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

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Are we part of the problem of declining student interest in botany because we are making plants BORING? One certainly can argue that traditional instruction of traditional material does not help. The two feature articles in this issue may provide some ideas to help you infuse some excitement and wonder into your botany courses. David Senchina provides some tips that get right to the point of raising student awareness of the relevance of botany to their daily lives without necessarily making radical changes to the rest of your course. I suspect, however, that if you give them a try, you'll want to consider additional changes for the rest of your course.

The second article was contributed as an advertisement for a new Plant Society, the Society for Plant Neurobiology. Their name is meant to be evocative. It certainly caught my attention and I'm sure the name, and the plant phenomena on which it is based, will do the same for students – and perhaps for you! Dynamic processes in plants -- perception, signaling, and responses -- are anything but BORING!

With summer upon us, these articles should stimulate your thinking for trying new things in your courses next year. For more ideas be sure to join us in Vancouver this summer. In addition to the Educational Forum and the BSA and CBA/ABC Teaching Sections, several symposia will address concerns and prospects for botanical education. I hope to see you there! -Editor



The Students Were Right All Along...Plants Really Are B.O.R.I.N.G.

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I have been teaching Bio 001 General Biology for Non-Majors at Drake University every semester since Fall 2006. Over the semesters, during the botany unit (in whatever form it takes) I have heard again and again the same lament from students: plants are boring. Sometimes students voice this sentiment abjectly. Other times it is through questions such as, "Why do we have to study plants? Why can't we spend more time on the animals? They're more important." Students seem to value the study of plants much less than the study of other organisms. When I ask why in casual conversation, I get responses such as "plants don't move or do anything" or "they're not cool." What struck me about these responses is that they were similar to what I'd encountered when I was a TA for the majors' general biology lab during my graduate student years in the Botany Department at Iowa State University. Biology majors or not, students were not perceiving botany to be interesting or relevant to them.

Nationally, we have witnessed a decline in interest in the study of botany as evidenced through enrollment declines in botany majors (both graduate and undergraduate), as well as declines in the number of post-secondary institutions offering botany majors or botany courses (Uno 2007). Even at the beginning of the twentieth century scientists were noticing a waning of student interest in botany (Bower 1925), with explanations ranging from

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“dryness” of topic material, too specialized of material (i.e., of apparently no practical import), or too much lecture (Hershey 1990; Tamir 1974). Others have noted that botanists themselves have treated non-majors botany education with apathy, or even antagonism (Greenfield 1955), but also that society’s general disdain for plants is reflected in the lack of university and general scientific community support of faculty who engage in botany education initiatives (Hershey 1989). For some allied fields such as medicine this is surprising, given for how many centuries botany and medicine have been intertwined (Norton 2006). Clearly this is a multifaceted problem.

The purpose of this communication is to share with readers one attempt I made to alleviate this problem in my general biology for non-majors course using a mnemonic memory technique coupled with a lecture and activity sequence. Based on results of a short, casual survey presented below, I believe this approach was effective in increasing student appreciation of plants in my own course. I am humbly sharing this technique with other botany and general biology educators not so much to promote the specific learning sequence itself, but rather to demonstrate that any simple gimmick such as that given here can be a very quick yet powerful way to increase student appreciation of botany. Such devices require little preparation work and can be easily implemented into pre-existing curricula.

I will first briefly describe both the nature of the non-majors biology course I teach as well as the learning sequence used and the curricular context. I will then describe the construction of the short survey and its results.

Bio 001 is a one-semester, three-credit general biology course for non-majors at Drake University with accompanying one-credit laboratory. Within a given semester, students ranging from freshmen

to graduate students enroll (though the majority is freshmen and sophomores), with an average class size of 30 students. High school students have sometimes taken the course as an “advanced biology” elective. Most students are secondary education majors, although other education majors, business majors, and non-biology science majors (such as environmental science or biochemistry) comprise significant portions of the class. Thus there is great variability within the student body and also a wide range of material needing to be covered in a given semester. Considering these parameters, the instructor can only spend a brief amount of time on each of the core areas of biology in order to survey the entire field in one semester, and emphasis is placed on content that will help prepare students for their future careers (such as teaching in a junior high or high school classroom, or being a critical consumer of biology-related information).

As detailed in the opening paragraph, students in the course have historically perceived plants as being of little relevance to them. To address this, I developed a 5-day instructional sequence including lecture, activity, and a mnemonic gimmick to assist in memory. The efficacy of mnemonic devices (such as acronyms) in assisting student memory and understanding has been shown repeatedly by other researchers (for just some examples: Fahey and de los Santos, 2002; Rebok and Balcerak, 1989).

The mnemonic itself played off a quotation taken directly from the students previously: plants are “B.O.R.I.N.G.” Each of the letters in the acronym “B.O.R.I.N.G.” stands for a short phrase summarizing one way plants are important to human society: B = botanicals (plant-based medicines), O = our lifestyle (a miscellaneous category comprising aspects not covered in other letters, such as relevance of photosynthesis to human life and biofuels), R = reactions (allergies and poisonous plants), I = industry, N = nutrition/food, and G = gardening/horticulture. These phrases were just “peg words”

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for more traditional botany content (such as anatomy and physiology, ecological aspects, etc.) but all within a human use/economic botany context to better appeal to non-majors. Admittedly, this acronym is arbitrary and just one of several that may be imagined and, further, other educators may wish to choose different words or assign the letters differently depending on the nature of their specific courses. I chose these particular topics due to the nature of Bio 001. One instructional day was spent on each of the 6 letters except for "I" and "G" which were consolidated into 1 day due to schedule restrictions. The order of presentation was "B", "R", "N", "I/G", and "O". Each class session included not only lecture but also an engaged learning activity, such as small group discussion or a hands-on activity using manipulatives (all of which were incorporated during the normal lecture period). The mnemonic was presented only at the opening of each class period, and letters used previously were reviewed using student responses. I consistently emphasized that students should not simply memorize the 6 letters of the mnemonic as an end goal, but instead use them as a vehicle to facilitate memory of more specific aspects of plants' importance to human society. Thus, although the mnemonic was the "front man" of the learning sequence, it was not the sole or overriding component.

To gauge the effectiveness of this pedagogical approach, I constructed a short survey which was given to students before instruction on the first day of the learning sequence, and after instruction on the fifth and final day of the learning sequence. Both the surveys and the learning sequence itself were approved for use by the Drake Institutional Review Board (ID# 2007-08029), the human ethics committee for the University. Twenty-nine students participated in the unit, with 27 students completing the pre survey and 28 students completing the post survey. All survey papers were anonymous and did not ask any identifying information such as name, age, gender, race, major, etc.

Items in the surveys were designed to address four purposes. The primary purpose was to assess changes in student attitudes or perceptions about plants as a result of the learning sequence. Although one question contained in both the pre and post surveys did assess changes in content knowledge, the surveys were *not* designed to be knowledge surveys (i.e., their primary purpose was not to assess changes in content knowledge or mastery). The other two purposes were to assess student experiences/knowledge of plants prior to instruction, and to gauge student satisfaction with the learning sequence itself. Based on these purposes, the pre and post surveys differed somewhat in content. The surveys were not designed to be all-encompassing

nor were they designed to assess any element of the learning sequence in isolation.

Surveys contained both quantitative and qualitative questions and each survey was approximately one typed page in length. Quantitative items presented students with a statement and asked them to gauge their response along a numerical continuum: strongly agree (1), strongly disagree (7), neutral (4), or somewhere between those reference points (2-3 and 5-6). A majority of the quantitative items were the same in both the pre and post surveys. Quantitative items shared between the two surveys were analyzed statistically using unpaired 1-tailed Student t-tests (because all surveys were anonymous) when appropriate. An alpha level of 0.05 was used to determine statistical significance. Qualitative items presented students with an open-response phrase or question (each described individually below) and asked for a written answer. Because most qualitative items were restricted to just one survey or the other, they were each considered separately. One qualitative item shared between both the pre and post surveys asked students to enumerate ways plants are important to human society.

Because the primary purpose of the surveys was to assess changes in student attitudes or perceptions about plants, it was important to first determine what types of experiences students have had with plants both inside and outside of the classroom. A majority of the qualitative items on the pre survey were constructed to assess this. Of the 27 students who completed the pre survey, 17 (63%) reported receiving some form of botany instruction in the past, with 13 of the respondents indicating their last experience was a "plant unit" in high school. Only 2 of the 27 students (7%) had grown up on a crop-growing farm whereas 1 student had been raised on a ranch. Twenty-one students (78%) reported tending or helping to tend a garden in the past (students described a variety of vegetable, flower, herb, and fruit gardening). Thirteen students (48%) said they kept houseplants at home. Ten students (37%) reported previous exposures to harmful plants such as poison ivy (8/10), stinging nettle (2/10), or other injurious plants (3/10). These responses suggest that while individual class members have had quite heterogeneous experiences with plants, most have had some exposure both inside of and outside of the classroom prior to Bio 001.

The primary purpose of the survey was to assess changes in student attitudes and perceptions about plants as a result of the instructional sequence. Table 1 presents the 12 quantitative survey items shared between the pre and post assessments, student scores at each time point, and significance

of comparisons. There was a significant increase in student agreement to the phrase "I find plants to be interesting" from pre to post (item #1; $p=0.026$) and also a significant decrease in student agreement to the phrase "plants are boring" (item #2; $p=0.029$). Significant increases in agreement to the phrases "I use my knowledge of plants in my everyday life," "it is important for the everyday citizen to have a broad knowledge of plants", and "plants are important to human society" were seen from pre to post (all $p<0.015$). There was a decrease in student agreement to the phrase "apart from a food source, plants are not very important in my personal life" from pre to post ($p=0.001$). No significant differences were found in student responses to other survey items.

Additional items were included on the post survey to better discern how student attitudes to plants may have changed as a result of the learning series. The 2 additional quantitative statements were: "I feel my *knowledge* of plants has increased as a result of this learning series" and "I feel my *appreciation* of plants has increased as a result of this learning series" (italics are used here only and not in the actual survey). Students indicated a high level of agreement to both the knowledge ($n=6.2$, $SE=0.21$) and appreciation ($n=6.1$, $SE=0.22$) statements, suggesting that students felt their understanding of plants had increased in both respects. One qualitative item found only on the post survey also

assessed changes in student attitudes: "How (if at all) has your opinion of plants changed as a result of this learning series?" Of the 28 respondents, 24 (86%) indicated a positive impact of the learning sequence on their opinions of plants, while the remaining students indicated their opinion had not changed (no students indicated a negative impact). Within just the positive responses, the most common change mentioned was greater "respect" or "appreciation" for plants. One student wrote: "I used to be extremely uninterested but now I think plants are fascinating and useful." Other responses included increased knowledge or interest. Disappointingly, despite these results, students did not indicate a greater desire to learn more about plants from pre to post (Table 1, item #4; $p=0.189$).

Although it was not the primary purpose of this study to diagnose changes in content knowledge as a result of the learning sequence, one qualitative item shared between both pre and post surveys may shed some light on this topic. The statement read: "Please make a list of all the ways you believe plants may be important to human society (if at all). Please be specific wherever possible." Five of the 28 students in the post survey simply wrote down the acronym with no elaboration; their results were excluded from further consideration because they lacked the specificity as requested in the item

Table 1. Results from the 12 quantitative items designed to gauge changes in student attitudes about plants. Each survey item was presented identically and in the same order in both the pre and post surveys. For both the pre and post time points, means plus standard errors (SE) are given. The last column presents the results of a 1-tailed Student t-test comparing pre and post data. Asterisks indicate statistical significance using $\alpha=0.05$.

Survey Item	Pre Mean (SE)	Post Mean (SE)	Pre vs. Post Significance
1. I find plants to be interesting.	4.8 (0.28)	5.5 (0.23)	0.026*
2. Plants are boring.	2.8 (0.26)	2.2 (0.2)	0.029*
3. I have enjoyed learning about plants in the past.	4.6 (0.28)	4.7 (0.27)	0.378
4. I would like to learn more about plants.	5.1 (0.26)	5.4 (0.18)	0.189
5. Animals are more interesting than plants.	5.6 (0.26)	5.2 (0.27)	0.119
6. Bacteria are more interesting than plants.	3.7 (0.31)	3.3 (0.35)	0.15
7. I use my knowledge of plants in my everyday life.	3.4 (0.29)	4.7 (0.24)	0.001*
8. It is important for the everyday citizen to have a broad knowledge of plants.	4.4 (0.25)	5.1 (0.22)	0.015*
9. Plants are important to human society.	5.9 (0.17)	6.5 (0.13)	0.003*
10. I don't really use or encounter plants in my everyday life.	2.6 (0.31)	2.0 (0.23)	0.074
11. In everyday life (walking to class, going to the store, etc.) I pay attention to the plants around me.	4.4 (0.33)	5.0 (0.3)	0.094
12. Apart from a food source, plants are not very important in my personal life.	3.2 (0.26)	2.1 (0.22)	0.001*

directive and could not be directly compared to other student responses. On average, the number of specific ways listed by individual students increased from pre to post (3.85 vs. 6.35, respectively; $p < 0.001$). However, the net diversity of responses across the class did not change from pre to post (28 vs. 28).

Table 2 presents a frequency listing of the top 10 responses at both the pre and post time points; other responses were not shown for the sake of brevity. Several caveats should be considered when examining Table 2. First, Table 2 is based on only one survey item and therefore is not robust enough to generate the caliber of conclusions as seen from Table 1. Second, it does not list all responses given. Third, the construction of Table 2 was difficult given the way students worded their responses. As just one example, whether a student response of “drug” meant medicine or illegal drug was not always clear (I assumed the former unless otherwise stated based on the emphasis given to medicine during the lecture sequences and/or the context of the response) and responses such as “drug” and “medicine” were collated into the same category. Other instructors may have elected to keep them separate. Fourth, as stated earlier, 5 students were excluded from the results due to their ambiguous responses. Given these factors, I did not feel comparative statistics were appropriate. Table 2 is valuable as a casual metric of where students' thoughts were concentrated at the 2 time points, and also serves as a baseline indicator of knowledge students had prior to the learning sequence.

