cornell, discussed in Becker, 2000; and reviewed by Brooks, 1998; Brown and Hall, 1990; Krämer, 2005; Matthew, 2005; McCutcheon and Schnoor, 2003; Pilon-Smits and Pilon, 2002).

Examples of phytoextraction from soils abound, including:

· Arsenic, using sunflower (*Helianthus annuus*) (Dushenkov et al., 1997; Gulz, Gupta and Schulin, 2003), or Chinese Brake fern ("*Pteris* spp"], a hyperaccumulator. Chinese Brake fern stores arsenic in its leaves (Wilkins and Salter, 2003).

· Cadmium and zinc, using alpine pennycress (*Thlaspi caerulescens*) (Watanabe, 1997) a hyperaccumulator of these metals at levels that would be toxic to many plants.

· Lead, using Indian mustard, *Brassica juncea* (Begonia et al., 1998), Ragweed, *Ambrosia artemisiifolia* (Raskin, 2000), Hemp Dogbane, *Apocynum cannabinum* (Lasat, 2000) or Poplar trees (Pierzynski et al., 2002) which sequester lead in their biomass.

· Salt-tolerant barley and/or sugar beets used for the extraction of sodium chloride to reclaim fields.

· Uranium, using sunflowers, exploited after the Chernobyl accident (Adler, 1996; Raskin, 2000).

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-Dorothea Bedigian, Research Associate, Missouri Botanical Garden

Esau's Plant Anatomy: Meristems, Cells, and Tissues of the Plant Body – Their Structure, Function, and Development, 3rd ed. Evert, Ray F. 2006. ISBN 0-471-73843-3 (Cloth US$150.00). 601 pp. Wiley Interscience, John Wiley & Sons, Inc. 111 River St., Hoboken, NJ 07030-5774.

Beyond doubt, this is the best exposition of plant anatomy available today in the English language. It is base upon that long-standing paragon, Katherine Esau's 1965 second edition of *Plant Anatomy*. Long awaited by botanists, Evert's is no mere revision of that work; it can stand by itself as a major contribution to botanical science!

The introduction sets forth an overview of the structure and development of the plant body. This is followed by a detailed discussion of cytology, including the morphology and formation of the cell wall. Meristems and differentiation come next, with

special attention to apical meristems and an explanation of plant hormones and their effects on regulating growth and development. Auxins, cytokinins, ethylene, abscissic acid, and the gibberellins are examined and their roles in plant development are reported. Tissue systems - - parenchyma, collenchyma, and sclerenchyma - - their origins, structure, functions, and locations in the plant are treated in detail. A special section is devoted to the epidermis consisting of a description of the cells and the cuticle; there is a thorough portrait of stomata, their origin, form, function, and relations with surrounding epidermal cells. Trichomes, silica cells, bulliform cells, and cystoliths are defined and located. An extensive review of xylem, both primary and secondary, follows. Tracheary elements, their origin, structure, and function, are treated, along with fibers and associated parenchyma.

The Baileyan hypotheses of phylogenetic specialization of vessel elements and fibers are outlined and discussed as well as the effects of macroclimatic environmental factors on these cells. Deviations from the major trends of specialization are examined and evaluated.

Wood holds an important place in the global economy and it is fitting that Evert has devoted an entire section to secondary xylem and variations in wood structure. The overall configuration of wood, the axial and radial systems, are stressed and features such as storied structure, reaction wood, and the effects of aging on the conductive function of wood are developed. Conifer wood is compared to wood of flowering plants. The cells of conifer and angiosperm woods and their origins are reviewed as these pertain to the identification of woody plants. The origin of the vascular cambium from procambium in plants with secondary growth is a main feature of discourse. Fusiform and ray initial comprise tow aspects of the cambial system and the derivatives of each are examined. Storying of cambial initials is demonstrated to be directly associated with the formation of storied structure that occurs in some woods. The vascular cambium and its activity in producing growth rings in seasonal climates are analyzed.

