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BOTANICAL SOCIETY OF AMERICA

I'm sure that all of you are familiar with the recent controversy concerning the intention of a few scientists to clone a human in the near future. The scientific community, as well as the general public, expressed immediate and vocal concern over the ethics of performing such a procedure. (Imagine my surprise when I learned that one of these scientists was an alumnus of my department - receiving his BS here in Kansas some 30 years ago!) Luckily such ethical dilemmas are restricted primarily to the biomedical sciences - - or are they? What about genetically modified crops? What about collaborating on a manuscript? What is scientific misconduct and what is our responsibility if we perceive it in our lab or in another?

In this issue Dr. Lee Kass, Associate Professor of Botany and Curator of the Elmira College Herbarium and Adjunct Associate Professor at the L.H. Bailey Hortorium, Cornell University, provides some perspective on how we might better prepare our undergraduates for the ethical situations they might encounter in graduate school and beyond. And yes, ethics in science also is a concern for botanists! If you're not familiar with our Botanical Society of America Guidelines for Professional Ethics, enacted in 1997, you can find them at http://botany.org/bsa/membership/ethics.htm.

-editor

ETHICS IN SCIENCE: PREPARING STUDENTS FOR THEIR CAREER.

INTRODUCTION

In 1932, at the 6th International Congress of Genetics held in Ithaca New York, R. A. Emerson, Chair of the Department of Plant Breeding at Cornell University, gave an opening address titled "The Present Status of Maize Genetics." In his introduction he declared "I cannot refrain from noting here a very real advantage experienced by students of maize genetics ... I am aware of no other group of investigators who have so freely shared with each other not only their materials but even their unpublished data. The present status of maize genetics, whatever of noteworthy significance it presents, is largely to be credited to this somewhat unique, unselfishly cooperative spirit of the considerable group of students of maize genetics. In this connection I want gratefully to acknowledge the help of many persons who have contributed directly or indirectly to this summary statement of the status of maize genetics."

Shortly before that conference Emerson notified maize geneticists of his plan to establish a Cooperation of Maize Geneticists. Soon after the Congress Emerson and his student Marcus Rhoades issued what is considered to be the first "Maize Genetics Cooperation News Letter" (October,1932), in which unpublished data were freely shared among the members. Future Nobel laureates George Beadle, Emerson's student, and Barbara McClintock, Beadle's collaborator, freely submitted their results to this communication, which continues to be published annually. This model laid the groundwork for a similar publication for the "Drosophila" geneticists in 1933, and more recently for the "Worm Breeders Gazette," the community newsletter of the roundworm biologists (Cohen 1995).

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The current discussions in the popular and academic press concerning ethics in science lead us as teachers to think about our role in educating students in ethical behavior, both as individuals and as research collaborators. Through the years we have encouraged students to pursue careers in science. After completing their undergraduate work some students who do go to graduate or professional schools write, phone or visit and tell us stories of their disappointment with some of the choices they made. Often this disappointment stems from their idealistic vision of what they expected their graduate experience to be like. The incidents they report often concern perceived misconduct in research, employment practices or personal interactions; areas recently examined by the Acadia Institute's (1994) Project on Professional Values and Ethical Issues in the Graduate Education of Scientists and Engineers. Some students are so disillusioned by their experiences that they leave graduate school, sometimes after they have completed their research and have begun writing their dissertations. Over the past few years reports have appeared alerting faculty and administrators to the perceptions held by both graduate students and faculty of misconduct in the academic community (Swazey, Anderson and Louis, 1993). Anderson and Louis (1994) reported that entering graduate students held views about ethics that did not differ substantially from those who had been in their program for several years. This result, they imply, indicates that "the importance of experiences with and exposure to science as undergraduates may be more important than has been previously thought, or at least more important than graduate school experiences." I believe it is critical, at the undergraduate level, to enlighten students regarding their idealistic expectations for graduate study and to give them the confidence to argue intelligently when faced with issues of perceived misconduct in science.

In this paper, first, I examine the perceptions that entering graduate students have regarding ethics in science. Second I discuss some of the realities our students face in graduate school. Finally, I suggest ways that we may better prepare undergraduate students for the challenge they may face if they do choose an ethical career in science.

UNDERGRADUATE PERCEPTIONS

In a paper published in *Research in Higher Education*, Anderson and Louis (1994), remind the reader of "Robert Merton's 1942 classical analysis of scientists' behavior, [identifying] the four norms of [academic] research that are fundamental to the scientific ethos." These norms are: Universalism, Communality, Disinterestedness and Organized skepticism (Table 1). These they tell us "are not so much ideals as shared working assumptions about the way research should be conducted" (Anderson and Louis 1994).

Table 1. Robert Merton's four norms of research fundamental to the scientific ethos (Anderson and Louis 1994).

1. **UNIVERSALISM**: the separation of scientific knowledge from the personal characteristics of scientists.
2. **COMMUNALITY**: the shared ownership of all scientific knowledge, and the full and open communication of all findings.
3. **DISINTERESTEDNESS**: the separation of research from personal motives, for the sake of truth and the advancement of knowledge.
4. **ORGANIZED SKEPTICISM**: the critical, public examination of scientific work.

With regard to these norms, the academy has "the responsibility for the conduct of its own members" and is therefore entrusted with communicating it to new generations (Anderson and Louis 1994). It appears that many of our undergraduate students come to expect these

norms with respect to their science education. Indeed some may embrace science because of the idealistic belief that their professors have "a firm devotion to the pursuit of knowledge and truth" (Anderson and Louis 1994).

Merton of course "recognized that scientists' behavior often deviated from the norms" and Mitroff in 1974, identified a set of "counter norms that are contrary to Merton's norms" (Anderson and Louis 1994). These counternorms are: Particularism, Solitariness, Self Interestedness, and Organized Dogmatism (Table 2). The set of alternative norms, Mitroff suggested are neither superior nor inferior to Merton's norms (Anderson and Louis 1994).

Table 2. Mitroff's counternorms that are contrary to Merton's norms (after Anderson and Louis 1994).

1. **PARTICULARISM**: assessment of scientific knowledge based on the research group presenting it.
2. **SOLITARINESS**: the protection of scientific findings to guard priority credit.
3. **SELF-INTERESTEDNESS**: competitive research for recognition of personal achievements.
4. **ORGANIZED DOGMATISM**: Scientists promote their own findings, theories, or innovations.

Anderson and Louis (1994) cite Rosenzweig's 1985 description of the norm of communality as a "cultural myth" that has a firm basis in reality, but it exaggerates reality in order to serve its real purpose, which is to tell people how they ought to behave, not how they do behave. Anderson and Louis (1994) also cite Zuckerman's 1988 argument that the social significance of norms is indexed in the moral indignation expressed by scientists when such norms are violated. They also point out that the norms stand as statements of widely shared conceptions about appropriate behavior for academic researchers. Our undergraduate students, I believe, share these conceptions.

REALITIES OF GRADUATE SCHOOL

In 1994, Braxton and Bayer (1994) reported that the [1992] survey of members of the AAAS [American Association for the Advancement of Science] found that three fourths of those responding indicated that media coverage had exaggerated the problem of scientific misconduct. However, "37 percent of those polled believe that instances of fraud and misconduct [had increased in the previous 10 years]. Moreover, a separate survey by NSF [National Science Foundation, conducted in 1990] reported that about 20 percent of the scientists said that they directly encountered fraud, and about 20 percent of graduate deans have dealt with verified cases of misconduct during the [previous] five years."

Certainly the reaction to the highly publicized reports regarding falsifying research, inventing data, and appropriating materials from papers under review, testify to the belief that many scientists do not support this type of behavior in their students or colleagues. Although we would like to believe that these are isolated incidents, the results of a graduate student survey by Anderson et al. (1994) leave "no doubt that many students are in contact with misconduct in their graduate programs." Anderson and her colleagues surveyed 2,000 graduate students in the disciplines of chemistry, microbiology, civil engineering, and sociology for their exposure to what they perceived as misconduct in the areas of research, employment, and personal interactions (Table 3). The 72% response rate suggests a high rate of student concern. This concern seems justified because the survey reported that "the average graduate student was exposed to misconduct by 2-5 graduate students or faculty members" (Anderson et al. 1994). At this point one might ask why the graduate student survey revealed such an unexpectedly high incidence of reported misconduct. Anderson et al. (1994) found that "students are unlikely to report these instances to institutional authorities. Over fifty percent (53%) of the respondents said that they could not report cases of suspected misconduct without expecting retaliation." A similar faculty survey found that only 35% of faculty believe that they could report a colleague without reprisals (Swazey, Louis, and Anderson 1994).

Table 3. Anderson et. al (1994) surveyed 2,000 graduate students for exposure to perceived misconduct as defined below. "...the average graduate student was exposed to misconduct by 2-5 graduate students or faculty members" (Anderson et al. 1994, see also their Appendix A).

1. **RESEARCH MISCONDUCT**: behaviors that violate the norms and standards specific to the academic enterprise.
2. **EMPLOYMENT MISCONDUCT**: conduct that would be deemed inappropriate or illegal in most organizations.
3. **PERSONAL MISCONDUCT**: inappropriate or illegal behaviors among individuals with reference to the broader social context.

Additionally, the results of a survey by Anderson and Louis (1994) regarding graduate

student's subscription to the norms of science indicate that there is "substantial ambivalence about the norms of academic research and considerable support for the alternative counternorms." The survey asked students to indicate the extent that they felt the norms and counternorms "should represent" the behavior of scientists (Anderson and Louis 1994). Overall they found "strong support among graduate students for the classical norms governing the behavior of scientists." They also found however, that "subscription to the norms is not universal and subscription to the counternorms is substantial" (Anderson and Louis 1994). They conclude that this is an indication that "many students do not see norms and counternorms as opposites, but as values that can be held simultaneously without contradiction" (Anderson and Louis 1994). They believe that "students may tend to be more supportive of one set of values or the other, but most are characterized by some ambivalence" (Anderson and Louis 1994). The researchers examined the effects of climate, structure, mentoring, and time spent in graduate school on student's subscription to the norms verses the counternorms of scientific behavior.

As they hypothesized, their results show that "aspects of structure, climate, and mentoring that put students in close contact with faculty will be positively associated with subscription to the norms and negatively associated with support for the counternorms. Smaller working group size, value congruence among the student group, lower levels of exploitation, opportunities to publish with faculty, and technical mentoring are all positively related to support for the norms. Conversely, large group size, formal supervision, and competition are associated with the counternorms" (Anderson and Louis 1994).

Contrary to their hypothesis, Anderson and Louis' (1994) study suggested that "the value orientations of U. S. students may be relatively fixed at the point of entry [into their graduate programs]." They found that "the number of years spent in [a] department is not correlated with support for the norms and is only modestly negatively correlated with support for the counternorms." In addition, they found that for U. S. students not only are there no effects associated with time in the program but "there is also evidence that neither departmental structure, nor departmental climate, nor experience with mentors influences in significant ways the degree to which students subscribe to the norms or counternorms" (Anderson and Louis 1994).

I believe that one important aspect of the Anderson and Louis study, which affects teachers of undergraduate students, is their implication that "the importance of experiences with and exposure to science as an undergraduate may be more important than has been previously thought". "This implication, [they conclude] is consistent with data suggesting that students who attend smaller liberal arts colleges, where they are more likely to have worked closely with their professors, are more likely to attend graduate school and obtain Ph.D.'s than students attending large universities." They presume that this "greater likelihood of attendance is the exposure and anticipatory socialization to a value system that is consistent with the dominant norms" (Anderson and Louis 1994).

PREPARATION FOR GRADUATE SCHOOL

While we may be proud that the science faculty in small liberal arts colleges are socializing students to expect the norm in professional scientific behavior, should we ask ourselves if educators are doing undergraduate students a disservice by not providing them with the preparation to deal with the realities of counternorms and possible misconduct, which they may face in graduate school? In the context of teaching our subjects we can use historical examples to demonstrate and initiate discussions of the norms and counternorms of scientific behavior. We can compare and contrast these historical examples with current behaviors in science. This may result in preparing students for the realities of their careers and perhaps give them the confidence to speak out against it.

The example of Darwin and Wallace's contributions to the theory of evolution is one that can be used to begin an examination of this subject. First year students often learn that Darwin began preparing a manuscript about his ideas on evolution shortly after returning from his voyage as naturalist on the "Beagle". However, because his theories were so revolutionary, he set to work collecting overwhelming quantities of evidence that would dispel the prevailing concepts. Indeed we often use this as an example to teach the scientific method. We may also ask our students to think about who deserves credit for the idea. Although Charles Lyell and Joseph Hooker prodded Darwin for years to publish his ideas, he refused. In 1858, Alfred Russell Wallace, who conceived the same theory independently of Darwin, prepared a 20 page manuscript on the subject, and mailed it to Darwin for approval and requested he send it to Lyell. Darwin of course immediately recognized that Wallace's arguments on the "struggle for existence" agreed with his exactly. Darwin sent the manuscript to Lyell with a note requesting the manuscript be returned so he could offer to send it out for publication. He sadly concluded that his "originality, whatever it may amount to, will be smashed." Lyell and J. D.