Finally, two quantitative questions were included in the post survey to gauge student reactions to the learning series proper. The first item asked: “Did you enjoy this learning series. If ‘yes’, why? If ‘no’, why not?” Of the 28 respondents, 27 or 96% enjoyed the learning series (1 student indicated “neutral”). Reasons given included the nature of the information presented, an increase in appreciation for plants, or that the series was enjoyable/interesting. The second item asked: “What could be done to improve this learning series?” Of the 28 respondents, 7 (25%) did not respond, 12 (43%) said “nothing”, and the remaining students gave a variety of responses. Two students suggested spending more time on the sequence and two students suggested incorporating additional activities. All other responses were limited to just one student and included requesting more information on the medical and nutrition aspects, spending more time with actual plants, studying local plants, moving the plant unit to earlier in the semester, and “I didn't like learning about the structures” (most likely referring to the time spent on structure, function, and human use of roots, stems, leaves, and flowers).

Perhaps the most positive impact of the learning series was not manifest in the surveys themselves. In between this learning series and the final, one non-traditional student who is not my advisee requested an office visit. When the student arrived, they explained that they had been floundering for a major and as a result of this learning series finally found a topic they were interested in: ethnobotany.

Table 2. Top 10 qualitative responses to the survey item: “Please make a list of all the ways you believe plants may be important to human society (if at all). Please be specific wherever possible.” This item was included in both pre and post surveys. Responses are arranged alphabetically. Number of respondents was 27 for pre and 23 for post. More than 10 items are listed in Table 2 because top responses differed between the 2 time points.

Student Response	Pre # respondents (% total respondents)	Post # respondents (% total respondents)
Animal food/habitat	3 (11%)	0
Building materials	0	8 (35%)
Carbon sink (absorb CO ₂)	1	6 (26%)
Dyes	1	8 (35%)
Enjoyment, recreation	15 (56%)	13 (56%)
Erosion control	2 (7%)	0
Food and nutrition	24 (89%)	22 (96%)
Fuel	2 (7%)	16 (70%)
“Knowledge”	2 (7%)	0
Landscaping	2 (7%)	3 (13%)
Medicine	20 (74%)	23 (100%)
Oxygen production	16 (59%)	10 (43%)
Paper	0	5 (22%)
Poisonous plants (agents of disease)	2 (7%)	3 (13%)
Tobacco	0	5 (22%)

The student sought help in selecting possible courses that would assist them in studying ethnobotany further. To the best of my knowledge, the student is still on this trajectory.

The survey items employed here cannot formally speak towards which particular aspect of the learning sequence (i.e., lecture, activity, or mnemonic) contributed towards which outcomes of the survey because no survey items addressed this issue. In fact, I specifically avoided mentioning the mnemonic in the survey because I did not wish to bias the results. The positioning of the surveys relative to the learning sequence is also important to consider. For example, in the post survey it is clear from responses that students recalled information from the latter portion of the learning sequence more readily than information from the beginning. Further, we cannot determine from these results how much effort students put into the surveys; for example, because the post survey occurred at the end of the instructional period, students may have rushed

through the survey and not fully demonstrated their thinking. Alternatively, students may have responded in ways they thought would please the instructor and not according to their natural thoughts.

Taken together, these results suggest that this particular initiative was effective in increasing student appreciation of plants. It is likely that similar initiatives launched in other classrooms would yield comparable outcomes. I have shared my experiences in this forum in the hopes that other educators can take these anecdotes and adapt them to their own classrooms for similar benefit. It is imperative that college educators in both general biology and botany classrooms exchange ideas, not only to improve student learning, but also to identify student trends (such as apathy towards botany instruction) and techniques for facilitating greater appreciation of plants. Identifying and working towards remediating these trends now will ensure that future generations of educators do not neglect botany instruction in their own classrooms.

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The world's oldest species of tree has surprised botanists by producing seeds in Britain. The 2 million-year-old Wollemi Pine was thought to be extinct – and had been identified only from fossils – when a crop of 100 trees was found in Australia in 1994. Now a Wollemi at Tregothnan Gardens in Cornwall has become the first in the Northern Hemisphere to produce cones, right. Officially closed for winter, the gardens will open this weekend for visitors to see the tree. Jonathon Jones, the gardens' director, who said the pine was an "unbelievable sight", hopes to raise seedlings.

From *The Times*, April 16, 2008

<http://www.timesonline.co.uk/tol/news/environment/article3753771.ece>

Symposia in Plant Neurobiology: A New Venue for Discussion of Plant Behavior and Communication

Plants perceive and respond to subtle changes in their environments. They actively engage in complex ecological interactions with one another and with other organisms. Underpinning these activities is a variety of chemical, electrical, and hydraulic signaling and response pathways that are becoming increasingly well documented by science. Modern plant biology textbooks include detailed information on these topics, stemming from discoveries first described in the scientific literature of the 19th century and even earlier. Yet, there remains a general unawareness among many people—including numerous biologists, environmental scientists, science teachers, journalists and those responsible for funding education and research—that plants are capable of active engagement with their surroundings.

The lack of focused awareness of integrated plant responses to external and internal stimuli seems puzzling considering the importance of similar phenomena in animal biology. Why are we so reluctant to attribute sensation, response and communication to plants? Charles and Francis Darwin had no difficulty referring to plant behavior (1). And, while the seminal work by J.C. Bose on plant behavior in the early 20th century may have been discounted by subtle racism (2), Bose's conclusion that plants have a kind of nervous system, and can integrate adaptive responses to their environments through coupled electrical and chemical signals, has re-emerged in the contemporary plant science literature (3).

The Society for Plant Neurobiology was recently established to provide a venue to discuss research on plant signaling and behavior from the molecular genetic and cellular to the population level. The Society has held symposia annually for the past three years in Florence, Italy (2005), Beijing, China (2006), and Strbske Pleso, Slovakia (May 2007), and will meet in Fukuoka, Japan in June 2008. Approximately 400 scientists from around the world have come to these meetings to present and discuss their research on topics ranging from conceptual issues relating to information theory in biology and the history of plant biology thinking as applied to this field, to empirical studies on mechanoperception, inter- and intracellular electrical signaling, membrane biology, transport, the role of neurotransmitters in plants, responses to environmental stimuli, plant movement, and chemical ecology.

The symposia have been intellectually challenging because they include a wide range of methodological approaches to understanding how plants work, addressing processes occurring on scales that range from the molecular to the ecological. They have also been unusually stimulating, especially when we are presented photos and videos of plants "doing things." For example, at the 2007 symposium, Mark Mescher (4) presented almost sinister footage of the parasitic dodder plant (*Cuscuta pentagona*) growing upward in a rotating, searching motion, sniffing for its prey.

These plants use airborne chemicals emitted by other plants to find their hosts and can even distinguish between the odors of more and less desirable host plants. This clear and straightforward example of the coupling of plant sensing and dynamic response is compelling even to non-biologists. Plant movements may be slow, but it is difficult to imagine that many people, having seen time-lapse footage of a parasitic dodder vine searching for a host (www.psu.edu/ur/2006/parasiticplantphotos.htm), would object to use of the term "behavior" in plants.

Use of the term "neurobiology" to describe aspects of plant function evokes strong reactions, both positive and negative, among plant scientists—including many who have attended the symposia.

At the May 2007 Plant Neurobiology symposium, a portion of the program was devoted to a spirited discussion of the wisdom of using of this name for the research field. Literalists object to use of the prefix "neuro" to describe plants, as no one suggests that plants contain nerves. Yet, applying a broader sense of the prefix, the search for physiological mechanisms of stimulus perception, information processing, and physiological and behavioral response is increasingly documenting examples of neuro-like mechanisms in organisms ranging from mammals to prokaryotes. The integration of research in these areas across taxonomic boundaries is undeniably desirable. A possible objection to this broader interpretation is that it conflicts the narrow use of the term neurobiology in animal systems to refer specifically to the study of the nervous system and cognition. While no consensus was reached on these matters, it was generally agreed that disagreement over the name of the meeting or society should not detract from the imperative of pursuing high-quality research in this important emerging field.

While there is no doubt that plants process information differently from animals, it is worth our while to find out how they are doing it, so that we can interact in a beneficial way with them as our environment changes and challenges our existence.

Reason for writing the article:

There remains a general unawareness among many people— including numerous biologists, environmental scientists, science teachers, journalists and those responsible for funding education and research—that plants are capable of active engagement with their surroundings. This seems puzzling considering the importance of similar phenomena in animal biology. Why are we so reluctant to attribute sensation, response and communication to plants?

The newly established Society for Plant Neurobiology provides a venue to discuss research on plant signaling and behavior from the molecular genetic and cellular to the population level. Recent annual symposia held in Florence, Beijing, and Strbske Pleso, Slovakia have been intellectually

challenging. They have included a wide range of methodological approaches to understanding how plants work, addressing processes occurring on scales that range from the molecular to the ecological. They have also been unusually stimulating, especially when we are presented photos and videos of plants “doing things” e.g. www.psu.edu/ur/2006/parasiticplantphotos.htm .

Use of the term “neurobiology” to describe aspects of plant function evokes strong reactions, both positive and negative, among plant scientists—including many who have attended the symposia. While there is no doubt that plants process information differently from animals, it is worth our while to find out how they are doing it, so that we can interact in a beneficial way with them as our environment changes and challenges our existence.

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Virginia Shepherd, Department of Biophysics, The University of NSW, Sydney, Australia vas@phys.unsw.edu.au
Eric Brenner, New York Botanical Garden, New York, NY, USA ebrenner@nybg.org
Elizabeth Van Volkenburgh, Biology Department, University of Washington, Seattle, WA, USA lizvanv@u.washington.edu

World's oldest tree found in Sweden

It may not look like much but scientists claim that this tree is the oldest in the world. Discovered in the Dalarna province of Sweden, the trunk upon which this spruce has grown is believed to date back nearly 10,000 years. “Spruce trees can multiply with root penetrating branches, meaning they can produce exact copies, or clones,” says Leif Kullman from Umeå University. Scientists found four “generations” of spruce remains in the form of cones, and wood produced from the highest grounds of Fulu mountain. The age was tested by carbon dating in Florida.

From *The Times*, April 18, 2008
<http://www.timesonline.co.uk/tol/news/uk/science/article3767950.ece>

News from the Society

News from the Office

Over the past year, the Botanical Society of America has engaged in a number of activities designed to move us into a new paradigm as a professional organization. In part, we are responding to new IRS, NSF and other federal, state and partner granting agencies requirements and compliance standards for non-profit organizations.

Three of the most significant endeavors have been 1) our first ever full audit; 2) the establishment and meeting of a strategic planning group; and 3) a review and revision of the Society bylaws, including the development of policy and procedure documents.

BSA Audit

Brown Smith Wallace, L.L.C. were hired to provide an audit of the BSA systems and accounts for the 2007 financial year. They will undertake a follow-up audits in 2008, 2009 and 2010.

Brown Smith Wallace, L.L.C. reported to the BSA Executive Committee in March, and I'm pleased to report a positive result. The Society is in a sound financial position, and we have, or are putting in place, all appropriate policies and procedures to meet federal, state and other organizational compliance requirements. The 2007 audit is available on request (wdahl@botany.org), and it will be on the agenda at the BSA Annual Business Meeting on Tuesday, July 29, at the Botany 2008 Conference in Vancouver, BC.

Strategic Planning

Deep Thought II took place at the BSA offices in St. Louis on March 30, 2008. You will hear more from this group in the very near future as they appeal to the membership for thoughts, ideas and comments on the future directions of the Society. Please take the time to respond.

The committee includes:

BSA Members - Pam Soltis; Karl J. Niklas; Christopher Haufler; Gregory Anderson; Janice Coons; Theresa Culley; Kent Holsinger; Simon Malcomber; Brent Mishler; Muriel Poston (unable to attend); Mackenzie Taylor; Gordon E. Uno
BSA Staff - Robert Brandt; Heather Cacanindin; Bill Dahl; Claire Hemingway; Richard Hund; Wanda Lovan; Amy McPherson; Johanne Stogran

BSA Bylaws, Policies and Procedures

Over the past two years, the Executive Committee has been exploring options for reviewing the overall governance of the Society. This is in part due to our evolution as a fully staffed organization and our move to partner with outside funding agencies.

However, there are also major changes taking place in our operating environment, in communications options, increasing compliance requirements and IRS regulations facing governing bodies within non-profit organizations. It is fair to say a great deal has changed for the BSA as an organization since moving to a full-time staff in late 2002.

Directly following the meeting in Chicago, BSA President Pam Soltis asked Scott Russell to chair the BSA Bylaws Review Committee. Additional committee members include Past Presidents Judy Jernstedt, Ed Schneider and BSA Student Representative Andrew Schwendemann. The committee was charged with: 1) reviewing our current bylaws and procedures; 2) envisioning for future possibilities and inclusion of best practices; and 3) ensuring legal compliance with federal and state laws for the governance of non-profit organizations. Anchor Management, a small consultancy specializing in governance related issues, was employed to facilitate the process.

It is important to note that all changes are designed to move the BSA closer to a "best practices" model for governance. The bylaws become the core structural document for the Society. At this level, changes should not occur often and a vote of the membership is required to make any changes. Items not deemed part of the core structural document are moved to the supporting policies and/or procedures documents. Here the officers elected and charged with running the Society can make changes to policies and procedures, notifying the membership of any and all changes.

The recommended changes also include an update on the current governance structure of the BSA. This is suggested for several reasons, including a consolidation of the fiduciary responsibility as well as just plain common sense. At present, our governing body is a 36-member Council that meets once a year. The Council is charged as the managing board of the Society and transacts the business of the Society except as otherwise provided in the bylaws. It is then stated that the Executive Committee acts on all interim matters that arise between regular annual meetings of the Society and in essence replaces the Council. It is recommended that the governance be consolidated within the elected executives (the board of directors in most organizations) and that this group expands slightly to provide appropriate representation. It is recommended that the body we call the Council becomes an advisory group to the board.