Phloem comprises the food conducting tissues of vascular plants and the various cell types that contribute to this function are described. The peculiar cytology of phloem conductive cells, the contrast between the sieve cells of gymnosperms and sieve tube elements of angiosperms is reported in detail. The development, cell wall structure, and contents of phloem conductive cells are surveyed along with the mechanisms of callose formation in sieve tube elements, and nuclear degeneration in sieve cells. The mechanisms of phloem transport in angiosperms and gymnosperms are investigated as are the trends of specialization in sieve elements. Cells associated with phloem conductive cells, companion cells in angiosperms, parenchyma and fibers are profiled. The sieve elements of seedless vascular plants are also described. Differentiation in the secondary phloem and the formation of fibers, sclereids, and fiber-sclereids is shown, and relationships of phloem conductivity according to its position in the inner and outer bark are discussed.

Periderm, its formation and origin from the phellogen, the sites of origin of the phellogen, and the variable appearance of first and subsequent periderms are discussed. The protective tissue of the woody monocot stem are contrasted with the dicot periderm and shown to differ in both origin and structure. Lenticel morphology in woody angiosperms and the relationship of lenticels to the presence of stomata is pointed out.

External and internal secretory structures - - glands, salt bladders, two-celled and multicellular glands in dicots, hydathodes, nectaries, osmophores, and glandular trichomes - - are presented in detail. The cytology of cells comprising resin ducts and laticifers is described, especially the laticifers of the Para rubber tree, the major source of commercial rubber.

Illustrations are superb, showing off and supplementing the text. Many are taken from already published works and others are original. In all cases reference is made to the original sources.

Each chapter concludes with a list of references cited in the text of that chapter. An unusual appendage is a final list of other pertinent references not cited in the text. A unique feature of Evert's work is the bold-faced statement that heads each major section which briefly summarizes what is to be found in that section. The book concludes with a glossary of terms, author and subject indices.

Evert is passionate about the need among botanists to keep the whole organism in sight as they scurry to reduce understanding of plants to the lowest common denominator at the expense of losing their grasp of the interrelationships and interdependence among the parts of plants. Evert's book, with its integration of anatomy, development, physiology, chemistry, and molecular biology seeks to provide a firm foundation in understanding the meristems, cells, and tissues of the plant body. This has been achieved magnificently in "*Esau's Plant Anatomy*," a volume that will stand preeminently in plant science during the years to come.

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The Structure and Function of Plastids: Advances in Photosynthesis and Respiration, Volume 234. Robert R. Wise and J. Kenneth Hoober (eds). Springer, Dordrecht, The Netherlands. 2006.

"The Structure and Function of Plastids" covers the most well known function of plastids, including photosynthesis, in addition to other essential plastid functions, such as aromatic amino acid synthesis. The target audience for this comprehensive reference volume on plastid biology includes beginning and experienced plant biologists. The text opens with a section entitled "A dedication to pioneers of research on chloroplast structure" in which the earliest documentation of the observance of plastids and plastid ultrastructure is traced. Following this historical framework, four sections covering topics from plastid origin, development and evolution through plastid metabolism, photosynthesis and plastid specialization are presented.

Section I of this volume entitled "Plastid Origin and Development" contains signification information and detailed micrographs of the diversity of plastids and plastid functions found in nature. The endosymbiotic origin of plastids, transfer of genes from a plastid progenitor genome to the plant cell nucleus and the origins of the diverse plastid forms observed in plants are reviewed. The details of chloroplast development and carbon fixation are presented in plentiful detail. A significant aspect of the development of functional chloroplasts is the import of nuclear-encoded plastid proteins. A great deal of knowledge has been gathered about protein import into plastids and this information is well summarized in the text, including coverage of protein import across both outer and inner chloroplast membranes. The summary of these processes includes sufficient details about the proteins and diverse mechanisms involved. Plastid division and specific details of the machinery and mechanisms involved in division are also discussed.