Hooker solved the problem of assigning credit by proposing a novel solution. They would read part of Darwin's 1844, 230 page manuscript and a copy of an essay he wrote to Asa Gray in combination with Wallace's paper at the July 1st 1858 meeting of the Linnean Society. The reading of Darwin's and Wallace's papers on evolutionary theory, (later published in volume 3 of the "Journal of the Linnean Society") received little attention. However, the publication in 1859 of "On the Origin of Species" was greeted as revolutionary and popularized the theories with the result that Darwin is usually credited with the idea of evolution by natural selection. Students may read for themselves, in the "Introduction" to the first edition of Darwin's "Abstract," how he credits Wallace's ideas. He explains that he has been induced to publish "as Mr. Wallace...has arrived at almost exactly the same general conclusions that [he had] on the origin of species." And he continues by explaining the circumstances of their joint publication.

This example might serve for a discussion of the consequences of the norm of communality and disinterestedness. Had Darwin ascribed to the "counternorms" of "solitariness" and "self-interest" he might have immediately published his own manuscript without attributing any credit to Wallace. What might have been the advantage or disadvantage of that decision? Did Wallace's acceptance of the "norms" detract from his success as a scientist?

This consideration might lead to a discussion of how scientists currently work, and what they expect from their colleagues and students with respect to cooperative research. Or one might use this example to discuss how the process of doing science has changed over the last few decades. In that vein one might examine the competitive nature of science by requiring that students read both "The Double Helix" (Watson 1968) and "Rosalind Franklin and DNA", by Ann Sayre (1975). Students can then be made aware of how, upon the publication of "The Double Helix", it became acceptable for scientists to promote self-interestedness and even to appropriate the ideas of others without their knowledge.

Ann Sayre conducted a private poll of graduate students at one of the New York State University Campuses upon which she based the following paragraph from her book:

A generation of graduate students in science read "The Double Helix" and learned a lesson: the old morality was dead, and they had just been told about its demise by a respected highly successful Nobel Laureate, an up-to-date hero who clearly knew more about how science was acceptably "done" than the old-fashioned types who prattled about ethics. One of them told me cheerfully that the way to get on was to keep your mouth and your desk drawers locked, your eyes and ears open, and "then beat the other guy to the gun." No doubt there have always been ambitious graduate students-and postgraduates, too-who thought this way; few of them announced it; none of them thought that such engaging frankness would be a recommendation. They have learned differently. Another graduate student said that it was all down in "The Double Helix", how to get ahead, and nobody thought the worse of Watson, did they" (Sayre 1975)?

Some U. S. researchers have argued that self-interestedness is really the "norm" and is necessary for our competitive grant application process. Indeed Kass and Eshbaugh (1993) demonstrated that the process is not without error and can lead to misconduct. Their example of the appropriation of a botanical research idea by an NSF program director may be cited to alert students of this possibility. In 1970, William T. Gillis in collaboration with Richard A. Howard, and George R. Proctor, submitted a grant proposal to the Program for Systematic Biology at NSF to prepare a flora of the Bahama Vascular Plants. The grant proposal was rejected. However, in 1973, upon leaving his appointment with the Program for Systematic Biology, the former Director was awarded a grant to prepare a Flora of the Bahama Islands. A comparison of both grant proposals leaves no doubt that the original proposal's ideas and details were resubmitted by the former Program Director, who had access to them. Although Gillis offered to assist with the Bahama flora project he was rebuffed. In reviewing and using the "Flora of the Bahama Archipelago" it was obvious that many of Gillis' contributions to that flora had been ignored (Kass and Eshbaugh 1993).

Returning to some examples from the history of applied botanical science, our students might read Medvedev's (1969) account of the "Rise and Fall of T. D. Lysenko". This reading can show students the methods used by the Lysenkoites to gain recognition for their ideas. "Distortion of facts, demagoguery, intimidation, dismissal, reliance on authorities, eyewash, misinformation, self-advertising, repression, obscurantism, slander, fabricated accusation, insulting name calling, and physical elimination of opponents- all were part of the rich arsenal of effective means by which, for nearly thirty years, the "progressive" nature of scientific concepts was confirmed. ... any free discussion put Lysenkoism in mortal danger (Medvedev 1969:191). These historical accounts may demonstrate the importance of maintaining scientific integrity.

The reading of "Silent Spring" (1962) can also be used as an example to heighten student's awareness of the problem scientists face in getting new ideas accepted. This study can introduce students to the "norms" and "counternorms" of "Organized Skepticism" vs. "Organized Dogmatism." Students can learn that Rachel Carson was ostracized for her ideas, and only with the courage of a supportive editor of a popular magazine was her work first able to appear in public. One might also consider whether her position as a female scientist may have hindered acceptance of her ideas. It is revealing for students to examine the overwhelming data that Carson presents to support her arguments for the correlation of pesticide use and the rise in cancer rates, and to compare it with the arguments made against her hypothesis. Some of these arguments were that DDT had been hailed as the "new war weapon of the Allies," (Sharpe 1994) and that the eradication of typhoid, and the control of malaria was of greater significance than the possibilities of it causing a few deaths from cancer. Indeed Paul Herman Mueller was awarded the 1948 Nobel Prize in Physiology or Medicine for his 1939 discovery of the insecticidal powers of DDT. We know of course that Carson's book was influential in having DDT banned in the U. S. in 1973, but it is still manufactured here and exported for routine use in third world countries. With the advent of recent findings (Kelce et al. 1995), that the persistent DDT metabolite DDE is a potent anti-androgen and may be linked to changes in human male reproductive health, including testicular cancer, our students will find yet another subject for discussion.

It is not my intention to have the undergraduate curriculum dwell on this topic. However, just as we incorporated the teaching of "writing across the curriculum" into our classes, we might think about teaching "ethics across the curriculum." We may also wish to consider the causes for misconduct. LaPidus and Mishkin (1990) remind the reader of Nelkin's suggestion that "scientific knowledge has become ... a commodity vulnerable to commercial interests, public demands, and military controls." They add that "the pressure to produce results has become intense and the stakes, in terms of continued research support and access to information, have become much higher. ... It does seem clear [they conclude] that the tensions exist that can interfere with the development of good scientists as well as with the conduct of good research" (LaPidus and Mishkin 1990).

CONCLUSION

In conclusion, with respect to undergraduates, at least at the smaller liberal arts colleges, there appears to be statistical as well as anecdotal evidence to support the idea that science majors attending these schools have preconceived ideas concerning their expectation for norms of scientific behavior. As graduate students they are often disappointed when they experience a higher number of encounters with research, employment, and personal misconduct than they had expected. It is my belief that there are examples in the history of science that we can teach our students to prepare them for current scientific practice. These lessons of history may be used to prepare our students to face the realities of a career in science and to afford them the confidence to be good scientists and to do good research.

In 1995, Harriet Creighton, former President of the Botanical Society of America, wrote to me (Creighton to Kass, 27 February, 1995) in response to a series of questions I had asked her regarding her graduate school experiences: "We were all there together [at Cornell, 1929-1934] doing what we had been hired to do and taking the courses recommended to us, and doing our research and writing it up, hopefully for publication--They were all pleasant, decent, honest, active, fun loving (when there was time) people. Had they, or any number of them, been mean, grumpy, crooked and nasty, I might have decided that if these are what botanists are, I don't want to be among them- -But they and the faculty I knew at Wellesley and at Cornell, and botanists I met at the annual scientific meetings were all good people."

I would like to think that we can prepare our students to have a similar experience.

Acknowledgments

I wish to thank Jeanette Mullens for inviting me to present these ideas to the Continuing Symposium on Essential Botanical Knowledge at the College/ University Level sponsored by the Teaching Section of the Botanical Society of America in 1995. I am most grateful to my friends and colleagues for their support and encouragement in pursuing this most controversial topic. Specifically I wish to thank Jerry Davis, Robert Dirig, Michael Hanson, Robert Hunt, Melissa Luckow, Beverly Rathcke, and Hardy Eshbaugh for thoughtful insights.

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Lee B. Kass, an active member of the BSA Archives and History Committee, is Visiting Professor at the L. H. Bailey Hortorium, Department of Plant Biology, Cornell University. This paper was presented for an invitational symposium sponsored by the Teaching Section of the BSA in August of 1995, San Diego, CA. It was submitted for publication at the urging of then Present W. Hardy Eshbaugh. Her research interests are in the flora of the Bahamas and the history of botany. She has published on the Bahama flora and has written biographies of American botanists. She is the recipient of a 1995-96 Fulbright Scholar Award at the College of the Bahamas, where she and her husband Dr. Robert E. Hunt facilitated the establishment of a National Herbarium for the Bahamas. NSF funding at Cornell University has assisted her research and writing of an Intellectual Biography of Nobel Laureate Barbara McClintock.

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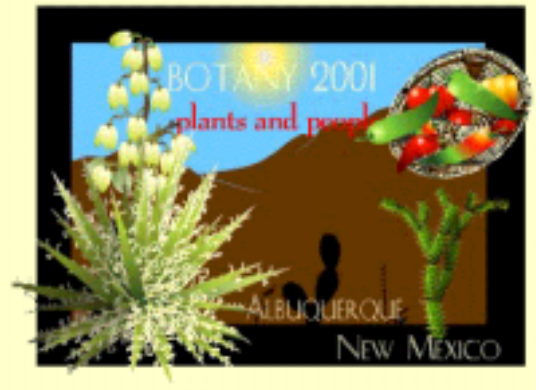
News from the Society



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Plenary Lecture / Symposia

Plenary Lecture
Dr. Gary Nabhan

Bridging Western Science and Indigenous Science: Ethnobiology and Cross-Cultural Conservation Collaborations in the Bi-National Southwest.

Sunday, August 12, 7:30 pm, Enchantment Ballroom, Hyatt Regency Hotel.

Dr. Gary Nabhan is an award-winning writer and conservationist whose wise ranging, prolific work has explored such connections as those between cultural diversity and biological diversity, between people and desert wildf\llife, between wild and cultivated plants, and between poetry and natural science. His second book, *Gathering the Desert* (1985), received the John Burroughs medal for

nature writing. The MacArthur Foundation gave him a "genius" fellowship in 1990, the same year he received a Pew Scholarship on Conservation and Environment. Nabhan has focused his projects and writings mostly on the Sonoran Desert region of Northwestern Mexico and the southwestern United States. Dr. Nabhan is currently director of Northern Arizona University's Center for Sustainable Environments, a research center specializing in the sustainable use of natural resources on the Colorado Plateau.

SYMPOSIA

Plenary Symposium: **Functional and Comparative Genomics: Evolutionary Implications.** Douglas Soltis, Washington State University, WA

Form and Function in Bryophytes: Development, Constraints, and Consequences. Angela E. Newton, The Natural History Museum, London, UK

Lichen Biodeterioration: Progress and Problems. Larry St. Clair, Brigham Young University, UT and Mark Seaward, The University, Bradford, Yorkshire, UK.

Structural Botany in Systematics: A Symposium in Memory of William C. Dickison. Kenneth M. Cameron and Dennis W. Stevenson, The New York Botanical Garden, NY.

Plasticity in Integrated Phenotypes. Katherine A. Preston and Theodore G. Wong, Stanford University, CA.

Why Leaves Turn Red: The Function of Anthocyanins inVegetative Organs. David Lee, Florida International University, FL; Kevin Gould, University of Auckland, New Zealand; James W. Wallace, Western Carolina University, NC.

Evolution and Adaptations of Pteridophytes in Dry Climates. George Yatskievych, Missouri Botanical Garden, MO; Elisabeth Hooper, Truman State University, MO.

Linnaean Taxonomy: A Viable System for the New Millennium? Jerrold I. Davis, Cornell University, NY.

Biogeography and Phylogeny of Caribbean Plants. Timothy McDowell, East Tennessee State University, TN; Peter W. Fritsch, California Academy of Sciences, CA.

Origins and Biology of Desert Flora. Timothy Lowrey, University of New Mexico, NM.

Young Botanist Awards for 2001

Certificate of Special Achievement

Christine Notis	*Iowa State University*
Michael Barker	*Dennison University*
Ross Mueller	*Lawrence University*
Abigail Fox	*Miami University*
Tristan Kraft	*Miami University*
Lesley Knoll	*Miami University*
Todd Gorman	*Miami University*
Nicholas Ruppel	*Miami University*
Kelley Miller	*Miami University*
Kirsten Schmidt	*Miami University*
Erin MacDonald	*Miami University*
Briana Gross	*Willamette University*
Nathan Gushwa	*Willamette University*
Jonathan Thompson	*Willamette University*
David Des Marais	*University of California, Berkeley*
Jeffrey Morawetz	*University of Wisconsin*
Amanda Habel	*Ohio University*
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Nile Kurashige	*Barnard College-Columbia University*
Heidi Marie Hartman	*Southern-Illinois University at Carbondale*
Sarah J. Pittman	*Southern-Illinois University at Carbondale*
Scott Schuette	*Southern-Illinois University at Carbondale*
Peter R. Girardin	*Southern-Illinois University at Carbondale*

The McIntosh Apple Poster is now in full bloom on the Botanical Society's web site:

http://www.botany.org or go directly to the poster at http://mcintosh.botany.org/

After many months of effort on the part of many people, we finally have a site that is useful to teachers and students. My thanks to the artist, Brent Seabrook, for his knowledge and skill as a horticulturalist and for his artist's eye as a photographer. It was a pleasure to work with Bob Hummel and Keith Cooper at the Ohio State University Printing Facility which did an excellent job of digitizing the images and designing and printing the poster. The project would not have been possible without the financial support (more than $3000) from McGraw-Hill and the moral support and encouragement from their sponsoring editor, Marge Kemp. Steve Rice and Amy Russell at Union College have done an excellent job in creating hands-on activities related to the poster. Their carefully conceived pioneering work can serve as a

model for additional learning activities which can be added in the months ahead. Finally, our overworked and underpaid web master, Scott Russell, contributed many hours of work to take material from several contributors and mold it into a unified design. The Botanical Society is indebted to each of these people, members and non-members, for their support in our effort to improve the quality of plant science education.