There will be a discussion meeting at the Botany 2008 Conference in Vancouver as we move towards a vote on the suggested changes some time later

in the year. Please come and discuss the recommended changes with the BSA Executive Committee and the Bylaws Review Committee. We will also be posting a discussion board on the BSA website. We look forward to your comments and participation as we move forward.

The documents involved can be found online at:

Current Bylaws - <http://www.botany.org/governance/bylaws.php>

Recommended changes - <http://www.botany.org/governance/AMbylaws.php>, supported by the

DRAFT BSA Policies - <http://www.botany.org/governance/AMpolicy.php>

BSA Award Recipients

It is award season at the Botanical Society of America. We are pleased to provide you with this year's recipients, to date, including Student Travel awards and the Young Botanists awards. Thank you to all of the award judges! We appreciate the time and effort that goes into these important awards. And thank you to the advisors for supporting all of the various award programs.

Vernon I. Cheadle Student Travel Awards (BSA in association with the Developmental and Structural Section) This award was named in honor of the memory and work of Dr. Vernon I. Cheadle.

James Cohen - Cornell University, Ithaca, NY - Advisor, Dr. Jerrold Davis - Botany 2008 presentation: "*The World of Walled Marriages: Comparative Floral Development in Lithospermum.*"

Nathan Jud - Ohio University, Athens, OH - Advisor, Dr. Gar W. Rothwell - Botany 2008 presentation: "*Anatomy of an Upper Cretaceous bennettitalean stem.*"

Natalia Pabon Mora - New York Botanical Garden, Bronx, NY - Advisor, Dr. Amy Litt - Botany 2008 presentation: "*Functional evolution of the AP1/FUL gene lineage in non-core eudicot plants.*"

Renate Wuersig - Purdue University, West Lafayette, IN - Advisor, Dr. Michael Zanis - Botany 2008 presentation: "*The Natural History of C-class Genes: Independent Duplication Events in Diverse Angiosperm Lineages.*"

2008 YOUNG BOTANIST Award Recipients

Certificate of Special Achievement

Jared Barnes
Jennifer Bufford
Bethany Butler
Nate Ellis
Britnie Foutch
Alyssa Hartson
Nguyet Hoang
Brittiney Hofmann

University of Tennessee, Martin, TN - Advisor, Dr. Darrell L. Ray
Willamette University, Salem, OR - Advisor, Dr. Susan R. Kephart
Miami University, Oxford, OH - Advisor, Dr. Nancy L. Smith-Huerta
University of Missouri, Columbia, MO - Advisor, Dr. J. Chris Pires
Indiana University, South Bend, IN - Advisor, Dr. Deborah Marr
University of Wisconsin, Milwaukee, WI - Advisor, Dr. Sara Hoot
University of Oklahoma, Norman, OK - Advisor, Dr. Scott Russell
Rose-Hulman Institute of Technology, Terre Haute, IN
- Advisor, Dr. Ella L. Ingram

Hayley Kilroy
Laura Lagomarsino
Hannah Marx
Shauna McDonald
Lachezar Nikolov
BreAnne Nott
Ana Piedrahita
Nikki Pisula
Amber Pouncey
Jenna Rosenwasser
Jen Rushford
Lauren Schwartz
Logan Senack
Erin Shanle

Miami University, Oxford, OH - Advisor, Dr. David L. Gorchoff
University of California, Berkeley, CA - Advisor, Dr. Chelsea D. Specht
University of Washington, Seattle, WA - Advisor, Dr. Richard Olmstead
Humboldt State University, Humboldt, CA - Advisor, Dr. Alexandru M.F. Tomescu
Harvard University, Cambridge, MA - Advisor, Dr. N. Michele Holbrook
Eastern Illinois University, Charleston, IL - Advisor, Dr. Andrew S. Methven
University of Florida, Gainesville, FL - Advisors, Drs. Pamela & Douglas Soltis
Eastern Illinois University, Charleston, IL - Advisor, Dr. Scott J. Meiners
University of Florida, Gainesville, FL - Advisors, Drs. Pamela & Douglas Soltis
Connecticut College, New London, CT - Advisor, Dr. T. Page Owen, Jr.
SUNY Plattsburgh, Plattsburgh, NY - Advisor, Dr. Christopher T. Martine
Willamette University, Salem, OR - Advisor, Dr. Susan R. Kephart
University of Connecticut, Storrs, CT - Advisor, Dr. Kent E. Holsinger
Southern Illinois University, Carbondale, IL
- Advisor, Dr. Barbara Crandall-Stotler

Patricia Soria
Nick Stanich
Laura Weingartner
Anthony Westby
Kirsten Wright

University of Florida, Gainesville, FL - Advisors, Drs. Pamela & Douglas Soltis
Ohio University, Athens, OH - Advisor, Dr. Harvey E. Ballard, Jr.
Miami University, Oxford, OH - Advisor, Dr. Michael A. Vincent
Emporia State University, Emporia, KS - Advisor, Dr. Marshall Sundberg
University of Puget Sound, Tacoma, WA - Advisor, Dr. Andreas Madlu

Conant “Botanical Images” Student Travel Awards This award provides acknowledgement and travel support to BSA meetings for outstanding student work in the area of creating botanical digital images.

John Schenk, 1st Place, Washington State University, Pullman, WA - Advisor, Dr. Larry Hufford
Matthew Valente, 2nd Place, University of Tennessee, TN - Advisor, Dr. Joseph Williams
Mauricio Diazgranados, 3rd Place, Saint Louis University, St. Louis, MO - Advisor, Dr. Janet C. Barber

Developmental & Structural Section Student Travel Awards

Julien Bachelier, Institute of Systematic Botany, Zurich, Switzerland - Dr. Peter K. Endress - Botany 2008 presentation: “*Floral structure of *Kirkia wilmsii*: implications for the systematic relationship of *Kirkiaceae* and the *Anacardiaceae-Burseraceae* clade (*Sapindales*).*”

Songhita Das, University of Texas, Austin, TX - Advisor, Dr. Mona Mehdy - Botany 2008 presentation: “*Understanding the Mechanisms and Functions of French Bean PvPRP1 Gene Down-regulation During the Defense Response in Transgenic Arabidopsis.*”

Chunmiao Feng, North Carolina State University, Raleigh, NC - Advisors, Drs. Jenny Xiang and Robert G. Franks - Botany 2008 presentation: “*Comparative developmental study of inflorescence in *Cornus*.*”

Alana Oldham, Humboldt State University, Humboldt, CA - Advisor, Dr. Stephen Sillett - Botany 2008 presentation: “*Associated Variation in *Sequoia sempervirens* (Coast Redwood) Leaf Anatomy: Potential Impacts on Whole-Tree Carbon Balance.*”

Nicholas Stanich, Ohio University, Athens, OH - Advisor, Dr. Gar W. Rothwell - Botany 2008 presentation: “*Early Cretaceous *Equisetum* fossils confirm that the modern evolutionary radiation was well underway 136 million years ago.*”

Ecology Section Student Travel Awards

Katie Becklin, University of Missouri, Columbia, MO - Advisor, Dr. Candace Galen - Botany 2008 presentation: “*The good, the bad, and the costly: Effects of shading and drought on the costs and benefits of mycorrhizae.*”

Jocelyn Campbell, University of British Columbia, Vancouver, BC - Advisor, Dr. Cindy Prescott - Botany 2008 presentation: “*Expanding the realized niche for cyanolichens in wet-temperate forests of interior British Columbia.*”

Andrew Simpson, California State University, Chico, CA - Advisor, Dr. Kristina A. Schierenbeck - Botany 2008 presentation: “*Multiple causal factors influence*

*propagule size gradients in *Arctostaphylos* (*Ericaceae*).*”

Meghan Skaer, Sonoma State University, Rohnert Park, CA - Advisor, Dr. Hall Cushman - Botany 2008 presentation: “*Evaluating the Effects of Cattle Grazing on a Coastal Prairie in Central California.*”

Genetics Section Student Travel Awards

Aaron Duffy, Utah State University, Logan, UT - Advisor, Dr. Paul G. Wolf - Botany 2008 presentation: “*Conservation of selection on *matK* in ferns following an ancient loss of the *trnK* intron by genome inversion.*”

Mycological Section Student Travel Awards

Katie Becklin, University of Missouri, Columbia, MO - Advisor, Dr. Candace Galen - Botany 2008 presentation: “*The good, the bad, and the costly: Effects of shading and drought on the costs and benefits of mycorrhizae.*”

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

What a remarkable year for PlantingScience—Funding, national recognition, and a doubling in participation!

Hearty thanks to the many BSA scientists who gave your time to coach 368 student research teams through the process of scientific discovery. Your efforts helped to take plant investigations to 1,223 students in 48 classrooms. To date, PlantingScience has reached 2,486 students from 25 states across the nation.

Over 120 scientists are now volunteering as mentors: <http://www.plantingscience.org/index.php?module=pagesetter&tid=5&filter=sipscientist:eq:1&tpl=scientists>

We invite you to join, or share the opportunity with your colleagues or graduate students. Graduate students and post-doctoral fellows have a special invitation:

Call for 2008-2009 Master Plant Science Team members

Who? Graduate students and post-doctoral fellows.
What? A team of 20 compensated mentors who commit to mentoring 3-4 student research teams via the web and participate in training conversations.
When? Fall 2008 & spring 2009 sessions. Each session lasts ~2-4 weeks.

Where? Online at <http://www.plantingscience.org/>

Why? To inspire appreciation for plant science in young learners and enrich your professional life. Benefits are described on the application form available at http://www.botany.org/outreach/MPST_appl08.pdf

Keep in touch with BSA-led education initiatives over the summer by visiting:

PlantingScience <http://www.plantingscience.org/>

Plant IT Careers, Cases and Collaborations <http://www.myplantit.org/>

Botany without Borders and Science for Everyone

If you're looking for education, outreach, and training (EOT) activities at Botany 2008, you'll find a rich array of workshops, sessions, social events, and special presentations throughout the week. Just a few are highlighted below.

Sunday: 14 free educational and scientific workshops

Monday: PlantingScience Mixer / All-society conversation: EOT that would you like to see at annual meetings

Tuesday: Past-President's Symposium: Understanding the Crisis in Science Literacy / Women in Science Luncheon

Wednesday: Carl Wieman, Nobel Prize Winner in Physics: Science Education in the 21st Century: Using the tools of science to teach science.

Be sure to visit the education and outreach booth in the Exhibit Hall to:

- Get your PlantingScience T-shirt.
- Try out new features on the PlantingScience website and give us your feedback.
- Listen to podcasts that students make during the July Plant IT program.
- Make a podcast of your own!
- Pick up information and hints on preparing NSF Broader Impacts statements.

Spotlight on BSA Member Contributions to Science Education

Engaging in outreach is nothing new to **Melanie DeVore**, Georgia Power Endowed Professor in Environmental Science at Georgia College and State University. She writes a newspaper column on environmental issues for the *Milledgeville Union Recorder*, leads a Study Abroad program in the Bahamas in which student projects are presented

at an annual Natural History of the Bahamas Symposium and coordinates a public lecture series, among other activities beyond her active research and publication on paleobotany. Melanie also recently became involved in Georgia College's Early College Program, which seeks to empower high school students for academic success. Melanie and a high school teacher in the GC Early College Program will partner over the coming years to blend high school and college experiences for underrepresented students. Next year they will begin to integrate PlantingScience mentored inquiry experiences into the program. We are thrilled to have the opportunity to partner with them and support their efforts.

<http://info.gcsu.edu/tip/archives/2005/EarlyCollegeprograminitia.html>

EOT integral to the iPlant Collaborative

The iPlant Collaborative has been established to catalyze discussions to identify Grand Challenge questions in plant biology that require computational approaches. It serves the entire community of plant science disciplines and has a strong education, outreach, and training component. **Susan Singer**, chair of the EOT Advisory Committee, moderated the EOT panel discussion at the April Kick-Off Conference held at Cold Spring Harbor.

Archived web casts from the Conference and information about EOT opportunities are available at: <http://www.iplantcollaborative.org/home>

Editor's Choice

Crossgrove, Kirsten and Kristen L. Curran. 2008. Using clickers in nonmajors- and majors-level biology courses: Student opinion, learning, and long-term retention of course material. *CBE-Life Sciences Education* 7:146-154. <http://www.lifescied.org/cgi/reprint/7/1/146>

-Not surprisingly, students were positive about using clickers in both classes, but the unexpected results are that student learning and student retention varied significantly. In general, positive results were more pronounced in the non-majors introductory class as opposed to the genetics class for majors.

Matlack, Glenn R. and Ryan W. McEwan. 2008. Forest in my neighborhood: An exercise using aerial photos to engage students in forest ecology and land use history. *The American Biology Teacher* 70 (3):13-17.

-Students are provided 1981 aerial photos of the area surrounding their home and current images of the same area. This personalizes an activity in which students investigate changes in forest distribution and land use patterns during the course of their lifetimes.

Sparks, Timothy C., Colleen M. Mills, Lisa A. Volesky, Jennifer A. Talkington, and Joanna S. Brooke. 2008. Leaf degradation, macroinvertebrate shredders & energy flow in streams: a laboratory-based exercise examining ecosystem processes. *The American Biology Teacher* 70(2): 85-94.

-Although presented as a traditional "cook book" exercise that introduces ecological sampling and statistical analysis, it has plenty of potential to be expanded to an inquiry-based model. The experiment runs in the laboratory over a 3-day period but some materials must be collected at least 3-weeks in advance.