Section II, "The Plastid Genome and its Interaction with the Nuclear Genome", initiates with a discussion of the immense amount of work that has gone into investigating the plastid genome. Recent proteomic work conducted to identify thylakoid-localized proteins is reviewed. This work and other studies have led to an understanding that chloroplasts contain components needed for expression, processing and translation of plastid-localized genes. Many of components and the machinery involved as well as the molecular details of these plastid processes are reviewed. As functional plastids depend upon both nuclear and plastid genomes, many studies have addressed the interactions between and co-regulation of these two genomes. Thus, in addition to focusing on the abovementioned processes derived from the plastid itself, plastid-to-nucleus signaling, i.e. the interactions between plastids and nuclei that result in co-regulation of genes derived from both compartments that are essential for plastid function, has been a well-researched topic in plastid biology and is well reviewed in this volume. Although signaling between the nucleus and plastids occurs in both directions, the text largely focuses on the retrograde plastid communication during which plastid-derived signals communicate the status of the plastid to the nucleus. Plastid signals purported to function in this retrograde pathway include redox signals and tetrapyrroles (e.g. Mg-protoporphyrin).The utilization of metals by chloroplasts, including in metal-dependent redox sensing, is discussed in proficient detail. This review includes a discussion of metal sensing, transport and utilization in plastid processes.

"Photosynthetic Metabolism in Plastids", the third section, explores the impact of environmental aspects such as light and other factors on carbon assimilation and other aspects of plastid metabolism. A review of the effect of light on the ferredoxin/thioredoxin redox pathway is discussed first, followed by a discussion of the impact of respiratory pathways on plastid function. To increase carbon fixation and limit photorespiration, specialized mechanisms are utilized by many organisms including carbon dioxide (CO_2) concentration near Rubisco to maximize carbon fixation. The text includes a detailed description of CO_2-concentrating mechanisms in cyanobacteria, algae and plants. Plastid function depends upon the import of a number of substrates for chemical reactions. Likewise, plastid function results in the production of a number of components via photosynthesis. A thorough discussion of transport of plastid products and photosynthate is included.

The most recognizable component of chloroplasts is chlorophyll. Chlorophyll synthesis and its regulation are covered in significant detail in the fourth section entitled "Non-Photosynthetic Metabolisms in Plastids". Additionally, the following topics receive detailed consideration – carotenoid biosynthesis and its regulation; lipid synthesis, lipid functions, and lipid metabolism and transport in plastids; and biosynthesis and metabolism of sulfur compounds in plastids. Additionally, the role of calcium and calcium signaling in chloroplast function is addressed. Finally, plastids play a vital role in the indispensable synthesis of a number of essential amino acids that are vital not only for plant growth, but also for the growth of animals that depend upon these amino acids derived from the plants that they ingest.

The final section of this volume, "Plastid Differentiation and Response to Environmental Factors", reflects on plastid differentiation and the impact of the environment on plastids. Topics covered include plastid functions in specialized plant processes such as fruit ripening, leaf senescence, and gravitropism. Often these processes depend upon or result in the intercoversion or differentiation of plastid types. The direct responses of plastids to the environment, notably light- and stress-induced chloroplast movements and reactive oxygen species formation in plastids and stress tolerance, are also considered. Finally, specialized plastid types – i.e. kleptoplast and apicoplasts – are discussed. Kleptoplasts are functional plastids internalized and retained by a hetrotrophic organism. Apicoplasts are chloroplast-derived organelles of the parasitic Apicomplexa. The origin, function and distinguishing characteristics of these specialized plastid types are examined.

The text contains a number of detailed color plates that present interesting aspects of plastid origin, structure and function, as well as a detailed subject index. In summary, all of the chapters address unique aspects of plastid biology and function with both relevant historical information as well as discussions of the most recent findings. This broad range of information results in a volume that is a significant collection and an extremely valuable resource for plastid biologists and biologists studying photosynthetic organisms in general.