Curricular Materials:

Development

Gasping for Breath: Bottle Experiments With Mung Beans

Cultivation

History of Cultivation of McIntosh Apples: A Research Project Flower Stucture and Function (We are looking for submissions here)

Fruit Structure and Function

Bad Apples: Synchrony in Ripening Fruit

Sailing Seeds: An Experiment in Wind Dispersal

Coming Soon!

Big and Bendy: On the Biomechanics of Supporting Fruit

BSA Needs a New Webmaster

The Botanical Society of America is searching for a webmaster to manage the web activities of the Society, beginning August 16, 2001. The BSA web site was created in December 1995, to meet the worldwide information service needs of the Society as it entered the electronic age. Currently, the web site provides online access to most of the public documents of the Society and maintains information sites on sectional activities, meetings, and electronic versions of various publications. Since 1997, when BSA first obtained the domain "botany.org", over 800,000 page requests have been logged on the main site, with over 3 GB of data transmission in the entire domain (and sub-sites) in the last month.

The BSA Webmaster position will require knowledge of web page construction, how to mount and maintain files on a web server and how to construct pages that can be read by major available browser programs (MSIE is the most prevalent [~50%] while Netscape accounts for~35%, others ~15%). Web pages should be constructed so that viewers from around the world can view them. The

BSA Webmaster should be dedicated to the development of the discipline of botany through the web site. The BSA Webmaster is a highly visible volunteer position, with financial support available for purchase of software, selected pieces of hardware and for web page development. The candidate will be able to use existing servers or migrate the site to other servers, if this is in the best interests of the Society and the candidate. The BSA Webmaster also serves as the Chair of the BSA Web Committee, which is a standing committee established under the bylaws answering to the BSA Executive Committee. This is an excellent opportunity to learn about electronic publication and electronic media delivery for the web. For further information, or to apply for the position, please contact Scott Russell (srussell@ou.edu), BSA Webmaster and Chair, Web Committee by email, telephone (1-405-325-6234) or mail (Scott Russell, Department of Botany & Microbiology, University of Oklahoma, Norman, OK 73019).

Announcements

In Memoriam:

DR. ELISABETH (BETH) E. MCIVER (1941-2001).

On April 1st, 2001, Dr. Elisabeth (Beth) Ellen McIver passed away after lengthy battle against cancer. She was an eminent paleobotanist and active member of the International Organization of Paleobotany, Botanical Society of America, American Institute of Biological Sciences and other organizations. Beth was born on July 11, 1941 in Loon Lake, Saskatchewan and grew up amidst the boreal forest, where her interest in nature and wildlife flourished. Following high school, Beth enrolled in the B.Sc. Nursing program at the Regina General Hospital, graduating as a registered nurse in 1962. Her nursing career spanned nearly two decades, and a diversity of positions. Her exceptional competence and organizational abilities suited her well to the demanding role of an operating room nurse, where she earned considerable respect among staff and physicians. After raising a family of three children, Beth enrolled in a B.Sc. program in Biology at the University of Saskatchewan, completing her B. Sc. Degree with Distinction in 1979 and an Honors Certificate in Science in 1983. While her initial intention was pursuit of a medical

career, Beth soon became enthralled with botany, particularly plant diversity and evolution. A major influence was Dr. Taylor A. Steeves, who became her first academic mentor, and whose teaching opened the door to a world of discovery that would become Beth's great passion. Beth's interest in plant evolution, combined with her love of nature and fieldwork, drew her to the field of paleobotany. On the strength of her outstanding performance in her undergraduate program, Beth was awarded a prestigious Natural Sciences and Engineering Research Council of Canada Postgraduate Scholarship. In 1983 Beth embarked on a graduate research program that would earn her a Ph.D. in 1989 from the University of Saskatchewan on the basis of her dissertation on *The Fossil Flora of the Paleocene Ravenscrag Formation in Southwestern Saskatchewan*.

Beth McIver subsequently was awarded an NSERC Visiting Postdoctoral Fellowship in the Geological Survey of Canada, Calgary, Alberta, held from 1989-1991. In 1991 Beth returned to Saskatoon as a research associate with the Department of Geological Sciences, University of Saskatchewan. She served as Assistant Professor of Plant Systematics in the Department of Biology (1995-1999), and as Adjunct Professor in the Department of Geological Sciences (from 1995). She joined the W. P. Fraser Herbarium of the University of Saskatchewan as a Research Associate in plant systematics, where her collections of extant plants from the Old and New world are deposited.

Beth McIver became an internationally recognized authority in the areas of Early Tertiary Paleofloristics and the origin and evolution of the Cupressaceae, a family that she used as a model to address challenging systematic and evolutionary theories. A major aspect of her research was the reassessment of phylogenetic relationships at the inter- and intrageneric levels in the light of new fossil evidence. She was responsible of the discovery and description of many extinct Cupressaceae, and her synthesis of information from fossil and extant taxa provided her with important insights into the evolutionary and geographic history of the family. Her field research in remote areas of Asia and the Southern Hemisphere to collect and examine living Cupressaceae complemented her global view of the natural history and evolution of the family. As an evolutionary botanist, Beth conducted extensive research on the interpretation of paleoenvironments through correlation of climate, plant morphology, and diversity. More recently, her research focused on the study of the paleoenvironments of Cretaceous/Tertiary boundary beds of Western Canada, including those hosting the dinosaur *Tyrannosaurus rex*, in which she reconstructed local vegetation on which dinosaurs depended. She used fossil plants as a primary source of information on habitat and climate to reconstruct the local paleoenvironments, and to help her to understand processes surrounding the extinction event. She submitted a manuscript, on the paleoenvironment of *T. rex*, to the Canadian Journal of Earth Science for publication only two weeks before her death.

In 1987, Beth published the first of what would become a series of highly regarded papers describing fossil taxa of the Cupressaceae, completing major articles on the evolution of *Chamaecyparis, Mesocyparis, Fokienia, Thuja*, and *Widdringtonia.* The latter, completed during the last few months of her life, is to be published posthumously in an upcoming issue of the International Journal of Plant Science. Other systematic contributions include papers on *Equisetum* and a fossil flower she called *Kurtzipites*, as well as her monographic treatment of the flora of the Ravencrag Formation of Saskatchewan. Publication of her arctic research, carried out in collaboration with her husband, Jim Basinger, contributed substantially to the understanding of Early Tertiary high latitude floristics. During her extensive career, she authored 13 major scientific articles in refereed journals and numerous other contributions, and remained committed to her science to the end. She was also devoted to public scientific education, including on-screen contributions to TV documentaries, the most recent filmed by Cinenova Productions (Discovery Channel) only two months before her death.

Beth is survived by her husband Jim Basinger; daughter Tara Vincent (Danny Remenda), sons Jay Vincent and Jeff (Lean Anne) Vincent, stepdaughter Claire Basinger, grandson Nicholas Remenda; sisters Sharon McIver De Bruyn, Carol (Bill) Bursell, Mary (Russ) Rodman; brothers David (Wendy) McIver, Calvin (Vicky) McIver, Roger (Beverly) McIver, Jon (Dianne) McIver, and Dan (Evelyn) McIver.

Her family, friends and students will remember her as an outstanding and devoted scientist, an inspiring teacher and mentor, and a dynamic and enthusiastic colleague. We all have lost a wonderful friend and colleague too soon. Her passion for nature, endless energy, enthusiasm and profound commitment to scientific research, particularly the paleoflora of North America, will be deeply missed. Her work has already inspired new generations of her former students.

According to her wishes, a Service of Celebration of her life was held in the Geology Atrium and Museum of Natural Sciences, the University of Saskatchewan,

a most appropriate setting, with its permanent exhibit of full size replicas of dinosaurs including *Tyrannosaurus rex*, *Stegosaurus* and *Triceratops,* surrounded by ferns, cycads, conifers, and flowering plants.

List of Selected Publications by Dr. Elisabeth E. McIver

McIver, E. E. (in review) The paleoenvironment of *Tyrannosaurus rex* from southwestern Saskatchewan, Canada. *Canadian Journal of Earth Sciences.*

McIver, E. E. 1999. Paleobotanical evidence for ecosystem disruption at the Cretaceous-Tertiary boundary from Wood Mountain, Saskatchewan, Canada. *Canadian Journal of Earth Sciences* 36:775-789.

McIver, E.E. and Basinger, J.F. 1999. Early Tertiary Floral Evolution in the Canadian High Arctic. *Annals of the Missouri Botanical Garden* 86:523-545.

McIver, E.E. and Basinger, J.F. 1993. Fossil flora of the Ravenscrag Formation (Paleocene), southwestern Saskatchewan, Canada. *Palaeontographica Canadiana10*:1-167.

McIver, E.E., Sweet, A.R., and Basinger, J.F. 1991. Sixty-five-million-year-old flowers bearing pollen of the extinct triprojectate complex - a Cretaceous-Tertiary boundary survivor. *Review of Palaeobotany and Palynology* 70:77-88.

McIver, E.E. and Basinger, J.F. 1989. The morphology and relationships of *Equisetum fluviatoides sp. nov.,* from the Paleocene Ravenscrag Formation of Saskatchewan, Canada. *Canadian Journal of Botany* 67:2937-2943.

CUPRESSACEAE PUBLICATIONS:

McIver, E.E. (in press). Cretaceous *Widdringtonia* Endl. (Cupressaceae) from North America. *International Journal of Plant Science.*

McIver, E.E. 1994. An early *Chamaecyparis* (Cupressaceae) from the Late Cretaceous of Vancouver Island, British Columbia, Canada. *Canadian Journal Botany* 72:1787-1796.

McIver, E.E. and Aulenback, K.R. 1994. The morphology and relationships of *Mesocyparis umbonata sp. nov.*: fossil Cupressaceae from the Late Cretaceous of Alberta, Canada. *Canadian Journal of Botany* 72:273-295.

McIver, E.E. 1992. Fossil *Fokienia* (Cupressaceae) from the Paleocene of Alberta, Canada. *Canadian Journal of Botany* 70:747-779..

McIver, E.E. and Basinger, J.F. 1990. Fossil seed cones of *Fokienia* (Cupressaceae) from the Paleocene Ravenscrag Formation, Saskatchewan, Canada. *Canadian Journal of Botany* 68:1609-1618.

McIver, E.E. and Basinger, J.F. 1989. The morphology and relationships of *Thuja polaris sp. nov.* (Cupressaceae) from the early Tertiary, Ellesmere Island, Arctic Canada. *Canadian Journal of Botany* 67:1903-1915.

McIver, E.E. and Basinger, J.F. 1987. *Mesocyparis borealis gen. et sp. nov.:* fossil Cupressaceae from the Early Tertiary of Saskatchewan, Canada. *Canadian Journal of Botany* 65:2338-2351.

Submitted by J. Hugo Cota-Sánchez, University of Saskatchewan, Saskatoon, Canada. Jim Basinger, University of Saskatchewan also contributed to this article.

Photo caption

Dr. Elisabeth E. McIver conducting Arctic field work in Ellesmere Island.

The University of Florida and Monsanto Honor BSA Member **Indra K. Vasil**

The University of Florida and Monsanto Company have established an endowed professorship, the Vasil-Monsanto professorship, in honor of Indra K. Vasil, who recently retired from the University of Florida after 32 years. Mark Settles, from Rob Martienssen's group at Cold Spring Harbor Laboratory, who works on the functional genomics of maize (endosperm mutants), has been appointed the first Vasil-Monsanto professor. Vasil, known for his work on pollen development, and the molecular biology and biotechnology of cereals, continues as a Graduate Research Professor Emeritus (ikv@mail.ifas.ufl.edu) at the University of Florida. As President of the International Association for Plant Tissue Culture & Biotechnology (IAPTC&B), he is currently directing most of his effort toward the organization of the 10th IAPTC&B Congress - Plant Biotechnology 2002 and Beyond (www.hos.ufl.edu/iaptcb) to be held June 23-28, 2002, in Orlando, Florida.

The New York Botanical Garden Appoints New Director for the Institute of Systematic Botany

Dr. Dennis W. Stevenson, one of the world's leading authorities on cycads, is The New York Botanical Garden's newly appointed Director for the Institute of Systematic Botany (ISB), a department of The International Plant Science Center, effective February 1, 2001.