Spiro, Mark D. and Karin I. Knisely. 2008. Alternation of generations and experimental design: a guided-inquiry lab exploring the nature of the *her1* developmental mutant of *Ceratopteris richardii* (C-Fern). *CBE-Life Sciences Education* 7:82-88. <http://www.lifescied.org/cgi/reprint/7/1/82>

-C-Fern (www.c-fern.org) has become one of the standard plants for inquiry-based learning. This exercise concentrates on introducing first-year majors to alternation of generations and experimental design. It is also the starting point for a characterization of the *her1* (hermaphroditic) mutation that affects sexual development in the gametophyte. The paper describes the 2-week introductory module that forms a basis for further investigation.

News from the Sections

Emanuel D. Rudolph Award Historical Section, BSA

In 2006 the Historical Section of the Botanical Society of America established the Emanuel D. Rudolph Award for the best student paper on a historical subject in botany to be awarded at the annual meeting (PSB 52(4): 127). Please encourage your undergraduate and graduate students to consider presenting a paper, poster or symposium on a historical subject in botany to be eligible for this honor.

In Memoriam:

Jerry McClure (1933 - 2006)

Jerry Weldon McClure, 72, professor emeritus of botany at Miami University, Oxford Ohio, died Tuesday, April 25, 2006 in Oxford, Ohio. He joined the Miami University faculty in 1964, attaining full professorship in 1973 and retired in 2001.

Chair of the Physiological Section, Botanical Society of America 1969-72, editorial board 1972-74 and long-term supportive member of the Botanical Society, Jerry will be missed by the members for his informative conversations on phytochemicals. McClure was President (also treasurer) of the Phytochemical Society of America.



Standing: Anitra Thorhaug, Arthur Chronquist and Jerry McClure, Amherst, 1973 - from Thorhaug

Jerry was born May 3, 1933 in Floydada, Texas and took pride in having gone from a depression-era cotton farm and one-room school to becoming an internationally recognized scientist. At Wayland Baptist College he was offered a music scholarship in voice; however, he transferred to Texas Tech University, where he earned a degree in agronomy in 1954. Jerry served in the U.S. Air Force in 1955 to 1959 and then he returned to Texas Tech, where he received an M.S. in agriculture. In 1964, Jerry received his Ph.D. in botany from the University of Texas, Austin.

Throughout his career, he received numerous National Science Foundation and U. S. Department of Agriculture grants to fund his research. He received the Alexander von Humboldt Foundation Senior U. S. Scientist Award from the West German government, in 1974-75, and simultaneously received a Fulbright Foundation Honorary Research Fellowship award. He was a visiting professor at

Ruhr-Universität, Bochum, Germany, giving more than 30 invited lectures in the U.K., Belgium, Netherlands, Poland, USSR and East Germany. In 1982 he was named Distinguished Visiting Scientist, Texas Tech University; in 1983, he received the Heinrich-Hertz research award in Dusseldorf, West Germany, and the Gordon Research Conference organizing award. In 1987, he was an invited visiting scholar, University of Nairobi, Kenya, and at the same time, worked with the Richard Leakey group and National Museums of Kenya. Before returning to Miami University in the fall of 1987, he presented invited lectures in Africa in Addis Ababa, Ethiopia; Asmara, Eritrea; and in Peoples Republic of China in Nanking and Guilin.

His public service included being a member of the Council for International Exchange of Scholars, Life Sciences; screening committee for Fulbright Awards; screening committee of the Woodrow Wilson National Fellowships Foundation. He and his wife, Frances were Danforth Faculty Associates; presidents of the McGuffey Laboratory School PTO and Community Service Program for Foreign Students (COSEP).

His grasp of the scientific literature related to secondary natural products in plants was remarkable particularly as it related to plant phenolics. Not only could he cite virtually all recent publications in natural products, Jerry often provided personal anecdotes about the authors.

As a teacher he encouraged industriousness, initiative, and originality from his generations of students who remember him as a mentor, advocate, and friend.

James Edward Canright (1920 - 2008)

James Edward Canright passed away on April 9, 2008 at the Hospice of the Valley, Tempe, Arizona. At 88 years of age, Jim suffered from several ailments that eventually became too much for him to manage. Many AASP members, and other professionals will remember Jim as a direct, no-nonsense person, who spoke his thoughts clearly and with conviction. He was, it seemed, a part of the palynological scene forever. I can still recall my early days in palynology, hearing of Jim's impact on our science.

Jim Canright was born in Delaware, Ohio on March 1, 1920. He earned an A.B. degree from Miami University of Ohio in 1942. Working with I.W. Bailey, Jim attended Harvard University and completed his

MA (1947) and Ph.D. (1949) in biology. Jim's work on evolution of the stamen in primitive angiosperms is still reproduced today in botany textbooks. He served as Lieutenant in the US Coast Guard Reserve in 1942-1946 in the Southwest Pacific area. Jim married Margaret Barnhouse in 1943, and together they raised four children, James Douglass, Lawrence, Susan and Eloise.

From 1949 through most of 1964 Jim served as



Jim and Peggy Canright at home in Arizona
Photo by David Jarzen

Instructor and Professor of Botany at Indiana University, Bloomington, Indiana. It was here at IU that Jim began the collection of Paleozoic plant fossils, primarily from the mid-west USA, but also from several parts of the world. His collections of this material have formed the basis for several Masters theses and Doctoral dissertations. I became familiar with the Canright paleobotanical collections when they were eventually transferred to the Florida Museum of Natural History, Gainesville, where in 1996 through 2002, I was Collection Manager for Paleobotany and began a detailed cataloguing and database entry of the Canright collection. These collections include both a core assemblage of representative fossil plants that were originally acquired primarily for teaching, as well as several subcollections, including fossil coal samples, fossil and extant pollen samples, and an extant wood and other plant anatomical structure collection. Some of this work was published in the well-illustrated "*Fossil Plants of Indiana*" published by the Indiana Department of Conservation, Geological Survey, in 1959.

In 1964 Jim and his lovely wife Peggy moved to Tempe, Arizona, where Jim assumed the position of Professor and Chairman of Botany and Microbiology at the Arizona State University. He served in this capacity from 1964 through 1972, eventually settling comfortably into the role as Professor of Botany until his retirement in 1985. ASU awarded Jim the position of Emeritus Professor upon his retirement, a position he respected and enjoyed.

In 1971, Jim was an invited Visiting Professor of Botany at the National Taiwan University in Taipei, Taiwan. Additionally Jim was recognized by his colleagues through his association in many professional organizations. He joined AASP in 1968, and held the office of President for the 1979-1980 term, member of the 1973 Nominating Committee, and Chairman of the 11th annual meeting in Phoenix, AZ. He served as President of the International Federation of Palynological Societies (IFPS) from 1992-1996. Jim was Editor of *Palynos*, the Newsletter for the IFPS, from 1977 (from its conception) through 1992. Jim Canright holds the distinction of being the only person to attend all nine of the IPCs, up to the 10th IPC in China. Perhaps a little known bit of trivia concerns the emblem/logo currently used for the IFPS. The stylized *Acacia* pollen grain with the letters IFPS was developed by Jim and designed by his son James Douglass in 1984 (see: *Palynos* vol. 7, no. 2, pgs. 1-2).

Travel played an important part on Jim's life, and it seems, looking at his Curriculum Vitae, that he managed to live in six different countries and travel to at least 45 countries. Part of this travel was through the courtesy of Uncle Sam, as Jim served as Communications Officer with the US 7th Fleet (1943-1945) in the Southwest Pacific arena. While in Malaysia he learned the basics of the Malayan language. He lectured in Nepal and India.

Jim was also recognized by his peers through awards and presentations. Jim was a Fellow of the Indiana Academy of Science and the American Association for the Advancement of Science (AAAS). He served on the Governing Board for the American Institute of Biological Sciences (AIBS), and received the Outstanding Paleobotanist Award from the Botanical Society of America. In 1960 he received a John Simon Guggenheim Fellowship. Jim's career has been profiled in *American Men and Women in Science*, and *Who's Who in America*.

Professor Canright served as Chair or Principal Advisor for many students working toward their graduate degrees, both at Indiana University and Arizona State University. Several of his students will be immediately recognized by AASP readers, and

include Robert Romans, Joseph M. Wood, Gottfried Guennel, Donald Engelhardt, William Dickison, Robert A. Stewart, Jerome Ward, John D. Shane, Michael Zavada and Michael Farabee.

I really only truly got to know and appreciate Jim Canright through our association involving the IFPS. When I was Secretary-Treasurer of the IFPS, I worked closely with Jim on several matters. We attended all the scheduled meetings and a few ad hoc meetings together in order to firmly establish the "process and procedures" necessary to build a strong international association. The record shows that thanks to Jim's commitment as Editor and eventually President of the IFPS, that organization today stands on a firm, well thought out constitution and working bylaws. We as a group of scientists, as palynologists and paleobotanists, owe a great deal to Jim Canright for his dedication and foresight in the early years of organizing our plans for the future. Today we are enjoying the effort of Jim and his colleagues through AASP and the IFPS.

Peggy Canright tells me that they have cremated Jim's remains, and for now his ashes will be placed in his study, among his years of documents and memorabilia (he discarded nothing!). Eventually, following Jim's wishes, the ashes will be strewn at sea. Jim loved the Pacific Ocean, and he will remain there forever. Although I was never a formal student of Jim's, I learned much from him. We shared many professional and personal times. Jim was truly a dear friend....I will miss him.

And Michael Farabee remembers.....

I first met Professor Canright when I was a student in his Plant Morphology class. Taking his class without the pre-requisite Plant Anatomy, I was captivated by the methodical presentation of plants in an evolutionary context, interspersed with stories and anecdotes that made a dull subject (so my friends told me) come alive. I returned to graduate school; luckily Paleobotany and Palynology were offered during the spring of 1980, so I signed up. To my surprise Jim remembered me and when he learned I was a graduate student, he quickly became my advisor, signed me up for Palynology, supported me in gaining regular graduate admission, and eventually I became his teaching assistant. To get me out of the lab, Jim invited me to play racquetball. Despite giving several decades to me, Jim never lost.

During one of those games he spoke of the academic life, encouraging me to think beyond the Master's and go for a Ph.D. This push from the nest (Jim told me that three degrees from ASU would **not** be a good thing, and that I needed to experience new settings and labs) led me to doctoral work with John

Skvarla and L.R. Wilson at the University of Oklahoma, and then to a post-doc with Tom and Edith Taylor at The Ohio State University. Through it all Jim remained a friendly correspondent as my career progressed. From Jim I learned to steer my course by my own bearing, ignoring the currents and opinions that would way-lay me. I learned the value of passion and caring about the science of botany and palynology, to be organized and set rules that would allow others to follow in my wake. As the founding science faculty member at Estrella Mountain Community College I have held to these ideas.

Michael Zavada recalls as well.....

In 1971, I was in my second baseball season at the best baseball program in the country— Arizona State University. I managed to squeeze in some education between the long, physically demanding practices. It had been my high school dream to be tutored by the blunt and no nonsense, three-time national champion Coach Bobby Winkles who was to show me the way to professional sports and success. It was the same year that I met the blunt and no nonsense Jim Canright. Jim's obvious intelligence and experience, coupled with his lucid way of delivering his intended message, always caused you to pause and to reflect. Jim demanded hard work, a disciplined mind, stick-to-itiveness, intelligence and nothing less than excellence. Jim was the Bobby Winkles of Botany. There was never any doubt that Jim had my well being and development as a thinking person at the core of his demands and advice. Despite the lavish resources and the national reputation of the ASU baseball program, it was Jim who changed my life. He taught me the meaning of quality of life. He put me on a path that provided an outstanding living, adventure, travel, a greater appreciation of the wonder of the natural world, and the challenge of the academic life. I had the pleasure of knowing Jim for thirty-seven years and my appreciation for the significance that he played in my life at a crucial time and my affection for him have grown over the years. It was just about a week before Jim passed away that I received a newspaper clipping from him about Clint Myers, a successful women's softball coach at ASU who was my teammate and formidable competition as a catcher at ASU. Jim asked me if I had regrets about taking the career path that I have, rather than exploring the possibilities in professional sports. Jim, I have no regret, and I thank you for being an honest, fair and caring educator and friend. I will miss you.

-David M. Jarzen, with contributions from Michael Zavada and Michael Farabee

Personalia

Peter Raven Elected to National Geographic Board of Trustees

Botanist and conservationist Dr. Peter H. Raven, president of the Missouri Botanical Garden, has been appointed to the National Geographic Society board of trustees, along with investment banker Tracy Wolstencroft of Greenwich, Conn., a partner at Goldman Sachs. They join 19 other trustees who are leaders in science, education, law, business, finance, government and public service.

The 120-year-old Society, whose mission is to inspire people to care about the planet, is one of the world's largest nonprofit scientific and educational organizations. It reaches more than 300 million people each month through six magazines, National Geographic Channel, television documentaries, radio, music, films, books, DVDs, maps, school publishing programs, interactive media and expeditions. It has funded nearly 9,000 scientific research projects and supports an education program combating geographic illiteracy.

"National Geographic is fortunate to have the additional counsel and experience of Peter Raven and Tracy Wolstencroft, who have impressive records of leadership and service in the conservation and finance fields and to National Geographic," said John Fahey, Society president and CEO.

Raven is one of the world's leading botanists and advocates of conservation and biodiversity. Under his 36-year leadership, the Missouri Botanical Garden has become a world-class center for botanical research, education and horticultural display. Raven is also chairman of the National Geographic Society's Committee for Research and Exploration, which awards grants for field-based scientific research around the world.

Described by *Time* magazine as a "Hero for the Planet," Raven champions research around the globe to preserve endangered plants and animals and is an advocate for building a sustainable environment. He has received numerous prizes and awards in recognition of his work in science and conservation, including the National Medal of Science, the highest award for scientific accomplishment in the United States; the International Prize for Biology from the government of Japan; Environmental Prize of the Institute de la Vie; Volvo Environment Prize; the Tyler Prize for Environmental Achievement; the Sasakawa Prize; and the International Cosmos Prize, Osaka.