Beronda L. Montgomery, Michigan State University, East Lansing, MI 48824

Scott D. Russell wrote, On 4/19/07 2:05 PM:

Just when you think it can't possibly get any worse ....!!!!

In a sign that we may need to rethink intro botany courses in Oklahoma, yesterday the state legislature voted for the official OK State Vegetable.

And the winner is:

Watermelon!

Books Received

If you would like to review a book or books for PSB, contact the Editor, stating the book of interest and the date by which it would be reviewed (15 January, 15 April, 15 July or 15 October). E-mail psb@botany.org, call, or write as soon as you notice the book of interest in this list because they go quickly! - Editor

Biogeography in a Changing World. Ebach, Malte C. and Raymond S. Tangney (eds). 2007. ISBN 0-8493-8038-3 (Cloth US$89.95) 212 pp. CRC Press, Taylor & Francis Group, Taylor and Francis Group, 6000 Broken Sound Parkway, NW, Suite 300, Boca Raton, FL 33487.

The Biology of Peatlands. Rydin, Håkan and John Jeglum. 2006. ISBN 0-19-852872-8 (Paper US$49.50) 343 pp Oxford University Press198 Madison Ave., New York, NY 10016.

Compendia of World's Medicinal Flora. Singh, Amritpal. 2006. ISBN 1-57808-430-X (Paper US$55.00) 348 pp. Science Publisher, Inc., c/o Enfield Distribution Co., 234 May Street, P.O. Box 699, Enfield, NH 03748.

Electron Microscopy: Methods and Protocols, 2nd ed. Kuo, John. 2007. ISBN 1-588-29-573-7 (Cloth US$150.00) 608 pp. Humana Press. 999 Riverview Drive, Suite 208, Totowa, New Jersey 07512.

Flora of North America North of Mexico, Volume 24: Magnoliophyta: COmmelinidae (in part): Poaceae, part 1. Flora of North America Editorial Committee. 2007. ISBN 0-19-531071-3 (Cloth US$95.00) 944 pp. Oxford University Press, 198 Madison Avenue, New York, NY 10016-4314.

Forages: The Science of Grassland Agriculture, Volume II, 6th Edition. Barnes, Robert F., C. Jerry Nelson, Kenneth J. Moore, and Michael Collins (eds). 2007. ISBN 0-8138-0232-6. (Cloth US$159.99) 256 pp. Blackwell Publishing, 2121 State Avenue, Ames, IA 50014-8300.

Fungi: Multifaceted Microbes. Ganguli, B.N. and S.K. Deshmukh (eds) 2007. ISBN 1-4200-4328-5 (Cloth US$139.95) 321 pp. AnamayaPublishers, Taylor & Francis Group, Taylor and Francis Group, 6000 Broken Sound Parkway, NW, Suite 300, Boca Raton, FL 33487.

Genetically Engineered Crops. Taylor, Iain E. P. (ed.) 2007. ISBN 978-1-56022-989-6 (Paper US$29.95) 430 pp. Haworth Food & Agricultural Products Press. 10 Alice Street, Binghamton, New York 13904-1580.

Genetic Improvement of Solanaceous Crops, Volume 2: Tomato. Razdan, Maharaj and Autar K. Mattoo. 2007. ISBN 978-1-57808-179-0 (Cloth US$108.00) 637 pp. Science Publisher, Inc., c/o Enfield Distribution Co., 234 May Street, P.O. Box 699, Enfield, NH 03748.

Induced Resistance for Plant Defence: A Sustainable Approach to Crop Protection. Lyon, Gary. 2007 ISBN -13: 9781405134477 (Cloth US$199.99) 272 pp. Blackwell Publishing Professional, 2121 State Ave., Ames, IA 50014-8300.