As the Director of the ISB, Dr. Stevenson will oversee a full-time staff of 23, including Ph.D. scientists, research assistants, technicians, and support staff. The ISB strives to document plant diversity through field research around the world, to identify and describe plant taxa, to study evolutionary relationships, to inform the scientific community and the public of new finding, and to train future botanists. In the year 2000 alone, ISB researchers conducted some three dozen field expeditions around the work: published 52 papers in scientific journals' published 31 abstracts, book reviews, or popular articles; and managed nine major Web sites. Researchers are active in efforts to conserve ecosystems through compiling floristic surveys for policymakers and studying plant and animal extinction. ISB curators work closely with other ISB scientists from the Garden's Lewis B. and Dorothy Cullman Program for Molecular Systematics Studies to determine patterns of plant evolution and biogeography.

"With momentous technological developments in molecular biology, this is an exciting time to be involved in studies of plant systematics and evolution. We now have new tools to address what were intractable questions a few years ago. Leading the ISB in the incorporation of these new methods into our research repertoire here at the Garden will be both challenging and exciting." – Dr. Dennis W. Stevenson, Director for the Institute of Systematic Botany and the Plant Research Laboratory.

In addition to his role as Director of the ISB, Dr. Stevenson will continue to serve as the Garden's Director of the Plant Research Laboratory. The Laboratory conducts phytochemical studies; analyzes plant-derived pharmaceutical applications: and collaborates with State agencies to monitor weather and air quality of the New York City metropolitan area. It provides data from scanning electron microscopy for the study of pollen, floral development, and leaf surface structure. The laboratory often hosts visiting researcher from around the world conducting phytochemical research, molecular systematics, and plant anatomical research. It is also actively engaged in the Garden's Graduate Studies Program.

"I am delighted that Dr. Stevenson was able to be persuaded to ad to his already considerable responsibilities at the Garden by taking on the leadership of the Institute of Systematic Botany. He is a first-rate, prolific botanical scholar with broad experience across the discipline. In addition, he is an accomplished teacher and mentor to students. I am confident the ISB and the Garden will be well served by Dr. Stevenson's new appointment." – Dr. Brian M. Boom, Vice President for Botanical Science and Pfizer Curator of Botany.

Dr. Stevenson is a specialist in Cycadales (cycads), an ancient group of plants recognized as the sister group to all other living seed plants. He pursues active field programs, particularly in the Neotropics, to study cycads. He is also engaged in The Plant Genomics Consortium, a program led by the Garden, Cold Spring Harbor Laboratory, and New York University to conduct genomic studies. His particular genomic research involves the examination of leaf and reproductive development, and the potential role of these plants in the development of medicinal products. He has published numerous research papers and serves on the faculties of Cornell University, Columbia University, New York University, and Yale University.

Dr. Stevenson succeeds Dr. Scott Mori, who will stay with the ISB as Nathaniel Lord Britton Curator of Botany and continue his research on the fungal and plant diversity of central French Guiana.

Symposia, Conferences, Meetings

Chicago Botanic Garden Hosts Plant Conservation Conference "Ecology and Management of Oak Woodlands

The 2001 Midwestern Plant Conservation Conference, hosted by the Chicago Botanic Garden, will be held on September 13 and 14, 2001. This conference is intended to provide a forum for exchanging research results on Midwestern conservation issues, for setting regional plant conservation priorities, and for developing and implementing collaborative conservation projects.

The first day of the meeting will be dedicated to a symposium entitled, "Ecology and Management of Oak Woodlands." Oaks have been a prominent part of North American deciduous forests and a critical component of Midwest ecology. Planned in collaboration with the Morton Arboretum, the symposium will feature talks by Marc Abrams, John Kotar, Craig Lorimer, Louise Egerton-Warburton, Tom Crow, Karel Jacobs, and Roger Anderson addressing such issues as recent ecological changes in oak forests, canopy-understory processes, invasive species management, fragmentation, and other topics.

The second day of the symposium will focus on contributed papers and posters dealing with research and stewardship projects focusing on conservation of Midwestern plants and communities and will include a Midwestern Rare Plant Task Force meeting. Scientists, stewardship professionals, arboreta and botanic garden staff, volunteers, and other interested in botany and conservation biology will want to attend.

For registration materials, contact: Ed Lyon, Symposia & Special Programs Coordinator at (847) 835-8278 or elyon@chicagobotanic.org. Chicago Botanic Garden, 1000 Lake Cook Road, Glencoe, IL 60022.

Updated Positions Available Listings At BSA Website

Current position announcements are maintained on the Botanical Society's website Announcement page at URL **http://www.botany.org/bsa/announce/index.html**. Please check that location for announcement which have appeared since this issue of Plant Science Bulletin went to press. To post an announcement, contact the webmaster: <srussell@ou.edu>.

Second International Conference on Plants & Environmental Pollution (ICPEP-2)

National Botanical Research Institute, Lucknow, India
5-10 November 2001.

Registration (concessional) and Abstracts: 30th June 2001.

Registration (normal) at the conference desk: 5th November 2001.

Conference inauguration by Dr.M.S.Swaminathan: 5th November 2001, 16.00 hrs

Scientific Sessions: 6-10 November 2001.

Plenary Session: 10 November 2001.

Conference Secretariat: Dr. K. J. Ahmad
Organizing Secretary ICPEP-2
National Botanical Research Institute
Lucknow - 226 001, India.

Phone: +91-522-205831 to 35 extn. 223 (Office)
+91-522-269269 (Residence)
Fax: +91-522-205836/205839

Email: **isebnbrilko@satyam.net.in**
nbri@sancharnet.in
Website: **http://members.tripod.com/conference-2001/**

Positions Available

Conservation Horticulturist

Fairchild Tropical Garden, a nonprofit botanical garden in Coral Gables, Florida, with internationally recognized programs in science, education and horticulture, seeks to fill the full-time permanent position of Conservation Horticulturist within the Research Department. Responsibilities: Plan, implement and maintain an active conservation horticulture program for the purpose of supporting and augmenting the Garden's conservation programs. Specific duties include: 1) manage an ex-situ collection of approximately 100 species from S. Florida, Puerto Rico and the Virgin Islands; 2) manage the Seed Storage Facility and conduct research on tropical seed storage methods; 3) collect and voucher, propagate, cultivate, reintroduce and monitor native plant species; 4) supervise the Assistant Conservation Horticulturist, graduate students, volunteers and interns; 5) interact with

local, state, regional and national agencies, in particular the Center for Plant Conservation; 6) coordinate activities with the Horticulture and Education Departments to display and interpret the Lynn Fort Lummus Endangered Species Garden and the new Jewels of the Caribbean exhibit; 7) participate in public outreach events, local, state and regional conferences; 8) teach public and university courses. Qualifications: Ph.D. in horticulture, botany, agronomy, forestry or related science; one-year postdoctoral experience specific to endangered species conservation preferred; M.Sc. with equivalent experience will be considered. Demonstrated excellence in written and spoken communication, grant proposal writing and budget management. Salary: Commensurate with experience, with full benefits. Letter and Curriculum vitae to: Director of Research, Fairchild Tropical Garden Research Center, 11935 Old Cutler Road, Coral Gables (Miami) FL 33156-4299, or research@fairchildgarden.org. Closing date for applications: 30 June 2001 or until position is filled. Equal Opportunity Employer; ADA/Drug-free Workplace Compliant

Special Opportunities

The David Starr Jordan Prize in Evolution, Ecology, Population or Organismal Biology

In 1986, Cornell, Indiana, and Stanford Universities jointly endowed a Prize, interna-tional in scope, to commemorate David Starr Jordan, a scientist, educator, and academic leader associated with all three Universities. The Prize is presented every three years to a young scientist (or scientists; normally no more than 40 years old, or not more than 10 years post-Ph.D.) whose research is redirecting work in one or more areas of Jordan's interest: evolution, ecology, population and organismal biology. In addition to receiving a commemorative medal and a cash award of $15,000, the recipient(s) will deliver scholarly presentations of his/her work at each of the participating Universities.

The Prize winner, selected by a committee drawn from all three Universities, will be announced in late 2001. Letters of nomination, accompanied by a) two other letters of support; b) the nominee's full *curriculum vitae*; and c) copies of five representative publications by the nominee, should be sent, prior to 15 September 2001, to:

Prof. Ward B. Watt
ATTN: David Starr Jordan Prize Committee
Dept. of Biological Sciences
371 Serra Mall
Stanford University
Stanford, CA 94305-5020 USA
(650)-723-4297 · FAX (650)-723-6132

Other News

Hunt Institute Launches Databases on Web Site

At the Hunt Institute for Botanical Documentation, we are in the process of formatting for the Web existing databases of the information contained in our collections and publications. Through the databases, we hope to offer the global community greater access to our information. To date we have launched six databases on our Web site (huntbot.andrew.cmu.edu).

Originally published in nine parts from 1985 to 1998, the *Catalogue of the Botanical Art Collection at the Hunt Institute* database was compiled by James J. White with the assistance of Elizabeth R. Smith. The database contains information on the 30,000 paintings (mostly watercolors), drawings and original prints in our collection. The data fields include name, nationality, dates, taxon, title, description, printmaker, signature, place of execution, date of execution, medium, support, image size, dimensions, edition, publication, accession number and notes. Currently, the artist's name and nationality, the taxon, and the title of the artwork are searchable fields.

The *Categorical Glossary for the Flora of North America Project* (Robert W. Kiger and Duncan M. Porter, 2001) is available also as a database. This database contains 2,627 terms with their synonyms, categories, limitations and definitions, and can be searched by one or more of these fields. This selective glossary attempts to reconcile, integrate, and codify the traditional terminology of plant-taxonomic description, and should be especially useful for computer-based comparative databanking of such information. It covers a high proportion of the total complement of structures, characters, and character states pertinent to detailed conventional description of the morphology and higher-level anatomy of plants other than algae.

Compiled by Robert W. Kiger and James L. Reveal, the *Comprehensive Scheme for Standardized Abbreviation of Usable Plant-Family Names and Type-Based Suprafamilial Names* database is a scheme of four-character abbreviations for all

properly usable plant-family names known to have been published to date, and of two-character rank suffixes for coordinated abbreviation of type-based names at standard suprafamilial ranks. The database can be searched by full family name or by four-character abbreviation.

The *Index to Binomials Cited in the First Edition of Linnaeus' Species Plantarum* database, compiled by Robert W. Kiger, lists all binomials in Carl Linnaeus' *Species Plantarum* of 1753. The records in the database include fields for genus, epithet and page number. The genus and epithet are searchable fields.

Two parts of the *Index to Scientific Names of Organisms Cited in the Linnaean Dissertations together with a Synoptic Bibliography of the Dissertations and a Concordance for Selected Editions* (Robert W. Kiger, Charlotte A. Tancin and Gavin D. R. Bridson, 1999) are available as databases. Compiled by Kiger, the *Index to Scientific Names* database accounts for over 30,700 occurrences of more than 13,900 different formal names of plant and animal taxa that appear in the original editions of the 186 Linnaean dissertations, and is intended to serve as a finding aid. The database includes the scientific names, the dissertation titles, the Lidén reference numbers, pagination and any additional notes. The *Original Linnaean Dissertations* database incorporates the synoptic bibliography section of the book, which was compiled by Tancin and based on a handlist prepared by Bridson. This database includes in each entry the Lidén number, respondent, title, date of defense, pagination, short title, Lidén title, Soulsby title, Drake title and notes. The searchable fields are Lidén number, respondent, title and date of defense.

As we fine-tune the format and the search capabilities of these databases and those to come, we will appreciate any comments or suggestions.

— Scarlett T. Townsend, Editor
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Missouri Botanical Garden Establishes A Center for Conservation and Sustainable Development

A Center for Conservation and Sustainable Development has been established at the Missiour Botanical Garden with a $5 million pledge from the Bellwether Foundation of St. Louis and $1.1 million from four other foundations: the John D. and Catherine T. MacArthur Foundation, The David and Lucile Packard Foundation (each $400,000), the William and Flora Hewlett Foundation ($200,000) and The Summit Foundation ($100,000). Under the terms of the Bellwether pledge, the Garden will raise another $900,000 and the Center will seek program support for its different activities.

The Center, structurally a new division of the Garden, will serve as a clearinghouse for plant conservation efforts, striving to make information about plant diversity readily accessible to all stakeholders – government agencies, non-government organizations, researchers, farmers and industrialists – charged with the preservation and sustainable utilization of plant resources.

Roger McManus, former president of the Center for Marine Conservation and currently Advisor for Oceans in the Office of the Secretary, U.S. Department of the Interior, was named director of the Center, effective March 7. McManus was trained as a botanist at the University of Arizona and has a career of achievements in the field of conservation, especially endangered species, both for government agencies and non-government organizations.

"The Center's work will be based on the Garden's already extensive global reach to advance international conservation and sustainable development through the world." Said Dr. Peter H. Raven, director of the Garden. Raven, one of the world's most distinguished botanists and conservation advocates, envisioned establishing the Center when he first came to the Garden in St. Louis 30 years ago.

"The establishment of the Center has always been a dream for me. But I knew we had to build our research program first. The Garden now is a world center for the identification and collection of plants under the most rigid international protocols, publishing our discoveries, and making them available in cyberspace, through the largest data base of plant information in the world, to other scientists and interested parties without restriction….The Center will promote development which meets the needs of the present world community without compromising the ability of future generations to meet their own needs…. This means, of course, protecting natural resources and improving living standards and ecological systems for the benefit of all mankind," Raven said, noting that "We are living in a time of runaway extinction,

when perhaps a third of all kinds of organisms in the world may disappear, with enormous impact on both the developing and developed world, but especially on those who already are suffering from the deterioration of the world's life-support systems."