He served for 12 years as home secretary of the National Academy of Sciences, to which he was

elected in 1977. He is also a member of the American Academy of Arts and Sciences and of the American Philosophical Society.

Raven is co-editor of *Flora of China*, a joint Chinese-American international project that is producing a 50-volume account of the roughly 31,000 species of plants in China. He has written numerous books and publications and is senior author of *Biology of Plants*, the internationally best-selling textbook in botany, now in its seventh edition, and *Environment*, a leading textbook on the environment, now in its sixth edition.

Raven received his Ph.D. from the University of California, Los Angeles, in 1960, after completing undergraduate work at the University of California, Berkeley. He holds honorary degrees from a number of universities around the world.



photo by Kristi Foster, Missouri Botanical Garden

Peter Raven Wins BBVA Foundation Award for Conservation Biology

Peter H. Raven, president of the Missouri Botanical Garden, will receive the Award for Scientific Research in Ecology and Conservation Biology, a 500,000 euro prize, from the BBVA Foundation Awards for Biodiversity Conservation. Raven is a co-recipient with Harold Mooney, professor of Environmental Biology at Stanford University.

The BBVA Foundation Awards -- whose global prize money of over one million euros is the highest of its kind internationally - recognize and support the work of the scientific community, organizations and professionals devoted to biodiversity conservation. The awards exemplify the foundation's commitment to sustainable development and improved quality of life. They will be presented in Madrid.

The BBVA Foundation's international jury grants the Award for Scientific Research in Ecology and Conservation Biology to scientists in any country who have significantly advanced the boundaries of knowledge in this field. Raven and Mooney were recognized for "their outstanding contributions to understanding the evolutionary and co-evolutionary processes that shape the adaptations of plants, the communities they form, and the diversity and biogeography of those communities, and how plants contribute to ecosystem function. Both lead the world in their understanding of, and raising concerns about, the loss of plant diversity through habitat destruction and invasive species, and in seeking ways to prevent biodiversity loss."

The contributions of these two eminent scientists have been vital to the shift in perspective that has taken place in conservation biology research, away from a species-centered approach to one based on ecosystems and the services they provide to humanity.

The jury also singled out their joint contribution to improving knowledge and awareness regarding loss of biodiversity due to habitat destruction and the action of invasive species, along with their invaluable work in the search for strategies to halt this loss.

Raven is an eminent plant scientist and evolutionary biologist. The Missouri Botanical Garden is one of the world's leading centers for botanical research and training. Raven is the author of key contributions to the biological sciences field; among them the co-evolution concept which he formulated on the basis of his studies into butterflies and the plants they feed on. He has authored over 450 articles in scientific journals and is editor or co-editor of 18 books, some of which have become basic textbooks in plant biology and environmental science. He has been cited in scientific papers on more than 5,000 occasions.

Positions Available

Director, Boyce Thompson Southwestern Arboretum

The Boyce Thompson Arboretum (near Superior, AZ) is looking for a new director. The person needs to have at least a Master's degree, have an appreciation of plants (especially desert plants), but especially have skills in public communication/education and some management experience (current \$1.6 million budget). Experience in fund raising is also very useful.

You can find the position description at www.uacareertrack.com; search by the job number — 40572

Position Title Director, Boyce Thompson Southwestern Arboretum
Job Number 40572
Department 0104-Arboretum Affairs

The position can carry a faculty appointment in the U of AZ, and will be appointed via the Agriculture Experiment Station of U.of A.

Teaching Postdoctoral Position University of Oklahoma

The Department of Botany and Microbiology at the University of Oklahoma announces a teaching postdoctoral position beginning August 2008. A Ph.D. in biology is required (exceptional ABD candidates will be considered). This position is for one year with the option for renewal of an additional year based on job performance.

Responsibilities include teaching an Introductory Botany course (taught using the inquiry method of instruction), another botany course depending on background (such as plant ecology or economic botany), and supervising teaching assistants for introductory level courses. The successful candidate should be highly computer literate and able to help maintain laboratory computers, probe wear, and class web-based material.

The successful candidate will have the opportunity to learn and hone inquiry skills and should be interested in the scholarship of teaching and learning biology. He/she will have the opportunity to work on several federally funded projects involving pre-college and college science classrooms. The 9-month salary is approximately \$25,000 (plus benefits), with an option of teaching in summer school and intersession courses for additional funding (up to \$9,000 more).

Interested candidates should send a cover letter, curriculum vitae (with teaching philosophy), a brief description of skills, a list of possible courses that could be taught, and two letters of reference to Dr. Gordon Uno, Department of Botany and Microbiology, George Lynn Cross Hall, 770 Van Vleet Oval, University of Oklahoma, Norman, OK 73019-0245. Direct inquiries to: guno@ou.edu.

Review for this position begins in May and will continue until the position is filled. Information on the University of Oklahoma and the Department of Botany and Microbiology is available at <http://www.ou.edu/> and <http://www.ou.edu/cas/botany->

[micro/](http://www.ou.edu/cas/botany-micro/), respectively. A profile of Norman, OK is on the web at <http://www.city-data.com/city/Norman-Oklahoma.html>.

(The University of Oklahoma is an equal opportunity, affirmative-action employer.)

Post Doctoral Research Fellowship in Ecological Genomics

A **post doctoral research fellowship** opportunity is available through the Ecological Genomics Institute at Kansas State University (K-State). Our interdisciplinary Institute seeks to understand responses of organisms to their natural environment by combining functional genomic and ecological/evolutionary approaches. The postdoctoral fellow will have access to excellent university resources including the Konza Prairie Biological Station, a core Long-Term Ecological Research (LTER) site (www.climate.com/konza.ksu.edu/), the K-State Gene Expression Facility (www.k-state.edu/gene-exp/), and infrastructure of the Division of Biology and Departments of Entomology, Agronomy, and Plant Pathology. For additional information about the Ecological Genomics Institute, please visit the Ecogen Website!

Candidates must have excellent oral and written communication skills, demonstrate evidence of past research achievement, and have completed requirements for a Ph.D. by the start date. This full-time position provides a competitive salary and benefits. The anticipated start date is summer 2008.

Full applications must include:

1. A cover letter detailing your qualifications and proposed start date.
2. A research proposal (three page maximum, not including references). *Proposals utilizing genetic and/or genomic approaches to examine ecologically relevant traits or interactions will receive highest priority.
3. A current curriculum vitae.
4. Two letters of recommendation from referees who are familiar with the applicant's research. Major advisor or member of supervisory committee preferred.

Completed applications can be e-mailed to Doris Merrill, dmerrill@ksu.edu.

Applications can also be sent by regular mail to:
Ecological Genomics Institute
Kansas State University
Division of Biology, Ackert Hall
Manhattan, KS 66506-4901

Symposia, Conferences, Meetings

New Phytologist Symposia for 2008

<http://www.newphytologist.org/symposia.htm>

19th New Phytologist Symposium
Physiological sculpture of plants: new visions and capabilities for
crop development
Timberline Lodge, Mount Hood, Oregon, USA
17-20 September 2008

20th New Phytologist Symposium
Arsenic: unravelling its metabolism and speciation in plants
Douglas Hotel, Aberdeen, Scotland
26-27 June 2008

21st New Phytologist Symposium
The ecology of ectomycorrhizal fungi
Centre for Functional Ecology and Evolution, CNRS, Montpellier, France
10-12 December 2008

For more information on any of the above symposia please email
<mailto:newphytsymp@lancaster.ac.uk>
or visit

<http://dmmsclick.wiley.com/click.asp?p=4818415&m=10067&u=134928>

Janet Meakin Poor Research Symposium Explores Climate Change

Chicago Botanic Garden, Wednesday, May 7

The Joseph Regenstein Jr. School of the Chicago Botanic Garden and the Center for Humans and Nature present the Janet Meakin Poor Research Symposium. This symposium addresses the implications of global warming beyond the temperature of the air. Nationally recognized experts discuss changes in the foundation of the ocean's food web, the persistence of plants and animals on land, and the spread of human disease. These alterations raise profound moral and ethical questions; the human role within nature and our responsibilities to nature are under consideration and study as seldom before.

Speakers include:

- * Robert Corell, global change director of The Heinz Center
- * Brendan Mackey, professor of environmental science at The Australian National University
- * Henry Henderson, director of the Natural Resources Defense Council
- * Martin Fowler of Elon University

Hours are from 8:45 a.m. to 4 p.m. on Wednesday, May 7. Early registration is \$79. After April 11, cost is \$119. Chicago Botanic Garden members pay \$79. Registration deadline is May 1. Registration includes, morning coffee, lunch, parking and all symposium handouts. To register for the symposium or to request a brochure call (847) 835-8261, or visit the Garden's Web site at www.chicagobotanic.org/symposia.

The Center for Humans and Nature is sponsoring a limited number of scholarships available to students.

Free Pre-Symposium Lecture

A free climate change lecture will be offered on May 6 before the symposium. Beth Viola will present "An Inconvenient Truth" from 7 p.m. to 9 p.m. on Tuesday, May 6 at the Notebaert Nature Museum. Viola is senior policy advisor with Holland & Knight in Washington, D.C. and former environmental advisor to Al Gore. For information and to register, call (773) 755-5191 ext. 1.

IV Latin American and Caribbean Congress of Cacti and other Succulents and XXX Congress of the International Organization for the Study of Succulents.

The Latin American and Caribbean Society of Cacti and other Succulents and the International Organization for the Study of Succulents will carry out a joint meeting together with the 59° Brazilian Botany Congress in Natal, Rio Grande do Norte, Brazil, from August 4 - 8, 2008. This will be a unique opportunity to bring together experts on succulents from all over the world to present recent findings in the study of these plants, and more important, to encourage botanical investigations on Cactaceae and other families containing succulent species in Latin America and the Caribbean region. Featured keynote speakers include David Hunt, Roberto Kiesling, Teresa Terrazas-Salgado, Beat Ernst Leuenberger, Héctor Hernández Macías, Detlev Metzger, Alejandro Casa, Nigel Taylor and Daniela Zappi, among 25 invited talks. For more information, including registration and the process for submitting contributing papers or posters, please access <http://www.59cnbot.com.br/>.



Award Opportunities

Grants For Ornamental Horticulture

The Stanley Smith Horticultural Trust invites applications for grants up to \$20,000 for support of education and research in ornamental horticulture. Not-for-profit botanical gardens, arboreta, and other tax-exempt organizations are eligible. The deadline for applications is August 15, 2008.

For current guidelines, contact Thomas F. Daniel, Grants Director, SSHT at tdaniel@calacademy.org.

Other News

Lenhardt Library Exhibit Tells Story of Priceless Rare Book First Edition "Temple of Flora" On Display

The exhibit "Temple of Flora" opens in the Lenhardt Library on Friday, May 23 and continues through Sunday, August 17. A recent acquisition, Temple of Flora, along with other works by Robert John Thornton, will be on display. A free library talk, "Dr. Thornton's Folly," will be given on Saturday, June 21 at 2 p.m. Partial funding for the exhibit was provided by the Burnstein family.

Temple of Flora, or, Garden of the Botanist, Poet, Painter and Philosopher: Being, Picturesque Botanical Plates of the New Illustration of the Sexual System of Linnaeus includes thirty-one botanical and allegorical illustrations and is considered "the single most famous of all florilegia." Published in London in parts between 1799 and 1807 and later bound into a single volume, it represents both the fulfillment of a dream and the cause of the financial ruin for England's Dr. Robert John Thornton (1768-1837). It was the third and final section in Thornton's New illustration of the sexual system of Carolus von Linnaeus, which honored Carl Linnaeus, the "father of botany," who established the system of nomenclature for all living things. Its brightly-colored plates are highly valued by print dealers, making an intact copy exceedingly rare.

Thornton (1768-1837) was a London physician with a passion for botany and Linnaeus. This work made Thornton both famous and nearly destitute. He hired the major painters of the day to create the initial oils and watercolors (though he painted the Roses plate himself). From these, London's best-known engravers hand-colored mezzotints and aquatints for the final plates. Less than successful in its time, Temple of Flora is now prized for its beautifully created, highly romantic illustrations.

Other books by Thornton in the exhibit include A Grammar of Botany; Containing an Explanation of the System of Linnaeus, and the Terms of Botany, with Botanical Exercises for the Use of Schools and Students; A New Family Herbal: or Popular Account of the Natures and Properties of the Various Plants Used in Medicine, Diet and the Arts; Elements of Botany; and The British Flora, or, Genera and Species of British Plants: Arranged After the Reformed Sexual System; and Illustrated by Numerous Tables, and Dissections.

The Lenhardt Library is the primary research tool for students of the Joseph Regenstein, Jr. School of the Chicago Botanic Garden. Visitors are encouraged to research their latest gardening project, thumb through inspiring garden journals and magazines, or see a sampling of the Garden's unique rare book collection in display cases.

For more information and to search the library collections, visit www.chicagobotanic.org/library.

Three High Horticultural Honors for the Missouri Botanical Garden

The Missouri Botanical Garden has added one statewide and two national recognitions to its growing list of awards for horticultural excellence. Three trees have been declared State Champions by the Missouri Department of Conservation (MDC). The oak collection has been certified as a North American Plant Collections Consortium (NAPCC) Collection by the American Public Gardens Association (APGA). The extensive daffodil collection has been named the first American Daffodil Society (ADS) Display Garden.

"These recognitions demonstrate the wonderful treasure that the Missouri Botanical Garden and its plants are to the metro St. Louis region," said Jim Cocos, vice president of horticulture. "Our valued State Champion trees reflect the fact that our institution has been here for almost 150 years. The national recognition of our oak and daffodil collections reflects the strength and breadth of our plant collections, which are prized for their diversity and quality."