Introduction to Fungi, 3rd ed. Webster, John and Roland W.S. Weber (eds) . 2007. ISBN 978-0-521-01483-0 (Paper US$75.00) 841 pp. Cambridge University Press, 32 Avenue of the Americas, New York, NY 10013.

The Mountain Flora of Java, 2nd ed. Van Steenis, C.G.G.J., illustrated by Amir Hamzah and Moehamad Toha. 2006. ISBN -13: 978-9004153-47-9 (Cloth US$195.00) 90 pp + 57 Plates. Brill, Plantijnstraat 2, P.O. Box 9000, 2300 PA, Leiden, the Netherlands.

Light and Plant Development. Whitelam, Garry C. and Karen J. Halliday (eds). 2007 ISBN 978-1-405-14538-1. (Cloth US$199.99) 325 pp. Blackwell Publishing, 2121 State Avenue, Ames, IA 50014-8300.

Measuring Plant Diversity. Stohlgren, Thomas J. 2007. ISBN 0-19-517233-7 (Cloth US$64.50) 390 pp. Oxford University Press198 Madison Ave., New York, NY 10016.

Muhlenbergia (Poaceae) de Chihuahua, Mexico. Arrieta, Yolanda Herrera y Paul M. Peterson. 2007. ISBN-10: 1-889878-16-2 (Paper US$25.00) 109 pp. Botanical Research Institute of Texas, 509 Pecan Street, Suite 101, Fort Worth, Texas 76102-4060. Spanish text.

Neotropical Savannas and Seasonally Dry Forests: Plant Diversity, Biogeography, and Conservation. Pennington, R. Toby, Gwilym P. Lewis, and James A. Ratter. 2006. ISBN 0-8493-2987-6 (Cloth US$119.95) 484 pp. CRC Press, Taylor and Francis Group, 6000 Broken Sound Parkway, NW, Suite 300, Boca Raton, FL 33487.

The Origins of Genome Architecture. Lynch, Michael. 2007. ISBN 978-0-87893-484-3 (Cloth US$59.95) 494 pp. Sinauer Associates, Inc. P.L. Box 407, Sundberland, MA 01375-0407.

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Plant Cell Separation and Adhesion. Annual Plant Reviews, Volume 25. Roberts, Jeremy A. and Zinnia Gonzalez-Carranze (eds) 2007. ISBN 1-4051-3892-0 (Cloth US$199.99) 232 pp. . Blackwell Publishing Ltd. 9600 Garsington Road, Oxford, OX4 2DQ , United Kingdom.

Plant Growth and Climate Change. Morison, James I.L. and Michael Morecroft (eds). 2006. ISBN 1-4051-3192-6 (Cloth US$199.99) 232 pp. Blackwell Publishing Ltd. 9600 Garsington Road, Oxford, OX4 2DQ , United Kingdom.

Reconstructing the Tree of Life: Taxonomy and Systematics of Species Rich Taxa. Hodkinson, Trevor R. and John A.N. Parnell (eds) 2007. ISBN 0-8493-9579-8. (Cloth US$119.95) 351 pp. CRC Press, Taylor and Francis Group, 6000 Broken Sound Parkway, NW, Suite 300, Boca Raton, FL 33487.

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Seed Development, Dormancy, and Germination. Annual Plant Reviews, Volume 27. Bradford, Kent and Hiro Nonogaki. 2007. ISBN 9781405139830 (Cloth US$199.99) 392 pp. Blackwell Publishing Ltd. 9600 Garsington Road, Oxford, OX4 2DQ , United Kingdom.

Structure and Function of a Chihuahuan Desert Ecosystem: The Jornada Basin Long-Term Ecological Research Site. Havstad, Kris M., Laura F. Huenneke, and William H. Schlesinger (eds). 2006. ISBN 0-19-511776-X (Cloth US$74.50) 465 pp. Oxford University Press198 Madison Ave., New York, NY 10016.

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