The Missouri Botanical Garden's mission is to discover and share knowledge about plants and their environment, in order to preserve and enrich life. Today, more than 140 years after its founding by Henry Shaw, the Missouri Botanical Garden is a National Historic Landmark and a center for research, education and horticultural display. More than 50 Ph.D. botanists and 150 technical support staff are based at one of the world's largest herbariums and a major botanical research library. Its botanists work in 24 countries on every continent, including North America, with a specialty in rain forests of the developing world.

The New York Botanical Garden Scientists Probe the Rain Forests of Belize, Revealing Crucial Data on Vanishing Maya Plant Lore and the Diversity of Plant Life.

Capping 13 years of field and laboratory work, three scientists at The New York Botanical Garden have succeeded in doing what few botanists have the energy or resources to attempt: They have inventoried all the species of plants of an entire country – Belize. This exhaustive inventory, presented in the publication *Checklist of the Vascular Plants of Belize: With Common Names and Uses*, includes the historical uses of plants by Maya civilizations and other cultures living in this area.

Full of dense rain forest, fire-scarred savanna, and hundreds of remote off-shore islands, Belize is slightly larger than the state of Massachusetts. Despite the threat of malaria and other tropical diseases, frequent hurricanes, and prolonged periods in remote areas with minimal supplies, Garden scientists and their local collaborators mounted over one hundred collecting expeditions to nearly every corner of the country. Travel through some of the most remote rain forests of Central America was by helicopter, jeep, canoe, unimog, and on foot. Many thousands of specimens were collected. Through painstaking research in the field and in herbaria throughout the United States, the authors have definitively placed the number of species in Belize at 3,560, eliminating much of the uncertainly previously associated with the identification of Belizean plants.

Checklist of the Vascular Plants of Belize, presents the flora of Belize as it exists today and provides insight into how the flora is currently utilized locally and regionally. Working with local people in Belize and specialists throughout the world, the authors, Dr. Michael J. Balick, Dr. Michael H. Nee, and Daniel E. Atha, have synthesized vast amounts of highly technical information into a concise summary that will be used by botanists, ecologists, anthropologists, medical professionals, and ecotourists.

Significant new finding in botany and ethnobotany are presented for the first time. Endemic plants and species never before reported for Belize are identified and discussed. Every species is classified into a comprehensive system utilizing information gained from centuries of classical taxonomic research and the results of modern molecular studies.

Among the ethnobotanical discoveries, the authors show that nearly 40 percent of the plants of the country are used for a variety of purposes, such as food, medicine, and construction, indicating the high degree to which local people still rely on plants for much of their everyday living.

Perhaps the most significant contribution of the work is the linking of thousands of years of Maya traditions of plant use with the latest research and taxonomic interpretations. Though not presented in great detail, the uses of individual plants are linked to valid scientific names, permitting more detailed studies of past, present, and future relationships between local people and the plants around them.

For millennia preceding Columbus' "discovery" of the New World, the species presented in this work provided the Mayas – widely regarded as the most advanced pre-Colombian civilization of the Western Hemisphere – with nearly all of their material, cultural, and spiritual needs. The Mayas were the only indigenous Americans to independently develop writing and from the few remaining works, it is clear that plants were central to nearly every aspect of the culture.

Though little remains of their writing, and despite systematic efforts to erase much of their culture, the Mayas succeeded in preserving much of their ethnobotanical heritage (especially the use of plants for healing) through oral tradition. Tragically, these traditions were nearly extinguished as the older practitioners died without passing on their knowledge to the younger generation, who are often indifferent to "the old ways."

Preserving these traditions required a multi-disciplinary approach, let by Dr. Balick and his colleagues in Belize, Drs. Rosita Arvigo and Gregory Shropshire of the IxChel Tropical Research Foundation, in which botanists, working with physicians, interviewed local people and made herbarium specimens of the plants they used. These specimens, and many thousands more,

were crucial in piecing together the whole flora. Without them, the report or suggestion of a species or plant use in Belize (or anywhere else in the world) is conjecture. But with a herbarium voucher specimen, a species can be independently verified by a qualified botanist anywhere in the world. And at any time in the future.

The New York Botanical Garden, founded in 1891, is a public garden and research institution dedicated to the documentation and preservation of the Earth's plant diversity. The Garden's International Plant Science Center is one of the most accomplished, intensive, and distinguished botanical science r\programs in the world. It includes the Institute of Economic Botany for research, teaching, and publication in the field of economic botany and the Institute of Systematic Botany for the research and documentation of plant diversity, plant taxa, and evolutionary relationships. The collections in its Herbarium and the LuEsther T. Mertz Library are among the most extensive resources of their kind. The Lewis B. and Dorothy Cullman Program for Molecular Systematics Studies and The Plant Genomics Consortium are becoming widely recognized as major contributors to our understanding about the origin and evolution of plants.

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To the Editor-

A little problem of nomenclature

The "In Memoriam" of Dr Rupert Barneby in the Spring 2001 issue of *Plant Science Bulletin* states that he was born in Monmouthshire, England. Monmouthshire as a county no longer exists, although what was Monmouthshire is now in Wales – shades of plant systematics and nomenclature?

Rather like the plant *Lotus uliginosus** - which oscillates between *L. uliginosus* and *L. pedunculatus* on almost a decade basis – Monmouthshire was in Wales until, in 1536, it was made subservient to English courts. Since then the position has been anomalous. Ecclesiastically it has always remained part of Wales and included in most Acts of Parliament relating to Wales, although excluded from others of importance. This was an uneasy situation. A University College of Wales and Monmouthshire was established in 1883. There was a land tenure bill (Wales and Monmouthshire) and a local government bill (Wales and Monmouthshire) rejected by the House of Commons in London in 1897 and 1902 respectively.

This ambiguity continued. The first language of the local people was Welsh for several centuries after 1536. Many place names in Monmouthshire are Welsh – probably Celtic originally because of similarity to those in Cornwall and Brittany. Someone born in Monmouthshire was eligible to compete at international level for England or for Wales, although most rugby players chose Wales.

This confusion was eventually resolved in the reorganization of counties in the United Kingdom in the 1970's. Glamorgan and Monmouthshire became Gwent, and Gwnet is in Wales.

**Lotus uliginosus* – (1952) 1st Edition of *Flora of the British Isles* by A.R. Clapham, T.G. Tutin and E.F. Warburg, Cambridge University Press.

L. pedunculatus – (1959) 2nd Edition of *Flora of the British Isles* by A.R. Clapham, T.G. Tutin and E.F. Warburg, Cambridge University Press. It was at this stage that New Zealand researchers started a breeding program with material supplied to them under this name.

L. uliginosus – (1987) 3rd Edition of *Flora of the British Isles* by A.R. Clapham, T.G. Tutin and D.M. Moore.

L. pedunculatus – (1991) *New Flora of the British Isles* by Clive Stace, Cambridge University Press.

In Volume 2 of *Flora Europaea* (1968), edited by T.G. Tutin et al., it is clear that P.W. Ball has *L. uliginosus* and *L. pedunculatus* as different species.

-David A. Jones, Department of Botany, University of Florida

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Book Reviews

Actin: A Dynamic Framework for Multiple Plant Cell Functions. C.J. Staiger, F. Baluska, D. Volkmann, P. Barlow. 2000. ISBN: 0792364120 (Cloth US$294) 663 pp. Kluwer Academic Publishers, P.O. Box 989, 3300 AZ Dordrecht, The Netherlands. - The plant cytoskeleton has been the subject of great interest in recent years to cellular and molecular biologists. While the cytoskeleton has an obvious structural function, its role in diverse signal transduction pathways is becoming increasingly appreciated. Actin filaments, sometimes referred to as microfilaments, along with microtubules constitute the bulk of the plant cytoskeleton.

This well-written and well-edited book consists of 36 chapters, which are review articles by recognized experts in their respective fields. These articles represent the current state of our knowledge about the actin cytoskeleton from cytological, cellular, physiological, and molecular perspectives. In fact, a strength of the book is having good representation of diverse methodological approaches.

The first chapter discusses the diversity of the plant actin gene family. Chapters 2 - 7 consider the critical role of actin-binding proteins, such as myosins, profilin, and fimbrin, in actin function. However, I do think that an overview chapter on this topic would have been helpful. There are several chapters on the role of actin in specialized systems (e.g., pollen tubes, root hairs, guard cells), and in processes such as gravitropism, auxin transport, and responses to pathogenic fungi. The last few topics covered deal with the latest methodologies such as visualization methods and GFP (green fluorescent protein) technologies.

The quality of the illustrations is very good. One can see the subtle features present in the confocal and electron micrographs as well as the bands on the gels. Some of the chapters include quality color illustrations as well. Having said this, I did find that several of the chapters included too few (or no) illustrations. The book lacks an index, which would have been helpful to the readers.

The review articles are current since the reference list includes papers up to 1999, and, in most cases, up to early 2000. In many chapters, these reference lists are extensive and exhaustive.

I enjoyed reading *Actin: A Dynamic Framework for Multiple Plant Cell Functions* and commend the editors for doing such a good job. Although it is a bit pricey, this book is a must for researchers interested in the plant cytoskeleton. The book can be used in graduate-level classes, and it is recommended for acquisition by university libraries.

- John Z. Kiss, Dept. Botany, Miami University, Oxford, OH 45056

Dream Plants for the Natural Garden. Henk Gerritsen and Piet Oudolf. Timber Press 2000. ISBN 0-88192-493-8. 144 pages. — The authors, who are from the Netherlands, choose about 1200 plants, mostly perennials, ferns, grasses and a few shrubs, of the myriad now available to gardeners and classify them into three maintenance categories: tough, playful and troublesome. Dream plants are tough. They are reliable and can be maintained over the years in an average garden without pesticides, artificial fertilizers or intense labor. However, by including plants from the playful and troublesome categories the authors also describe some of their favorites which though not completely meeting their criteria for dream plants may be worth the extra effort of dealing with their foibles. The resulting well-illustrated choices include many garden standbys as well as plants which are not ordinarily thought of.

In an era when the term natural gardening increasingly implies the use of native plants indigenous to the region so as to maintain habitat for local wildlife, these authors choose a more liberal definition. For them natural gardening is a matter of a certain wild quality in appearance which results from choosing either ornamental plants and cultivars or native plants which may also attract insects, butterflies and birds. Each plant is listed alphabetically by scientific name within its category and the hardiness zone, blooming time and sun/shade requirements are included. A great deal of very useful information about the morphology and culture of each plant is conveyed in a prose style which is botanically correct while at the same time is very readable. What sets this book apart from other books on the subject is the complete candor of the authors in explaining their choices. Even their disagreements are aired leaving the reader to choose. Interesting essays on an eclectic variety of topics such as winter silhouettes, color schemes and staking are interspersed among the pages of plant descriptions. These essays allow the authors to express some of their stronger opinions such as the failure of a traditional color wheel to provide any assistance whatsoever in achieving satisfactory color combinations in a garden.

Since the book is written by Europeans, I wondered about the availability of their recommended plants in my area of this country. By comparing an arbitrary selection (tough plants from A through C in zone 5 or lower) to those listed in the on-line catalog of a large nearby nursery here in Maine (Fieldstone

Gardens) I found that almost 50% were available. A useful addition to this book would be a checklist of all recommended plants with the maintenance category, hardiness zone and culture information listed. I strongly recommend this book to anyone who is interested in knowing more about plants which require little maintenance yet can bring interesting colors and textures to a garden. -- Joanne Sharpe, Coastal Maine Botanical Gardens, Boothbay ME 04537.

Elsevier's Dictionary of Plant Names and their Origin. Donald Watts. Elsevier Science, Amsterdam, 2000. ISBN 0-444-50356-0. xxx + 1001 pp. – The circulating coinage of virtually every nation on earth is stamped with the name of that nation. Cents plainly state, "United States of America," pesos read, "Estados Unidos Mexicanos," and so forth. The sole exception? The United Kingdom. Pence and pounds bear no national identification. I will not speculate on what this might imply about British attitudes. I only bring it up because the book at hand suffers the same deficit.

When one encounters a book with the straightforward title "Dictionary of Plant Names," one might reasonably assume that it will pretty much cover most plant names in some fashion. One might even be forgiven for concluding that such a book would permit access to information via scientific names as well as vernacular. Both those assumptions would be wrong in the present case.

What the book comprises is an alphabetical listing of vernacular names of plants *in the United Kingdom.* Incredibly, nowhere in the book is that delimitation spelled out explicitly. In the half page Preface (p. v), the only explanatory material in the book, there are passing references to "the West country" and "Devonshire and Yorkshire," but nowhere does the author indicate that the scope of his work is confined to the U.K.

So, aside from a misleading title, what of the book? It certainly does appear to be an exhaustive compendium of British vernacular names, with such explanations of their definite or possible origins as is possible. For example, random page-flipping tells us that *Ornithogalum pyrenaicum* Desf. is known as Bath Asparagus, because young shoots are picked and sold in the markets around Bath, to be eaten as a vegetable in the style of *Asparagus officinalis* L. We likewise learn that *Veronica chamaedrys* L. is charmingly referred to as Hawk-Your-Mother's-Eyes-Out, from the superstition that if a child picks the plant, his or her mother will die during the year.