The Champion Tree program recognizes the largest tree of each species living in Missouri. Size is calculated using a formula developed by American Forests and the MDC that takes into account a tree's height, crown spread and trunk circumference. The Garden now holds the record for the biggest white basswood (*Tilia heterophylla*), western soapberry (*Sapindus drummondii*), and possumhaw (*Ilex decidua*) in the state. All are native Missouri species.

The deciduous white basswood is often used for landscaping and known for its sweet, bee-attracting flowers. Towering above the Museum Building, the Garden's tree is 103 feet tall with an 81-foot spread.

The 52-foot tall western soapberry, near the Lehmann Rose Garden, has glossy green leaves which turn a showy yellow-gold in autumn. Its name comes from the chemicals in its fruits, which lather like soap in water but can also be toxic. The possumhaw is a much smaller deciduous shrub which displays colorful orange-red berries throughout winter. The average possumhaw is just seven to 15 feet tall with a five- to 12-foot spread. The champion possumhaw, located across from the Museum Building, is 18 feet tall with a 33-foot crown spread.

The Garden has also been honored by the APGA as a partner in the first multi-site *Quercus* (oak) collection to achieve official NAPCC Member Status.

"Your organization stands among a prestigious group of gardens and arboreta that have committed themselves to the conservation and care of specific plant collections curated at the highest professional level," said Pamela Allenstein, NAPCC coordinator.

The Garden joins 14 other institutions nationwide that will collaborate to strengthen their unified collection and preserve plant diversity. They will make tree data and germplasm (plant genetic material) available to each other for evaluation, selection, breeding and various other research purposes. The Garden's collection includes 385 individual oak trees representing 48 different taxa, or categories.

The American Daffodil Society has awarded the Missouri Botanical Garden's Narcissus (daffodil) collection as the first sanctioned ADS Display Garden. Certified collections must include not only a large number but also a wide variety of daffodils for public display and education; meet various criteria for plant signage and garden maintenance; and undergo bi-annual reviews by the ADS.

The Narcissus collection located in the Samuels and Heckman Bulb Gardens showcases nearly 650 unique varieties, representing 12 of the 13 horticultural divisions. The collection includes a number of historic varieties and a selection of daffodils hybridized in Missouri. Visitors can learn about the plants on display through interpretive signage and detailed labeling specialized for the collection. Blooming season runs from late February through April, with peak bloom usually in early April.

The 79-acre Missouri Botanical Garden is open from 9 a.m. to 5 p.m. daily at 4344 Shaw Blvd. in south St. Louis. Admission is \$8 adults (St. Louis City and County residents, \$4 adults, \$2 seniors). Children 12 and under are free. Special rates apply for some events and amenities. Visit www.mobot.org for details or call the recorded line at (314) 577-9400.

Darwin's Garden: An Evolutionary Adventure

April 25–June 15, 2008

Exhibition Highlights Darwin's Little-Known Fascination with Plants

The untold story of Charles Darwin's lifelong fascination and work with plants, including how flowers have evolved their extreme beauty and how plants are sensitive creatures responding to the least beam of sunlight and the pull of gravity, will be presented in an exhibition entitled *Darwin's Garden: An Evolutionary Adventure* at The New York Botanical Garden this spring.

Darwin's Garden will include exhibitions of living plants and historical documents in three Botanical Garden venues: the Enid A. Haupt Conservatory, LuEsther T. Mertz Library gallery, and Everett Children's Adventure Garden, plus an "evolutionary tour" of living plants demonstrating key points on the evolutionary tree of life. It will paint a portrait of Darwin as a naturalist and plantsman and show how Darwin's botanical experiments and discoveries helped shape his contributions to the understanding of life in general.

Darwin historian David Kohn, Ph.D., comments, "Only in his work as a botanist can we truly see all the dimensions of Darwin as a scientist—that is as a successful collector, as a powerful theorist, as an insightful observer, and as a rigorous and almost prophetic experimenter." Professor Kohn is curating the exhibition in the Mertz Library and advising on the other components of *Darwin's Garden*.

There will be several events and programs associated with *Darwin's Garden*, most notably a symposium with leading Darwin scholars in early May.

Darwin's Own Garden Re-created

The exhibition in the Haupt Conservatory will focus on Darwin's work with living plants, evoking Darwin's own gardens, greenhouse, and experimental beds where he conducted botanical research. It will tell the story of how careful observation of the plants in his gardens and greenhouse inspired Darwin's groundbreaking thinking about natural selection and evolution. The exhibition will re-create Darwin's gardens at Down House, his home in England, and the surrounding orchards and meadows where the naturalist made many further scientific observations. Primroses, insectivorous plants, orchids, and climbing plants, subjects of Darwin's research and writings, will be featured in the exhibition. Other plants will illustrate the role plants played in the evolution of Darwin's ideas and will bring to life the



kitchen garden at Down House as well as the famous “sandwalk” where Darwin made careful observation of nature and plants, the basis for much of his break-through thinking.

Displays of plants will evoke Darwin’s experimental studies and his investigations into pollination and the power of movement in plants.

Darwin’s Garden in the Haupt Conservatory will run April 25–June 15, 2008.

Darwin’s Botany in His Own Words

The exhibition in the Mertz Library’s William D. Rondina and Giovanni Foroni LoFaro Gallery will include original historical documents exploring Darwin’s deep personal relationship with plants, beginning in childhood. It will interweave information about Darwin as a person with the story of his rich botanical ideas, featuring Darwin’s own writings and collections. Illustrated books, manuscripts, and other historical documents will offer insight into his thinking and demonstrate the importance of botany throughout his life. Most of the materials come from Darwin’s own manuscripts in Cambridge University Library and from the Mertz Library’s extensive collection of 19th-century botanical works. Additional materials will be on loan from the University Herbarium at Cambridge, the Royal Horticultural Society’s Lindley Library in London, and the Archives at the Harvard Botany Libraries.

The exhibition will start with Darwin’s botanical heritage, his family history, and upbringing and proceed through his exposure to 18th- and early 19th-century botany in his undergraduate education at Edinburgh and Cambridge. It will also illustrate the significant role of plants on his historic, five-year journey around the world on the HMS *Beagle*. He spent much of his time collecting plants along with fossil bones and bird skins. **Darwin’s collections of “all plants in flower”** from the Galápagos Islands, for example, became the basis for the first flora of that archipelago and **provided his strongest evidence for evolution**. His field notes on the vegetation of Brazil and Tierra del Fuego reflect his developing thinking on natural processes.

The exhibition will also chronicle Darwin’s professional friendships and intellectual exchange with leading botanists of the era, including Joseph Dalton Hooker, Director of the Royal Botanic Gardens, Kew, and Asa Gray at Harvard University, and show how these contributed to the creation of *The Origin of Species*. It will also highlight his elegant and profound investigations into plant sexuality (the role of flowers, including pollination and co-evolution of plants and their pollinators) and

sensitivity (how plants respond to touch, light, gravity, and chemical substances).

Darwin’s Garden in the Mertz Library will be open April 25–July 20, 2008.

Children’s Adventures with Darwin

In the Everett Children’s Adventure Garden, an interactive exhibition including plants important to the development of the concept of evolution will invite hands-on exploration. Carnivorous plants will also be on display. Darwin the man will be brought to life through a re-creation of his research laboratory, an assortment of his working tools, a child-friendly timeline of the highlights of Darwin’s life, and a replica of the *Beagle*, together with a map of the ship’s five-year voyage to South America and around the world.

The exhibition and programs in the Children’s Adventure Garden will be open April 25–June 29, 2008.

Scientific Symposium

The New York Botanical Garden, in collaboration with the American Museum of Natural History, will also host a symposium on two evenings during the exhibition. Entitled *Darwin: 21st-Century Perspectives*, the symposium will feature presentations by scientists, historians, philosophers, and environmentalists—the current thinking by some of the world’s leading Darwin experts. Because Darwin’s theories continue to be a significant force in the world today, the symposium will offer an extraordinary opportunity to hear top scholars and commentators discuss Darwin’s far-reaching impact.

The two-part symposium, moderated by prominent naturalist and author Edward O. Wilson, Ph.D., will be open to the public. It begins the evening of Tuesday, May 6, at the Botanical Garden; the second session, the evening of Thursday, May 8, will be at the American Museum of Natural History.

Symposium Admission: \$10 each/\$16 for both sessions

Free to Members of AMNH and NYBG; registration required

Please call 800.322.6924 for information and to purchase tickets

Evolutionary Tour, Workshops, and More

From April 25 to June 15, an Evolutionary Tour will take visitors on a scavenger hunt through the tree of life among living plants in the Garden’s collections.

In the Haupt Conservatory and surrounding outdoor plantings, this approximately 40-minute walking tour will highlight significant plants in the evolutionary tree of life. It will be accompanied by signage and commentary accessible via visitors' cell phones.

A separate audiotour will also be available to guide visitors through their visit of *Darwin's Garden* in the Haupt Conservatory and Mertz Library. Weekend programs will feature drop-in lectures, workshops, and guided tours. In addition, performances will feature music and poetry from Darwin's era, much of it heavily influenced by nature.

About Darwin and Plants

Botany played a pivotal role in each phase of the life of Charles Robert Darwin (February 12, 1809–April 19, 1882). As an undergraduate he collected specimens for his botany professor's herbarium while geologizing in Wales. Voyaging aboard the HMS *Beagle* he wrote in his journal that his mind was "a chaos of delight" as he reveled in the luxuriance of tropical forests. Preparing to write *The Origin of Species*, he treated his primroses with guano to produce mutants. He tested by botanical experiments many of the critical arguments crucial to the development of this seminal work. For decades afterward, he turned his home and the surrounding countryside into a botanical field station and took great pleasure in his experimental gardening.

In the spring of 1860, a year after *The Origin of Species* was published, Darwin began plant experiments at Down House that resulted in six books that forever recast the field of botany and provided solid evidence for Darwin's theories of evolutionary adaptation. The books are *Fertilisation of Orchids* (1862), *Climbing Plants* (1865), *Insectivorous Plants* (1875), *Forms of Flowers* (1877), *The Effects of Cross and Self Fertilisation in the Vegetable Kingdom* (1876), and *The Power of Movement in Plants* (1880).

Darwin's work with plants provided credible and enduring evidence in support of his theory of evolution through natural selection. His studies on the fertilization of orchids, insectivorous plants, climbing plants, and the movements of plants were each a precise example of how evolution could solve the traditional mysteries of natural history. He laid the foundation of modern botany as an evolutionary discipline, which continues even today.

Darwin's studies of living plants also led to a succession of brilliant revelations. Through careful observation of insect pollination, for example, he concluded that the two different but stable forms of the wild cowslip, *Primula veris*, discourage self-

fertilization of the plant and guarantee cross-fertilization. He revealed that flowering plants attained their form and cross-fertilizing function to sustain genetic variability. Darwin also became an expert on virtually every British species of orchid. He discovered and demonstrated that the key to orchid pollination was the touch of an insect's proboscis, which releases spring-loaded pollen. From this breakthrough Darwin structured a convincing argument for adaptation by natural selection.

Through scientific explorations of botanical sex and sensitivity, Darwin projected a dynamic conception of nature that would substantially enrich both scientific and humanistic pursuits. And he contended that plants—no less than animals—are sensitive creatures in possession of behaviors that permit them to respond to their environment, including elements such as sunlight, touch, and gravity. Plants clamber over neighbors, track the movement of the sun, capture and digest insects, and respond to the "touch from a child's hair." Darwin delighted in discovering these adaptations.

Exhibition Leadership

The New York Botanical Garden is proud to have historian David Kohn, Ph.D., a renowned Darwin expert and Professor Emeritus at Drew University, as curator of *Darwin's Garden: An Evolutionary Adventure*. John Parker, Ph.D., Professor of Plant Cytogenetics and Director of the Cambridge University Botanic Garden, is Advisor to The New York Botanical Garden on the project. In addition, an Advisory Committee of distinguished Darwin scholars will contribute a wide range of intellectual perspectives. Senior New York Botanical Garden staff, including Vice President for Horticulture and Living Collections Todd Forrest, Mertz Library Director Susan Fraser, Vice President for Education Jeff Downing, and Vice President for Laboratory Research Dennis Wm. Stevenson, Ph.D., round out the leadership of this comprehensive exhibition.

After the exhibition at The New York Botanical Garden, portions of *Darwin's Garden: An Evolutionary Adventure* will be displayed at the Huntington Botanical Garden in Pasadena, California.



New England Wild Flower Society's Garden in the Woods

STANDING ATTRACTION: New England Wild Flower Society's Garden in the Woods open April 15-October 31, 2008 featuring 1,500 native plant species and cultivars, including 200 rare and endangered species. Select from 550 native plant species at the sales nursery. July 12-October 31: garden-wide exhibit, David Rogers' BIG BUGS, included with admission, with 13 giant sculptures and Web-of-Life Extravaganza events: April 15-September 1: Open daily 9-7. September 2-October 31: Open daily 9-5. Free parking. Tours weekdays at 10 a.m. and weekends at 2 p.m. included with admission, no reservations required. Admission \$8 for adults; \$6 for seniors and students with ID; \$4 for children 3-18. Free for members and children under 3. Purchases/memberships support the plant conservation programs of New England Wild Flower Society, 180 Hemenway Road, Framingham, MA. 508-877-7630. www.newenglandWILD.org

Resources of the Southern Fields and Forests,
Medical, Economical, and Agricultural.
Being also a Medical Botany of the Confederate
States;
with Practical Information on the Useful
Properties of
the Trees, Plants, and Shrubs:
Electronic Edition.
Porcher, Francis Peyre, 1825-1895

<http://docsouth.unc.edu/imls/porcher/porcher.html>

Priming Scientists for Successful Media Interviews

New AIBS book provides tools and tips for effective science communication

Evolution, climate change, stem cell research - Scientists are frequently called upon to provide expert information on hot button issues that pervade the daily news headlines, yet most find themselves woefully unprepared for the bright lights of the television studio or leading questions from a

newspaper journalist. A new publication from the American Institute of Biological Sciences (AIBS), *Communicating Science: A Primer for Working with the Media*, by Holly Menninger and Robert Gropp, will prepare scientists for successful and effective media interviews.