Most of the listed usages and origins are supported by literature citations. The bibliography listing the cited references covers 22 pages (pp. ix-xxx) and encompass a broad spectrum of academic, folkloric, literary, culinary, and agricultural work. Unfortunately, the citations are non-specific; only the work is cited, not the page.

Perhaps the greatest problem with the book (aside from the title) is its lack of any means to access scientific names. Each vernacular name listed is identified by one or more binomials (though without their appended author names), but there is no companion listing by binomial, nor even an index to these. For example, I wanted to learn the names applied to the British species of *Campanula*, but was unable to do so. This information could only be gleaned by reading each and every entry. This single failing will greatly limit the utility of the book to serious botanists interested in common names.

In summary, this misleadingly titled book will be of considerable use to those who have come across a vernacular name for some plant that grows in the British Isles and wish to identify the plant more precisely and understand the linguistic origins of the vernacular name. Beyond that, it has little to recommend it, short of the amusement value of names such as Fool's Ballocks, Yorkshire Fog, Flapdick, Jack-an-Apes-on-Horseback, Joynson's Remedy Cheese, and Priest's Pintle. — Thomas G. Lammers, University of Wisconsin Oshkosh, Oshkosh WI 54901.

Invasive Species in a Changing World. Harold A. Mooney and Richard J. Hobbs, Editors. 2000. ISBN 1-55963-782-X (paper, US$30.00) 457 pp. Island Press, 76381 Commercial Street, P.O. Box 7, Covelo, California 95428. - Biological invasions and global environmental changes caused by human activities are not only unprecedented ecological problems, but they also present interesting opportunities for biologists to explore basic principles and theories about biological organization. Although a great deal of scientific energy and funding has gone into studying these two phenomena separately, how might they interact? This is the premise of this very interesting volume put together by Mooney and Hobbs. The working (and supported) principle is that invasions are likely to be worse than anticipated under the global changes we face.

The book reports on presentations in a workshop

held in 1998 in San Mateo, California as a part of the Global Invasive Species Programme (GISP). GISP is coordinated by SCOPE (Scientific Committee on Problems of the Environment), and supported by a variety of world environmental organizations. It was formed to improve international collaboration in dealing with the invasive species problem, which is critical, as the dimension of the problem clearly requires such activity. GISP's mandate is to assemble information and approaches for prevention and management, disseminate such information to governments and communities, and to lay the groundwork for new tools in science, information management, education and policy to be developed through collaborative international action (see the website:http://jasper.Stanford.EDU/GISP). This book in the first of several anticipated to emerge from the program.

The material in this volume is broken up into three sections dealing with the dimensions of the problem of global change and biological invasion, societal impacts and regional examples.

The first section addresses ecological realms (freshwater, [Kolar & Lodge], marine [Carlton] and terrestrial [Dukes]), environmental changes (land use [Hobbs], fire [D'Antonio]) and ends with an exploration of the impacts of global change on microevolutionary processes [Barrett] and addresses various methods of impact and spread assessment [Mack]. Most of the authors in this section do a tremendous job of bringing their perspectives on invasions to the problem of global change and point out important interactions. For instance, Kolar & Lodge point out that increasing water quality in canals connecting the Laurentian Great Lakes (presumably a positive environmental change) is accelerating the movement of invaders between bodies of water, encouraging invasion. D'Antonio points out that in general, fire promotes the growth of alien species. Even when used as a management tool to eliminate invaders, fire creates opportunities for invasion to take place, whether or not the invaders are, themselves, fire adapted. The problem is exacerbated by the fact that changes in fire regimes associated with global change are likely to have unknown consequences for fire-adapted natives. Barrett's chapter on microevolution points out that invasions are good model systems for studying how plants in general will respond to global changes, but that more information about phenotypic plasticity and genetic variation are needed to effectively forecast the effects of environmental change. Most of these chapters have something new and integrative to say, although they are mostly written by people whose expertise is in the field of invasives, rather than that of global change effects.

The second section is mainly economic in nature. Chapters on international politics [McNeely], human health [McMichael and Bouma], assessments of environmental vulnerability [Sutherst], and environmental valuation [Naylor] are capped off by a fascinating analysis of the economic costs and benefits of removing Tamarix species from riparian habitats in the southwestern US [Zavaleta]. Zalaveta has quantified the amount of water lost in the region to transpiration by Tamarix, the costs of various efforts to reclaim this water, and the cost of total elimination of the species from the southwest ($3,000 per acre). She shows that elimination is the most cost-effective approach in the long run, especially in light of the global changes which are forecast to exacerbate the problems Tamarix generates. This chapter stood out as the most compelling chapter in the book for this reader. Similar analyses of other invaders would make fascinating comparisons possible. Overall, the timely message from this section is that explicit accounting of invader impacts and economic costs are needed to effectively mobilize monies needed for introduction prevention, control and eradication.

The final section addresses the impact of global change of invasions on a regional scale. It includes chapters on invasions in South Africa [Richardson et al.], Germany [Scherer-Lorenzen et al.], New Zealand [Clout and Lowe] and Chile [Arroyo et al.]. These regions differ very widely in the impact that invaders have had historically and the challenges they face in the future. South Africa is unique in the impact that alien woody shrubs and trees have had in a variety of habitats, including the fynbos. Germany, like the rest of Europe, has a long history of invasion that has mainly served to enhance biodiversity. New Zealand's natural history is nearly entirely dominated by invasions, while Chile's incredibly diverse array of habitats make the identification of potentially harmful invaders a complex affair. This section is the least compelling because most of these chapters concentrate on describing the breadth of invasions within the region and either model simple projections of changed plant distributions that have been done many times before, or weakly conjecture about the impacts of global change.

Global changes will clearly accelerate the rates at which species are introduced to new habitats, alter resource bases that shift competitive and other interactions between alien and native species, and inject new variables into projections of future species distributions and ecosystem composition. Although this volume is not likely to become a critical desktop reference for workers in the fields of global change or invasives, it is an interesting, thought-provoking read you should encourage your library to buy if you have any interests in either field. - Laura Hyatt,

Department of Ecology and Evolution, State University of New York, Stony Brook, NY 11794

Prairie Wetland Ecology. The Contribution of the Marsh Ecology Research Program. Murkin, H. R., A. G. van der Valk and W. R. Clark (eds.). 2000. ISBN 0-8138-2752-3 (cloth US$79.95) 413 pp. Iowa State University Press, Ames. - Twenty-two years ago, a partnership was forged between Ducks Unlimited Canada and the Delta Waterfowl and Wetlands Research Station to conduct an intensive ecological investigation of northern prairie wetlands known as the Marsh Ecology Research Program (MERP). This collaboration was aimed at advancing from a field dominated largely by descriptive studies to one that emphasized empirical work encompassing all areas of wetland ecology and management. The present book is an evaluation of the MERP, with chapters designed to summarize the past contributions of the program and current state of understanding achieved as a result of 10 years of intensive investigations. A major objective was to assess the effects of water level changes (wet-dry cycles) using long-term data obtained from 10 experimental cells. A variety of physical and biological information was obtained from these studies.

Eleven contributors provided 13 chapters which are organized in four parts: I: introductory material (two chapters), II: nutrient budgets (four chapters), III: ecology (5 chapters) and IV: summary (2 chapters). Three appendices add information on techniques and sampling, nutrient budgets, and publications (an impressive list of 93 articles and 16 graduate theses). Overall I found the book to be appropriately organized, and well referenced. Tables and figures were informative and explained clearly, with technical jargon kept to a minimum in the accompanying text. This format made the chapters easy to read and digest with good comprehension. Chapters were of uniformly high quality, with each section comparable in scope and depth as the rest.

The book begins with a succinct description of the study area (vegetation, climatic data, etc.), the design of the experimental cells followed in the course of the study, and the salient features of the wet-dry cycle operating in natural prairie marshes. Next, a description of nutrient budgets (N, P and C) and the effects of flooding, drawdown and reflooding experiments is given in good, understandable detail. This section presents a number of interesting findings, e.g., how nutrients (esp. N, P) can be lost (and productivity reduced) as a consequence of water-level management techniques and how changes in macrophyte pools resulting from drawdown influence nutrient pools. Data for all three nutrients are summarized in a number of useful tables and graphs that show the shifts in nutrient pools throughout various stages of the experimental manipulations.

The largest section of the book (Part III, ecology) begins with impressive maps of emergent species showing the changes occurring in all cells over the course of the experiments. Discussions include factors leading to zonation genesis and evaluations of various quantitative models of vegtational dynamics (e.g., logistic regression, spatially explicit models). The subsequent chapters summarize the dynamics of various groups of organisms including algae, invertebrates, birds, and muskrats. Most chapters conclude by a useful section on “Research Needs”. These chapters provide much useful information that would especially be important to wetland managers. The essential findings of these sections are also nicely summarized at the end of the book (Summary and Recommendations).

This book is an excellent example of how long term studies can provide useful synthetic information on ecological systems. Any person with an interest in wetland ecology should definitely check it out. There are a number of good case studies that demonstrate the biological effects of hydrological changes in wetlands and nicely demonstrate the complexity of interactions in these systems. Because of its fairly limited scope, this is not a book that would be suitable as a text for an introductory wetland ecology course. However, it would be ideal to use in a graduate level seminar course on wetland ecology. The abundance of stimulating multidisciplinary subject matter should provide plenty of discussion for an intensive semester of scrutiny, and it is especially suited for a diverse audience of wetland biologists and hydrologists. - Donald H. Les, Department of Ecology & Evolutionary Biology, University of Connecticut, Storrs, CT 06269-3043.

Tropical Ecosystems and Ecological Concepts Osborne, P.L. 2000. ISBN 0-521-64251-5, 0-521-64523-9 (cloth US $88.00, paper US$39.95) xiv+464pp. Cambridge University Press, 40 West 20th St., New York, NY 10011-4211.- Osborne's text on tropical ecosystems provides a valuable new resource for students in tropical countries, the intended audience, or for anyone interested in using examples from tropical ecosystems to learn about or teach ecology. This book is different from most ecology texts because each chapter is written to focus on a particular ecosystem type and ecological concepts are introduced as part of the discussion of the ecosystem. For example, competition among coral reef species is used to illustrate the niche concept and savanna grazing animals illustrate patterns of population growth in chapters on coral reefs and savannas, respectively. Osborne also has more on aquatic environments than most texts, with five out of 14 chapters on lakes, rivers, wetlands, mangroves, and coral reefs. The information on aquatic ecosystems is especially valuable because there are other texts on tropical rainforests or with a regional focus (such as Kricher 1997, Longman and Jenik 1987, Mabberley 1992, Whitmore 1991), but much less information is readily available on tropical aquatic ecosystems. Six chapters are on terrestrial ecosystems and three chapters discuss tropical areas in general: the first chapter on "The tropical environment" and the last two chapters on "Cities and human ecology" and "Global ecology".

Osborne, Executive Director of the International Center for Tropical Ecology at the University of Missouri-St. Louis, has traveled throughout the tropics, but admits a bias from his own work on tropical limnology and wetlands in Africa, Papua New Guinea and Australia. The text reflects his interests, although he brings in examples from the New World tropics and gives thorough overviews of both terrestrial and aquatic ecosystems. A quick check showed more than two-thirds of the examples are from Africa, New Guinea and Australia. The boxes highlighting examples or important topics related to a given chapter are mostly from Africa or New Guinea and the lakes and rivers chapters have more boxes than other chapters.

The book is ambitious, touching on all the main concepts of ecology in less than 500 pages, compared to 600-800 pages in many ecology texts. The writing style is clear and to-the-point with important terms highlighted in bold. Subsections within each chapter make the text easy to follow. The pictures, tables and diagrams are in black and white, clearly legible, with helpful legends. There are several attractive color photos on the front and back covers. At the end of the book there is an extensive glossary, with cross-references, a listing of references cited and a detailed index. Chapter summaries highlight the main points of each chapter. The text assumes that the reader has had at least an introductory course in biology and is planning to major in biology, ecology or environmental science.

While it is difficult to decide on the order of presentation of topics in any ecology text, I thought that little attention was paid to evolutionary concepts and it would have been helpful to have natural selection and speciation discussed earlier. The discussion of speciation and extinction was not introduced until near the end of the book in Chapter 12, "Isolated habitats and biogeography". In many cases I found it frustrating to have a question brought up, only to be told it will be discussed later. For example, the chapter on lakes (Chapter 5) brought up the issue of why there are so many species of fish in one lake compared to another and the reader is told that this issue will be discussed in Chapter 12.

The book begins by defining the tropics in terms of location, climate and biogeography. Basic terms such as biome, ecosystem and energy flow are defined. The reader is told that the text will focus on "similarities that exist within biomes from different regions in order to unravel the major features of their ecology" and that more specific information will be needed for details about a particular area. The chapter on deserts is used to discuss the effects of abiotic (environmental) factors on organisms and the grassland chapter facilitates the introduction of primary production and energy flow. Osborne points out that savannas cover one-fifth of the land surface of the world and half of the African continent and that much savanna vegetation is maintained through regular burning. The basics of population ecology are introduced in the savanna chapter, using examples from Africa to illustrate population growth, age structure, competition, predation, key factor analysis and ecosystem models. Lakes are used to discuss thermal stratification, aquatic primary productivity, food chains, biogeochemical cycles, eutrophication and consequences of exotic species introductions. In the discussion of rivers, the river continuum concept and the flood-pulse concepts are compared. Ecological succession is discussed as part of the wetland chapter, giving succession an aquatic rather than its usual terrestrial association. The importance of wetlands in reducing flood flow and enhancing downstream water quality is described. Although Osborne cites the figure that 80% of wetlands in Ohio, USA have been lost, no comparable figures are given for tropical areas. Decomposition and the detritous food chains are explained as part of the chapter on mangroves. Biodiversity is the focus of the discussion of rainforests, with emphasis on plant-animal interactions, nutrient cycling, species diversity, patch dynamics, forest fragmentation and conservation.

The structure of high and low elevation forests is compared and community change along environmental gradients is discussed. Coral reef formation and threats to coral reefs from bleaching and other organisms such as the crown of thorns starfish are clearly explained.

Resource management and conservation are emphasized in the last two chapters and discussed at the end of several chapters. Osborne points out that poor environmental health leads to impaired human health. The importance of planning for sustained yields in fishing and other industries is stressed, as is identifying high priority areas for conservation. The melting of tropical glaciers is discussed as an example of the effects of global warming and readers are warned that global warming may lead to human populations at higher elevations and the spread of malaria-carrying mosquitoes. The consequences of high rates of human population growth are also discussed.

Overall I recommend this book for anyone interested in the structure and function of tropical ecosystems. It provides a good overview of the main tropical ecosystems, with examples from around the world and clearly explains basic ecological concepts. This will be a valuable resource for students in tropical countries and for others looking to better understand tropical ecosystems. A goal of the book is to educate people so that they understand the basic science needed to make good conservation decisions. I would recommend this as background reading for students going on my field courses in the tropics, but those who have had introductory ecology will benefit more from texts focused on the natural history of specific regions. Travelers to tropical regions will benefit from the overview this book provides, but will also need to find more specific local references.-Kathleen L. Shea, Department of Biology, St. Olaf College, Northfield, MN 55057.

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A Rum Affair: A True Story of a Botanical Fraud.—Karl Sabbagh. 1999. ISBN 0374-25282-3 (cloth, US$24.00). 276 pp. Farrar, Strauss, and Geroux, New York. – It would be extraordinary, if not unprecedented, to find a book emphasizing floristic taxonomy on the New York Times Non-Fiction Best Seller List. Although *A Rum Affair* did not quite achieve this in the United States, it did receive attention in the *New York Times Book Review*. This curious book is a highly original contribution to a rare—one might almost say invented—genre of botanical literature: the botanical detective story. It reads in places like a British detective novel, with a flamboyant suspect who is thought to have committed fraud, and a botanical Jaubert whose zeal for justice leads him to pursue his Jean Valjean onto an unlikely locale in the Inner Hebrides off the coast of Scotland. In telling this story, the author, Karl Sabbagh, has clearly benefitted from his background of a Cambridge degree and experience in directing scientific educational television programs for the BBC. But *A Rum Affair* is scarcely a typical "who-done-it", because at the end of the book the culprit is never quite brought to justice, or even publicly exposed. For author Sabbagh, and for the reader too, the passage turns out to be more exciting than the destination.

The facts of the case (admittedly murky in places) involve suspicions—that rose to accusations—of botanical foul play in the early 1940s on the island of Rum (earlier spelled "Rhum" by Victorian geographers who prudishly shied away from having an island named for an intoxicating substance). The villain of our story, John William Heslop Harrison, was a professor of botany at the University of Newcastle on Tyne, in northern England (Northumberland) and a vigorous field naturalist who in the 1930s had begun field studies (that now would be called "biological inventory") in the Outer and Inner Hebrides Islands off the west coast of Scotland. As a result of his field studies, Heslop Harrison became an adherent of the "nunatak theory," earlier developed by Scandinavian botanists, that some species survived even during the height of the Pleistocene on isolated and unglaciated mountains (and islands). In a widely-read article in *Nature* in 1951, Heslop Harrison cited a number of species he had found, including several *Carex,* that he was certain had survived the Ice Age in "nunatak" areas in the Hebrides.

Aside from the fact that the "nunatak" hypothesis was never wholeheartedly adopted by the botanical community, even before publication of the *Nature* article Heslop Harrison had to contend with rumors circulating among British botanists that his "nunatak plants" were not convincingly documented. Some of the rumors appear to have originated from a competing team botanizing in the Hebrides that centered around A. J. Wilmott, head of the herbarium at the British Museum of Natural History, and his mercurial colleague Maybud Campbell, an ex-opera singer who played secretary-as-prima donna of the Botanical Society of the British Isles. These, and other supporting characters, lend a distinct flavor of Agatha Christie

to the story.

The island of Rum became the cockpit of this botanical drama because Heslop Harrison published in the *Journal of Botany* in 1941 new records from Rum that were disputed by other British botanists. His claim that he had found *Carex bicolor*, a species unknown from the British Isles, was considered suspect, along with a number of other new records from Rum. Wilmott seems to have been both exasperated by Heslop Harrison's effrontery and suspicious of the veracity of some of the botanical records coming out of Newcastle. Apparently he determined to settle scores with Heslop Harrison for his vulgar behavior in a contentious correspondence that continued up until 1945, as well as for his transgressions against professional ethics. The plot against Heslop Harrison appears to have materialized during a 1947 field trip to Glen Affric by a group of professional and amateur botanists, including Wilmott, Maybell Campbell, Charles Raven (the biographer of John Ray), and his son John. John Raven, then a student at King's College, Cambridge, and a keen amateur botanist, was apparently persuaded to take an active role in a "plan" to expose Heslop Harrison by making covert observations on the island of Rum. With Heslop Harrison's accordance, and not without some logistical problems, John Raven did succeed in landing on Rum and locating some of the botanical specialties such as *Carex bicolor*. What he found appeared to confirm suspicions that Heslop Harrison had "salted" localities on Rum by transplanting individual plants of the critical species from his own garden.

On the basis of his observations, John Raven wrote a report to Trinity College—which was necessary to justify the grant of £ 50 that he had received—in which he detailed his observations on Rum, and explicitly concluded that Heslop Harrison had planted individuals of several species on the island and then claimed to have "discovered" them. This report was never published, although Sabbagh was able to read it in the Trinity College library. However, in January 1949 Raven published in the prestigious journal *Nature* an abbreviated version of the report in an article titled "Alien plant introductions on the Isle of Rhum,." in which he concluded that *Carex bicolor* and *Polycarpon tetraphyllum* were introduced to the island. Although written in the usual dry academic prose, its carefully wordly statements carried crystal-clear implications for anyone familiar with the controversy about locality records of Hebridean plants..

Heslop Harrison, who may not have been a regular reader of *Nature*, apparently was unaware of Raven's article for a couple of years, but when he did see it his response was predictably violent, and his rebuttal to *Nature* was rejected by the editors. In 1952 he wrote a letter to Raven accusing him—with understandable bitterness—of visiting Rum under false pretenses. However, the tradition of Victorian gentility in matters of scientific controversy appears to have prevailed, and nothing further about the Rum episode appeared in public prior to Heslop Harrison's death in 1967.

One of the curious aspects of *A Rum Affair* is that it involves scientific fraud in the field of plant systematics. In their fascinating analysis of biological frauds, *Betrayers of the Truth*, Broad and Wade a couple of decades ago cited a considerable number of instances of fraudulent behavior, especially in molecular biology and medical research, but only two in botany: Mendel's fudging of crossing data in his experiments with peas, and Lysenko's outrageous repudiation of genetics in plant breeding. In the genteel field of plant taxonomy, where researchers' ethics are not tested by intense competition for huge grants from NIH, NSF, or NASA, there would seem to be much less temptation to succumb to fraud. Plant taxonomists have certainly had contentious disagreements (e.g., the interactions between E. L. Greene and M. E. Jones), but as hot as the rhetoric often was, the claims were usually about bad judgment, not fraud. Plagiarism—the appropriation of taxon descriptions done by someone else—has been leveled at botanical authors such as L'Heritier; even Darwin had a problem in explaining how much he was influenced by Blyth's earlier statement of the theory of natural selection. The botanical fraud committed by Heslop Harrison is therefore remarkable enough to justify Sabbagh's detailed analysis, although some readers may feel that the last two chapters of the book are beating a dead horse.

Overall, *A Rum Affair* presents an entertaining saga of the social dynamics in the parochial world of British floristic taxonomy in the mid-20th century; it provides a revealing glimpse into British botanical culture of that age that will bemuse American readers. In the 1940s the class differences between the Heslop Harrison and his Oxbridge/London enemies were apparently more consequential than would have been the case in the United States. The ambiguous role of John Raven remains slightly disquieting; his deceptive behavior in the clandestine trip to Rum detracts from his righteous, crusading role in exposing Heslop Harrison. He, and the others in Wilmott's circle, come across as social and academic snobs who apparently saw no serious ethical problem in bending the rules in order to expose Heslop Harrison's fraudulent behavior. Whether intentional or not, Sabbagh's account of all this is redolent of a comedy of manners in the pages of Trollope—we are missing only the Archdeacon! It also has something of the air of an anthropological treatise, describing the strange mores and supersititions of a secretive cult obsessed with unfathomable

minutiae of plant structures and relationships. Even more unkindly, Sabbagh comments that "botany does not have the image of a serious science." On the other hand, he graciously concedes that while "you don't expect botanists to win Nobel Prixes… you [also] don't expect them to blow up the world." Perhaps *A Rum Affair* is most commendable in the mirror it holds up so that each of us can see how much Heslop Harrison, Wilmott, or Raven is reflected in our own image.—Grady L. Webster, Herbarium, University of California, Davis.

North American Boletes: A Color Guide to the Fleshy Pored Mushrooms. Bessette, Alan E., William C. Roody, and Arleen R. Bessette. 2000. ISBN 0-8156-0588-9 (Cloth $US 95.00) 396 pp. Syracuse University Press, Syracuse, NY 13244-5160. - The boletes include some of the largest, strangest, most beautiful, and most delectably edible mushrooms that one is likely to encounter. They are impressive even to those normally uninterested in fungi, and they have inspired generations of devotees to collect and identify them. But the ugly truth is that they can be devilishly difficult to identify. This is because there are over 300 hundred species in North America alone, and many are rarely encountered, or similar in appearance. Worse yet, their descriptions are spread throughout various regional field guides and technical literature, and photographs or illustrations are unavailable for many. The new book, North American Boletes has made a giant leap toward solving this problem. It is the first, and only, comprehensive set of photographs and descriptions for North American boletes. All previous books, both field guilds and monographs, are either more regional, less complete, or both.

The photographs in North American Boletes are stunning - - so impressive that I would recommend this book to anyone with an interest in the boletes, even if it contained nothing beyond the photos. The color reproductions are excellent and in most cases multiple specimens are posed to reveal important macroscopic characters. The aesthetic appeal of these photos and the number of species photographed make this an easy book to peruse for hours. Photos are arranged alphabetically, which makes it easy to find particular species. Common species are often represented by several photographs to help document the range of variation. Short, semi-technical descriptions of the macroscopic features, spore color, spore dimensions, habitat, and edibility, and a comparison to similar species is provided in a uniform format for each species. In addition, the author and original citation for each species name is given at the beginning of each description. Common synonyms are often mentioned in the summary, and others are often cross-listed in the index. Descriptions and photos of gasteroid and lamellate boletes, such as Gastroboletus, Phylloporus and Meiorganum, are also included, as are photographs of "pseudoboletes", such as Albatrellus and Boletopsis. In addition photographs of 27 undescribed bolete species are provided, although descriptions or keys leading to them are not. Inclusion of these "new species" is a little frustrating, as many of them look so much like well-known species that it is not immediately obvious what sets them apart. However, others are clearly unique and are well enough illustrated that they are probably recognizable from these photos alone.

As stated in beginning of the book: "First and foremost this book is intended to serve as a guide for field identification ...", and "for amateurs" could be added to this statement. As such, the keys are based on non-technical macroscopic characters. In addition the terminology necessary is carefully defined and illustrated in the beginning of the book. The keys are divided between Eastern and Western North America, and within these two regions the species are broken down into seven or nine keys based on stipe and tube characteristics. These individual keys contain dichotomous couplets until they terminate in a set of from 2 to 8 short species descriptions. This will be a frustrating ending for many users, and is one of weakest features of the book. The book contains additional information of several types. It starts with a short dedication to Ernst Both, a living unsung hero of American boletes. A short history of "Boletology" in North America follows, and appendices on chemical regents, microscopic examination, collecting and cooking, and a glossary are given at the end.

At $95 from Syracuse University Press the book is a must for bolete lovers of all persuasions. Professional mycologists will find some deficiencies in the nomenclature, may dispute some of the species names assigned to the photographs, and may find it hard to jump to a particular species group and sort out the likely suspects, but will nonetheless, find it an indispensable book. Serious amateurs will love it; it was written for them, and there is no other book like it. – Tom Bruns, Department of Plant and Microbial Biology, University of California, Berkeley.