Recognizing that many scientists are reluctant to engage in media outreach, the *Primer* outlines compelling reasons for scientists to interact with the media and describes key differences between journalism and science that may not be apparent to practicing scientists. Step-by-step, Menninger and Gropp walk scientists through the entire interview process-from appropriate questions to ask when a reporter calls to practical advice for looking and sounding one's best on-air or on-camera.

The information and advice in the *Primer* is presented in eight easy-to-read chapters that provide vital information for scientists new to media outreach, as well as a quick refresher for seasoned experts - an ideal text for a graduate course on science communication or a professional development course for students and faculty. The *Primer's* authors speak from their own experiences as PhD scientists in the biological sciences with years of experience in media outreach.

The concise, user-friendly volume has several unique features that set it apart from other media guides for scientists. The *Primer* includes first-person interviews with nearly a dozen scientists who have successfully navigated print, radio, and television interviews. The scientists - including the "Island Snake Lady," Kristin Stanford, recently featured on the Discovery Channel show, *Dirty Jobs* - share advice and experiences on a number of topics, including safely speaking on behalf of an organization, avoiding trouble when discussing socially or politically controversial topics, and reflections on first interviews.

The *Primer* also provides worksheets to assist readers with interview preparation: building a message framework with talking points and transition phrases, developing analogies, and using illustrative props or images. It includes pages for readers to organize contact information of journalists with whom they have worked directly and those who have reported on stories related to their own research to keep as potential contacts for future story pitches.

Communicating Science: A Primer for Working with the Media is available now at www.aibs.org/bookstore/

The table of contents and cover image are also available at www.aibs.org/bookstore/

“PARASITE LOST”: BOTANIST DISCOVERS UNUSUAL PLANT MISSING SINCE 1985

Intensive field research and herbarium study leads the Missouri Botanical Garden in St. Louis to describe as many as 100 plant species a year that are new to science. The discovery of an entirely new genus is significantly rarer. Dr. George Yatskievych, scientist and curator in the Garden’s Science and Conservation Division, has successfully recovered and is studying such an undescribed genus: an unusual parasitic flowering plant that has lost its chlorophyll and depends entirely on its host tree for nutrients and water. Only one specimen of this “parasite lost” existed prior to Yatskievych’s research, found over 20 years ago and not seen since.

In 1985, Dr. Wayt Thomas of the New York Botanical Garden had a chance encounter with a single specimen while collecting other plants in the Mexican state of Guerrero. The odd, orange-brown, fleshy-stemmed plant had a pinecone-shaped dense cluster of flowers. The late Dr. Larry Heckard of the University of California, a leading North American expert on parasitic plants, examined the specimen but was unable to identify even its plant family. Parasitic plants are extremely hard to study as pressed specimens, as they become brown and distorted during the drying process. Thus, the plant remained unidentified for more than 20 years, before eventually making its way through the scientific community to the Missouri Botanical Garden.

As a Garden botanist, Yatskievych has performed taxonomic research on families of parasitic plants for the Flora of Missouri Project and the Flora of North America. Among these, the unknown specimen appeared closest in floral features to others in the family Orobanchaceae. Orobanchaceae are all parasitic on the roots of host plants. Although some of the genera are green and appear “normal” until their root connections are revealed, others have completely lost their ability to photosynthesize and appear as fungus-like, non-green plants with succulent stems and small, scale-like leaves.

“The Orobanchaceae that I have worked with are almost otherworldly in appearance,” said Yatskievych. “I’ve always been interested in plants that don’t fit the preconceived notion of what plants should be. The specimen collected by Dr. Thomas was so unusual that I had to see for myself what it looked like alive.”

During June of 2006, Yatskievych traveled to the Sierra Madre del Sur of western Mexico, northwest

of Acapulco, to return to the general area of the original collection. He and local researchers spent several days conducting intensive field searches before successfully rediscovering the plant, becoming the first botanists to see the species in more than two decades. They fully documented the plant for future scientific study through photographs and collection samples. Yatskievych’s second visit to the area in 2007 added further information on the ecology of the new genus and the identity of its host species (*Hedyosmum mexicanum*, a species in the Chloranthaceae family of flowering plants). It also confirmed that the undescribed parasitic plant is rare and imperiled in nature.

“The region where the plant grows is changing rapidly, as the abundant forests gradually are being logged for timber and the slopes burned to become pastures and crop fields,” observed Yatskievych. “In another decade or two, we might never have succeeded in relocating this undescribed genus in the field.”

The “parasite lost” was not the only species found on the journey. The group also documented a number of other plant and animal species during the trip, including an unknown caterpillar that researchers in Mexico hope to study further.

Results of Yatskievych’s research on the undescribed genus of the Orobanchaceae family are currently being compiled for publication in a scientific journal later this year, at which time the plant will be officially identified by its new name.

“In its use I would beg the teacher to bear in mind that the book [*The Essentials of Botany*] is intended to be merely *the guide*, and that a simple conning and recitation of its pages will give but a poor return indeed. Every effort should be made to have the pupil see things for himself. To aid him in this, numerous ‘practical studies’ are introduced after the principal topics, and it is urged upon teacher and pupil that as much use be made of them as possible. Indeed, it would be an excellent plan to use the ‘studies’ alone as a guide in a course of practical work.”

Charles E. Bessey
Ames, Iowa, July 8, 1884

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Electron Microscopy, Methods and Protocols, Second Edition. Edited by John Kuo. Volume 369 in Methods in Molecular Biology. Humana Press, Totowa, NJ. 608 pp. ISBN 13:978-1-58829-573-6

Who needs this book? Searching Amazon.com for "electron microscopy methods" returns 2,100 hits. If you are a person who suddenly decides to do a spot of ultrastructure, you won't turn to this book. Instead you would turn to your friendly neighborhood core facility for electron microscopy to be trained, possibly tormented, in the fine art of whatever subgenera is needed. On the other hand, if you are the director of said core facility and a customer, I mean a colleague, comes to you saying "Help, I need to look at xylem by cryoplaning" then you could pull *Electron Microscopy Methods and Protocols* off the shelf and turn to the chapter on cryoplaning and get a good start on figuring out what it was all about. Like all of the chapters, you would read an overview of the method but also find step-by-step instructions, complete with lists of materials and reagents, where to buy them, drawings and pictures of apparatus, representative images, and even references for further information. You would be well on your way

to helping your client cryoplane or urging him or her to go away.

Cryo-planing is a versatile but unusual method and is included quite possibly in no other book on electron microscopy methods. This reason alone may be enough to spur the insatiable collector to buy the book. But as that chapter is ten pages out of the book's 608, what about the other chapters? The first 150 or so pages (seven chapters) cover fairly well-trodden ground, namely conventional specimen preparation (i.e., fixation and embedding, including with microwaves), ultramicrotomy, and staining (both positive and negative). These are competent articles, but have little new and few citations after the year 2000. The ultramicrotomy article (by Herbert Hagler) fully describes that author's iconoclastic method for glass-knife making and anyone who uses a lot of these, particularly for fine work, might be game to try it. The next 14 chapters (the bulk of the book) aim at more specialized applications. Several of them include cryotechniques, with thorough chapters on high-pressure freezing, cryoultramicrotomy, and immunostaining; other chapters deal with

quantitative immunostaining, tomography, crystallography, and even in situ hybridization (i.e., detecting nucleic acids based on hybridization). The final 150 pages (seven chapters) are devoted to scanning electron microscopy; PSB readers might be surprised to hear that four of them deal specifically with plants. Included here is a chapter by Brendan Griffin on variable pressure and environmental methods that is particularly up to date and well illustrated. Few electron microscopy labs will need to do all of these protocols and few labs will be without books covering some of them; but anyone lacking books on electron microscopy would find this volume a reasonable addition.

The publisher makes a few odd choices. This is emphatically a protocols book but because it is short and thick, you can't keep it open without a third hand or lead brick, hence working from it at the bench is all but impossible. Some of the articles lend themselves naturally to the protocol format (i.e., a numbered list of steps) but consider ultramicrotomy: this is a process, not an assay, and the articles on it feel shoehorned into the protocol boot. In some articles, there are single notes covering two pages, and many articles contain dozens of notes, grouped together before the references in each chapter. The book has micrographs of the results of protocols properly executed but of almost no failures; nevertheless, failures illuminate and it can be helpful to know what to avoid as well as what to seek. Finally, I am a great fan of "the book" but I wonder whether the goal of publishing *methods* would be better served by an Internet-based approach? Suppose each chapter were available for download at a cost of \$5.00 each? This number is roughly the price of the book divided by the number of chapters. Arguably, if the book weren't printed, the costs would be less and so perhaps each article could sell for a dollar or two? Our gut reaction is to demand anything on the internet be free but yet be willing to shell out \$150 for a book in which we will use a couple of protocols. With that in mind, why object to paying less than ten percent of the whole book's cost for the articles you want, downloaded from the web?

Electron microscopy is a mix of high-wattage engineering and low-tech inventiveness. It is fascinating to see the ingenuity biologists have lavished on their samples, all for the sake of seeing the unseen. This ingenuity permeates *Electron Microscopy Methods and Protocols*, a book whose perusal will reward anyone interested in putting some of this cleverness to work for them or who wishes to compare their own practices to the devious devices of the community of electron microscopists.

-Tobias Baskin, Biology Department, University of Massachusetts, Amherst, MA, 01003

Plant Cell Separation and Adhesion: Annual Plant Reviews, Volume 25. Roberts, Jeremy A. and Zinnia Gonzalez-Carranza (eds.). 2007. ISBN 1-4051-3892-0. (Cloth US\$199.99) 210 pp. Blackwell Publishing Ltd., 2121 State Avenue, Ames, Iowa 50014-8300.

While there is a considerable literature on the process of abscission and fruit detachment, particularly from a horticultural perspective, this is the first volume to examine the basic processes of both cell separation and cell adhesion from a molecular developmental perspective. The editors have enlisted two dozen authorities, from around the world, to collaborate on the nine chapters represented in this volume.

In the brief introductory chapter, the editors provide an abstract of what will be found in the succeeding chapters. In a single provocative sentence they refer to the potential role of the cuticle in regulating cell adhesion processes. Unfortunately there was no elaboration in subsequent chapters. It is quickly apparent that most of the focus is on cell separation. Not surprisingly, organ abscission, dehiscence and fruit ripening are three of the nine chapters covered in the book. These are certainly the first topics that come to mind when thinking about the role of cell separation in plants and they are the areas with the most extensive literature. The authors of these chapters summarize recent advances in our basic understanding of the physiological processes involved and their commercial applications. In the chapter on organ abscission, a general model is proposed which appears to be conserved across species, applicable to various organs and processes. The first stage, patterning/differentiation, involves formation of an anatomically distinctive abscission zone. The second stage, activation, involves signaling and the activation of biosynthetic pathways. Stage three involves actual separation and the final stage involves scar formation. Most of the chapter details a variety of genes, from different plant models, involved with the first two stages. The chapter on dehiscence concentrates on regulation of cell wall dissolution associated with stage three of the previous chapter using *Arabidopsis* as the primary model. The chapter on fruit ripening concentrates on fleshy fruits, primarily the regulation of ripening in tomato. It is a good summary of our current understanding of the physiology of a process critically important to the food processing industry.

Though not so well known, interesting examples of cell separation associated with normal root growth are documented in their own small chapter. Most of the work focuses on border cell separation in the root cap involving enzymatic solubilization of cell

walls. The second model, branch root emergence, involves many of the same enzymes produced by root cap cells but which now act on the cortical cells through which the branch root grows.

Only one chapter, on plant reproduction, focuses on cell adhesion processes and this was limited primarily to pollen/stigma interactions and pollen tube growth, particularly the latter. This is a complex pathway involving signaling molecules and production of adhesion molecules both by the carpellary tissue and the growing pollen tube and the authors do a good job of summarizing current understanding. I was disappointed, however, that no mention was made of other fusion processes involved with floral development such as postgenital fusion of carpels.

The chapter on vascular cell differentiation seemed out-of-place. Even the authors in their conclusion admit that the processes of vascular differentiation, particularly of tracheary elements, only "associate or implicate cell separation-related events."

I found the two chapters bookending the text to be most interesting. Chapter 2, "Cell wall structure, biosynthesis and assembly," provided a good review of the molecular construction of plant cell walls and included many references to current molecular studies. While providing a useful foundation for all of the following chapters, it was critical for interpreting the final chapter, "The role of polymer cross-linking in intercellular adhesion." The latter was written from an interesting perspective -- that of the role of cell adhesion in food quality and preparation. I was particularly intrigued by the details of the spatial patterning of cross links in the cell wall. I had always assumed that primary walls (except of collenchyma) and middle lamella were more-or-less homogeneous. In fact, cross linkages form a "rip-stop" pattern, particularly in areas of tricellular junctions that provide mechanical strength while permitting formation of new intercellular spaces.

This book fits well within the series of annual plant reviews written for researchers and graduate students in plant biology. While few individuals will want to purchase a personal copy, it belongs in the collection of every research library and the libraries of colleges with a faculty member researching problems involving plant cell-cell interactions.

-Marshall D. Sundberg, Department of Biological Sciences, Emporia State University.

The Ecology and Evolution of Ant-Plant Interactions. Rico-Gray, Victor and Paulo S. Oliveira. 2007. ISBN 9780226713472 (cloth US\$70.00); ISBN 9780226713489 (paper US\$28.00), xiii + 331 pp. University of Chicago Press, 1427 East 60th Street, Chicago, Illinois 60637, USA

Plants are the autotrophic basis of life on Earth, and ants -- in terms of abundance and biomass -- are, in E.O. Wilson's words, "the little things that run the world." Thus it should come as no surprise that the rich variety of interactions between ants and plants continues to captivate botanists and entomologists, ecologists and evolutionary biologists, and keen observers of natural history. For nearly fifty years, ecological and evolutionary approaches to the study and analysis of ant-plant interactions have been framed by Janzen's classic study of the mutualism between ants and acacias (Janzen 1966) and the subsequent elaboration of a general theory of coevolution by John Thompson (1982, 1994). In their new book, *The Ecology and Evolution of Ant-Plant Interactions*, Victor Rico-Gray and Paulo Oliveira provide a comprehensive and readable overview of the hundreds of studies of ant-plant interactions conducted since Janzen (1966) and illustrate clearly how well Thompson's framework for understanding coevolution has supported the field.

After a quick introduction to the evolutionary history of ants and plants, and a brief review of the fossil record of ants, Rico-Gray and Oliveira focus their monograph on the two best-studied types of interactions between ants and plants: antagonistic interactions and mutualistic interactions. In particular, they work within the conceptual framework in which mutualism evolves from antagonistic interactions, and that places both within the context of relationships between consumers and their resources (Holland et al. 2005). This context serves Rico-Gray and Oliveira well, as they move seamlessly from a consideration of clear antagonistic interactions (leaf-cutting and seed harvesting by ants), through mutualisms as extensions of antagonism (ants as primary and secondary seed dispersers), to pure mutualisms in which plants feed and house ants that in return feed the plants and defend them from herbivores. In between, are the conditional mutualisms, both direct and indirect.

The directly conditional mutualisms are characterized by the broad range of associations found among ants and their host plants, including acacias, *Cecropia*, *Piper*, and *Macaranga*, to name only a few. Some of these ant-plant interactions are very elaborate, and include species-specific domatia and food bodies provided by the plant, which in

return is strongly defended by the ants. Others are more general, and revolve around extrafloral nectaries or limited provisioning of food resources. Given the spatial scattering of many ant-plants, the heterogeneous spatial arrangement of ant nests and their foraging strategies, and the opportunistic and facultative nature of most associations between ants and plants, Rico-Gray and Oliveira conclude that species-specific coevolution between particular ants and particular plant species is likely to be the exception rather than the rule. This conclusion is supported by the preponderance of evidence presented in their book.

The indirect mutualisms are perhaps more interesting to community ecologists such as myself who are interested in complex webs of interacting species. These interactions involve plants, phloem-feeding herbivores (primarily hemipterans) or other honeydew-secreting insects (butterfly larvae and some gallmaking wasps), and the ants that tend these herbivores. Here the conditional nature of the net interaction between ants and plants is most evident. Ants that tend hemipterans (for example) increase the latter's abundance and survival rate, and since hemipterans can reduce plant growth and survival, there is the potential for insect-tending ants to indirectly and negatively affect the host plant. But, if the ants also provide protection to the plants, and if that benefit outweighs the negative impact of the herbivores, then the net result will be an indirect positive effect of ants on plants. A further twist is added by plants that bear extrafloral nectaries. In some cases, such nectaries may benefit herbivores by attracting ants to tend them whereas in others extrafloral nectaries are thought to have evolved as a defense against ant-herbivore mutualisms.

The existence of ant-plant mutualisms has suggested some strategies for biological control. Rico-Gray and Oliveira highlight work done by Perfecto (1991) on using ants to control pests in small-scale maize-based agroecosystems in Nicaragua, and by Vandermeer *et al.* (2002) in coffee plantations in Mexico. While these two examples are compelling, neither biological control nor chemical control of pests should be used indiscriminately.

Much remains to be learned about interactions between ants and plants, and in their concluding overview of the field, Rico-Gray and Oliveira highlight a broad range of open questions and research topics. These include additional focus on spatial and temporal variability (moving beyond studies of single species in single populations for short times); better assessment of alternative defense strategies by plants (are the ants really necessary?); stronger

quantification of indirect costs and benefits in ant – ant-tended-herbivore -- plant systems; more attention to direct feeding of plants by ants; detailed consideration of the other arthropods in the system and elaboration of networks of interactions; and better use of phylogenetic information. This book should successfully generate many undergraduate projects, masters' theses, and doctoral dissertation topics, and should be on the shelf of any botanist, entomologist, ecology, or evolutionary biologist interested in interactions between the organisms that have built the world and those that run it.

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- Aaron M. Ellison, Harvard University, Harvard Forest, Petersham, Massachusetts 01366 USA (aellison@fas.harvard.edu)



Plants of Longevity- The Medicinal Flora of Vilcabamba. Plantas de Longevidad- La flora Curcandera de Vilcabamba. Bussmann, Rainer W. and Douglas Sharon. 2007. ISBN 0-9789962-2-4 (Paper US\$ 14.95) 253 pp. Graficart, srl, Jiron San Martin 375, Trujillo, Peru.

Plants of the Four Winds – The Magic and Medicinal Flora of Peru. Plantas de los Cuatro Vientos-Flora Mágica y Medicinal del Perú. Bussmann, Rainer W. and Douglas Sharon. 2007. ISBN 0-9789962-3-2 (Paper US\$29.95) 596 pp. Graficart, srl, Jiron San Martin 375, Trujillo, Peru.

These two books present the culmination of a number of years' worth of ethnobotanical research among herb vendors and traditional healers (curanderos) in Northwest Peru (Departments of Piura, Lambayeque, La Libertad, Cajamarca, and San Martin) and among curanderos and midwives of Southern Ecuador (Loja Province). Presented in a straightforward, bilingual (Spanish and English) format, both volumes are generously illustrated with black-and-white photographs and/or herbarium scans of nearly all of the plants they discuss, along with details of the preparation and uses of the medicinal flora of their respective regions. Introductory overviews of the historical and current status of traditional medicine in these regions as well as a list of the most commonly encountered medical conditions, including illnesses of supernatural origin, round out these volumes.

Plants of the Four Winds presents data on almost 500 plant species used in Northern Peru, and Plants of Longevity contains data for almost 200 plant species from Loja Province, Ecuador. Native species make up the majority of the plants presented in both volumes, although naturalized plants represent around 20% of the total. The regions covered in these two volumes are geographically contiguous, but the species that are presented differ substantially; even where there is species overlap, medicinal use can be significantly different. All of the plants under discussion have been vouchered in herbaria in their respective countries. Nomenclature of the Ecuadorean material follows that of the Catalog of the Vascular Plants of Ecuador, while nomenclature of the Peruvian material follows that of the Catalog of the Flowering Plants and Gymnosperms of Peru.

Ordered alphabetically by Family, Genus and species, vernacular names are presented for each species, along with plant part used, route of administration, preparation, medicinal use(s) and voucher numbers for each collection. These volumes take a decidedly plant-based approach to organization in the classical "cookbook" style of

documentary ethnobotany. The inclusion of a disclaimer of liability by the authors for injury caused by use of the plants found in these books underscores this point.

Although the introductory sections of both volumes touch briefly on historical and social aspects of local and regional medicinal plant use, the broader significance of this rich and poorly-studied component of the Andean flora is only obliquely referred to. The value of this research, and these books, in this context is extremely high.

Unfortunately, referring to these works will be made somewhat difficult by the cryptic style of the publication data.

-James G. Graham, Department of Pharmacognosy, University of Illinois at Chicago and Department of Botany, The Field Museum, Chicago Illinois.

Knowledge, Truth and Service: the New York Botanical Garden, 1891 to 1980. Harry M. Dunkak. 2007. ISBN –13: 0-7618-3849-1. 122. University Press of America, Lanham Maryland.

This small volume is not only a history of the establishment and growth of the New York Botanical Garden; it also provides an interesting perspective on the parallel history of the New York City area and the nation throughout the 90 years that are described, thoroughly footnoted and indexed by historian Harry Dunkak. A corporation to manage a botanical garden was established by New York State law in 1891 and was mandated to share management duties with the New York City park system and Columbia University. The 250-acre site of spectacular woodland chosen for the new botanical garden was formerly the estate of the Lorillard tobacco heirs and had been incorporated into the much larger Bronx River parklands just north of Manhattan.

The impetus for the establishment of a botanical garden at this time came from renowned botanists Nathaniel Lord Britton and Elizabeth Gertrude Knight Britton who had visited botanical gardens throughout Europe. They came home determined that a botanical garden on a par with the Royal Botanical Gardens at Kew was not only possible but necessary if New York and the nation were to become scientifically respected throughout the world. The emphasis from the start was on science, research and education as well as providing park land for

the increasing numbers of people living in the area in more and more crowded conditions.

As with any botanical garden, funding challenges provide a common thread for the story from the beginning when funds from private sources had to be raised before the city would provide the money to build the buildings and conservatory. Fortunately, the late nineteenth century was a time of great philanthropy and the garden buildings and grounds were well established before World War I, the Depression, World War II and inflation began to take their toll on staffing and maintenance.

It is incredible to read how many herbarium specimens poured in during the early years, both through exchange and through expeditions by garden staff, with many rooms filled for years with unmounted specimens until time could be found for processing. Even more amazing is the huge and ornate 1-acre conservatory that is the symbol of the New York Botanical Garden. From the beginning it had been engineered with twelve climate-controlled biomes for display of plants from all over the world. The original building stood for about seventy years before deterioration finally forced its demolition and meticulous re-building through the incredible generosity of Enid Haupt in the 1970s.

In addition to a chronological presentation of the history of the administration, building and grounds, Dunkak focuses on three major themes: the library (and herbarium), research, and education. Intriguing research such as the invention of puffed rice, faster growing rubber trees, and monitoring of pollution along the Bronx River, emphasize how much a part of the times the garden was, not only in its waxing and waning funding sources, but also the subjects of interest to the large scientific staff over the years.

This is a book about the history of the founding and administration of the New York Botanical Garden, not a botany book. The only plant names in the index are *Tsuga canadensis* and *Ginkgo biloba*. As such it should be of interest to anyone who has ever worked at or visited a botanical garden and wondered how it came to be. For me this book was especially interesting as I grew up in the vicinity of the Bronx River. I also eventually took botany classes out in the Bronx after an office work day in Manhattan and there developed the confidence to pursue my botanical studies professionally. To me it was and still is a miracle that the staff, facilities and grounds of such a beautiful and world-renowned institution are so available to the non-botanical public. As Dunkak's book demonstrates, it was planned to be that way from the very beginning.

-Joanne Sharpe, Coastal Maine Botanical Gardens,
Boothbay Maine

Cacti of Texas, a field guide: with emphasis on the Trans-Pecos species by A. Michael Powell, James F. Weedon, and Shirley A. Powell. 400 pages, 314 color photos, 124 maps, ISBN 978-0-89672-611-6 (paper \$24.95).

Powell & Weedon converted their extraordinary 2004 treatise *Cacti of the Trans-Pecos and Adjacent Areas* into an equally superb abridged version, a.k.a. field guide. See my review of their 2004 treatise in *PSB* 51(3): 110-112, which largely also applies to their 2008 field guide. In fact, due to some new photos, one additional co-author (Shirley Powell), and an especially seamless integration of figures with text, the field guide is better than expected. For each cactus taxon from Trans-Pecos Texas, the area between the Rio Grande and Rio Pecos, the authors not only include a relatively jargon-free description of the plant (so good that the glossary seems superfluous), habitat, and etymology, but also decent-sized photos of flowers and fruits, as well as a distribution map. All other cactus taxa in Texas are briefly described, including taxa native to the remainder of the state and introduced species. For any botanist traveling through west Texas, especially Big Bend, this is an invaluable field guide written by the true experts.

This volume is in a slightly larger format (6 x 9 inches, 15.25 x 22.75 cm) than many people would like to carry into the field. This could have been improved by moving the figure captions out of the margins, decreasing the spacing between lines of text, and shrinking the distribution maps.

Use of ploidy levels in the keys provides a difficult character for use in the field, unless you carry a microscope with you. On the other hand, while ploidy levels in the key of *Echinocereus* seem unnecessary, ploidy may provide the best or only way of keying out the confounding prickly pears, i.e. genus *Opuntia* s.s.

Cacti of Texas, a field guide is fairly error-free. I only spotted a few production errors, such as incorrect page reference to *Coryphantha minima* in the keys. Many combinations in this field guide supposedly will be published in a forthcoming chapter by Zimmerman *et al.* Unfortunately, one of Zimmerman's co-authors passed away over a decade ago, so these combinations may not be forthcoming any time soon. However, all in all, these are minor foibles in a beautiful field guide.

-Root Gorelich, Carleton University, Ottawa, Canada.

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! Note that books in green are already in review and no longer available. Books received are now posted on the web site as they become available and may be requested as soon as they are posted.
- Editor

Cacti of Texas: A Field Guide. Powell, A. Michael, James F. Weedlin, and Shirley A. Powell. 2008. ISBN 0-89672-611-8 (Paper US\$24.95) 400 pp. Texas Tech University Press, Box 41037, Lubbock, TX 79409-1037. reviewed in this issue

Carolus Clusius: Towards a Cultural History of a Renaissance Naturalist. Egmond, Florike, Paul Hoftijzer and Robert Visser (eds). 2008. ISBN 90-6984-506-7 (Cloth US\$75.00) 296 pp. The University of Chicago Press, 1427 East 60th Street, Chicago, IL 60637-2954. in review

The Curious World of Carnivorous Plants: A comprehensive Guide to Their Biology and Cultivation. Barthlott, Wilhelm, Stefan Porembski, Rüdiger Seine, and Inge Theisen. 2007. ISBN 978-0-88192-792-4 (Cloth US\$39.95) 224 pp. Timber Press, 133 S.W. Second Avenue, Suite 450, Portland, OR 97204-3527.

Duke's Handbook of Medicinal Plants of the Bible. Duke, James A. with Peggy-Ann K. Duke and Judith L. duCellier. 2008. ISBN 978-0-8493-8202-4 (Cloth US\$89.95) 528 pp. CRC Press/Taylor & Francis Group, LLC. 6000 Broken Sound Parkway, NW, Suite 300, Boca Raton, FL 33487.

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