Chemicals from Plants: Perspectives on Plant Secondary Chemistry. N.J. Walton and D.E. Brown, eds. World Scientific Publishing Co. Pte.Ltd. ISBN: 981-02-2773-6 - I know what you're thinking - - ANOTHER book on secondary chemicals?! There have been some great works published recently, so what can this work offer that you don't find in the others? I was thinking the same thing, and was pleasantly surprised by the scope and target of this effort.

Instead of organizing chemicals by their structure (e.g. alkaloids, cyanide, flavonoids, etc.), this book opens with a Harborne chapter on the ecological significance of chemicals, and groups chemicals according to their function in the environment. For example, this examines antifungal compounds, those associated with symbioses, as well as the more common secondary metabolite roles as pigments and anti-feedants.

Did you know that 74% of our currently used, plant-based drugs were discovered through ethnobotany? Take heed pharmaceutical companies! Simmonds and Grayer first take an ethnobotanical track in their discussion of drug discovery and development, discussing matters such as the above statement, and pharmaceutical screening techniques that I will certainly cover in future Medicinal Plants courses. Then, the authors offer a wonderful blending of 21 different plants and the pharmaceutical drugs that are made from them (often including drug trade names, such as Vepeside from podophyllotoxin's derivative), and brief drug actions (e.g. anti-cancer).

Another chapter focused on disease prevention and dietary substances. Williamson et al. take a much needed look at the problems of too many secondary plant chemicals in the diet. They focus on two compounds known to cause human problems: potato glycoalkaloids, and furanocoumarins of the carrot family. We've heard a lot about breeding plants with higher secondary chemical levels to make them more pest resistant, yet increased pest resistance doesn't always mean a better food item. The authors then go on to discuss several known benefits from increasing other phytochemicals. This includes the ability of some chemicals to act as antioxidants (and a good discussion on the wide variety of antioxidant actions), chemicals that block or suppress cancerous growth, and phytoestrogens.

Other authors focused on plant products that are used as lead structures for drug development, using plant enzymes to produce novel chemical structures, inserting and expressing foreign plant proteins, and the future of biotechnology. Although I would openly admit their essential nature, I have to admit, as an ecologist, several chapters made my eyes glaze over a bit. I also know that my chemist and molecularly-oriented colleagues would find them the meat of the book. One chapter is dedicated to characterizing secondary metabolite pathways. This chapter is a good review of our current knowledge, and includes a solid discussion of techniques such as the use of labeled precursors, radioactive tracer studies, protein purification and characterization, and molecular approaches to characterizations. Another chapter focuses on secondary product isolation and analyses, and encompasses a whopping amount of information, from extracting solvents to common (and uncommon) detectors for GC's. A third chapter examines the methods used for elucidating structures of different plant secondary products (e.g. mass spectroscopy and NMR).

As you can see, the compilation covers a wide range of topics, and might make a good graduate-level text, or a nice addition to a personal or facility library. It offers a good range of chemistry, drug discovery, molecular and ecological topics, although the book does lean a bit towards molecular and chemical aspects. - Michelle A. Briggs, Department of Biology, Lycoming College, Williamsport, PA 17701

The Orchid in Lore and Legend Berliocchi, L., translated by L. Rosenberg and A. Weston, editted by Mark Griffiths, 2000. ISBN 0-88192-491-1(hard cover US$29.95) 184 pp. Timber Press, Inc., The Haseltine Building, 133 S. W. Second Avenuue, Suite 450, Portland, OR 977204 – Orchids are strange! Right? Right! Orchids are weird! Right? Right! Orchid aficionados will buy any book that deals with their favorite plant. Right? Right! So, collect a few myths, several biographies, a number of stories, descriptions of selected genera, and a tidbit or two. Add a few illustrations (relevant or not, properly reproduced or not, fuzzy or not) to the mix, throw in a few pages of abbreviated botanical and horticultural data, combine with a dash of information stir and concoct this volume. It is limited and incorrect in spots, informative here and there, but entertaining throughout.

The opening line of the book and a statement on page 10 if not narrow and Eurocentric are certainly misleading: "Exotic orchids have been part of *our* (italics mine) lives for more than two hundred years . . . " (page 9) and "*our* (italics mine)

knowledge of orchids begins with . . . botanical texts of the second half of the eighteenth century" (page 10) certainly contradict statements on page 29 that information on orchids can be found in a Chinese text published "about 800 B. C" and that they were mentioned in Sanskrit texts dated 1550-1000 B. C., the Ebers papyrus (1600 B. C.) and Assyrian herbals (668-675 B. C.). Actually, the Chinese *Shih Ching* (The Books of Songs) was published in the 10th-6th century B. C (2500-3000 years ago) and other books or references to orchids in China date back to about 500 B. C., the 3rd century, 30-124 A. D. and 581-645 A. D.(Chen and Tang, 1982; Hew 2001) Good copy editing would have caught the contradiction which matters less than the question: "who is '*our*' "? For me at least "*our*" should be the entire human race, not just Europeans (Berliocchi is Italian) whose arrogance in dealing with people from other continents (including the Americas) and races (former colonials?) seems to have no bounds. Even in listing women who took a dim view of orchids the book limits itself to British suffragettes and fails to mention Gian Chin, Mao Zedong's wife who also waged war against them as capitalist flowers while secretly growing fancy hybrids herself.

Myths of orchids are covered in chapter 1. They are fun to read. Some were new to me, but in the absence of citation it is hard to determine whether all of them are true myths or if some were contrived or at least altered by the author. I do know that he story about an orchid clinging to a skull in an Australian cemetery was first told about South America and even found its way into a science fiction tale. The story about the Costa Rican boy who ran off with a crucifix from a chapel to hide it from the conquistadors certainly makes no sense. Chapels and crucifixes did not exist in Central and South America until after the conquistadors imposed them on the people. Again, good copyediting would have caught this error.

Chapter 2, which deals with orchids from prehistory to history, is interesting but not free of faults. For example, I wonder what do illustrations of ancient pagodas and the entrance to Beijing have to do with orchids. A short paragraph on page 32 suggests that orchids are mentioned in the Egyptian Ebers Papyrus and Vedic writings of the Aryans and Assyrian herbals, all without details and attributions. In my 40 years of working with orchids this is the first time I read these assertions and find it difficult to accept them on faith. The rest of the chapter contains short biographies of orchid botanists, which are accurate for the most part even if telegraphic. However the description of Georgius Everhardus Rumphius contains several errors. He was not a professional adventurer, his *Herbarium Amboinenses* which consists of 6+1 volumes not 12, was completed before his death, not after it, and not a single volume of this legendary series (which I finally got to hold in my hands in the library of the Singapore Botanic Gardens) is devoted entirely to orchids.

Orchid patrons and hunters are the subject of chapter 3. It opens with a short introduction dealing with collectors which asserts that "the Low Countries were the first to import [orchids] from the Malay Archipelago" without providing a source. I find this statement to be questionable. The remainder of the chapter consists of short biographies of orchid botanists and collectors of the past. Like the ones in the previous chapter these biographies are mostly accurate, short and devoid of details, but not free of errors.

The fourth chapter deals with arts and customs. It nits, picks and chooses subjects and manages to be interesting, but is far from being complete, detailed and fully accurate. .

Chapter 5 deals with the plants themselves. It presents minimal information and since nothing in it has anything to do with lore or legends I assume that it was added to beef up the book. Unfortunately it contains several errors. The orchids referred to on page 119 as saprophytic are actually parasitic on their fungi. If saprophytic orchids exist they are yet to be discovered. On page 125 the labellum is described as twisting "around 180 degrees when the flower blooms . . ." This is not true, the entire flower turns in a process called resupination. The extent of turning can be 180E. However in some instances the flowers turn less than that. In several species the rotation can be as much as 360E and the flowers end up in the position they were before resupinating. Also on page 125 pollination is referred to as fertilization. The question about how subterranean orchids are pollinated which is described on page 129 as one about which "we have no idea" was answered long ago by Australian botanists (Dixon, Pate and Kuo, 1990).

Altogether *Lore* is typical of books written by people who may (or may not) be accomplished experts in another area and become fascinated by orchids. They gather snippets of information, collect a few factoids, read several books, give a number of talks to growers, acquire admirers and convince themselves that they are orchid experts. Then they write a book which could have been good, but is not simply because the author(s) did not have the expertise to write it. *Lore* is fun and easy to read, but the information it contains should not be accepted without many questions. – Joseph Arditti, Department of Developmental and Cell Biology, University of California, Irvine, CA 92697-2300.

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Chen, S. C., and T. Tang. 1982. A general review of the orchid flora of China. Pages 39-87 *in* J. Arditti (ed.), *Orchid biology, reviews and perspectives* Vol. II. Cornell University Press, Ithaca, New York.

Dixon, K. W., J. S. Pate and J. Kuo. 1990. The Western Australian fully subterranean orchid *Rhizanthella gardneri*. Pages 37-82 *in* J. Arditti (ed.), *Orchid biology, reviews and perpsectives* Vol. V. Timber Press, Portland, Oregon.

Hew, C. S. 2001. Ancient Chinese orchid cultivation. A fresh look at an age-old practice. *Scientia Horticulturae* 87: 1-10.

Teaching Greenhouse. Mohammad Mehdi Fayyaz. 2000. CD, requires Windows 95 or higher, or Macintosh OS 7.5 or higher. University of Wisconsin. – Dr. Fayyaz, who is Director of the University of Wisconsin's Department of Botany's greenhouses and gardens, has produced an interactive "reference for instructors, greenhouse managers, instructional laboratory specialists, technicians, and high school biology teachers involved in the plant sciences. It serves as an aid in the cultivation of plants grown in the greenhouse for class use, and as a guide to acquaint users with the various teaching applications these selected instructional plants embody." The CD includes:

· "Over 200 plant species, accessed by their Latin name, common name, or anatomical structures
· Each species' plant family
· Suggested varieties, cultivars and/or alternate species for classroom study
· A brief botanical description
· Greenhouse cultivation and propagation
· Teaching applications
· Interactive, illustrated glossary of terms
· Cross reference by plant anatomy to assist in determining which plant species exhibit certain characteristics needed for instructional exercises"
· Integrated Pest Management references and recommendations

I have spent several hours exploring the contents of this CD and found that it delivers what it promises. The interface and its cross-referencing via hypertext links make the CD intuitively obvious to use, and provide easy access to its contents. Since I teach plant science at a (small) college without the benefit of a "Director of Greenhouses and Gardens," I am responsible both for teaching and for maintaining our greenhouse with help from student assistants. With the CD **Teaching Greenhouse,** I see more clearly how to closely integrate those two activities. Students will find this CD easy to use as a reference for their work in the greenhouse, and as an aid in starting their research projects with some sound, practical advice.

I have only a few negative comments. As with many resources published electronically, typographic errors are too common. Several of the links use different names to refer to the same target (e.g. Anatomy vs. Plant Organs). Integrated Pest Management is not included in the Table of Contents, although it is included in the site navigation frame. Finally, Dr. Fayyaz promises that "future versions will incorporate photographic images of each plant and supplemental illustrations." These will be welcome additions, although the current version does include photographic and line-drawn illustrations of many of the terms in the glossary. Other information or features that I would find helpful, and which I recommend for future editions, include:

· Adding a section of "Greenhouse Management 101" for neophyte (student) workers, including directions for common propagation and cultivation procedures, recipes for various media, and an orientation to the importance of maintaining different watering/light regimes for different plants
· Adding an Index by Teaching Application
· Adding Links to Websites with Instructional Exercises

No information was provided regarding the price of this CD. Unless the cost is truly unreasonable, however, this handy resource should be carefully considered by anyone involved in the operation of a *Teaching Greenhouse*. – Jonathan Frye, Department of Natural Science, McPherson College, McPherson, KS 67460.

The Cattleyas and Their Relatives Volume VI. The South American *Encyclia* Species Withner, Carl L. 2000. ISBN 0-88192-435-9 (hard covers US$44.95) 194 pp. Timber Press, Inc., The Haseltine Building, 133 S. W. Second Avenuue, Suite 450, Portland, OR 977204. – This is the last volume in what is described with a "cutism" as "a book in six parts" (the proper, "uncute" and straight term is "a six volume series"). I reviewed favorably two of the previous volumes. This volume deals with *Encyclia* species other than those found in Mexico and central America. It is of the same caliber as the previous volumes in thi series.

As with many other orchids the genus *Encyclia* was subject to debates. At one time all encyclias were part of the genus *Epindendrum*. W. Hooker separated *Encyclia* due to the "circumstance of the column of fructification being enclosed in, or wrapped around by, the labellum (*Encyclia* = *circumvolvo*)". At present this is still the main characteristic, which separates *Encyclia* from *Epidendrum* in addition to the fact that "encyclias

possess a pseudobulb, while (*sic*, the proper word here is "whereas") most epidendrums do not." However the vagaries of orchid nomenclature and horticulture being what they are (with the Royal Horticultural Society exerting tremendous traditional, international and undue influence) hybrids involving these species must be registered as *Epidendrum* (and to be "valid" all orchid hybrids must be registered with the RHS). All of this leads me, a non-systematist, to wonder whether all this labellum warping (or maybe carping) is really, really necessary or just another gymnastic so typical of orchid taxonomists. Somehow I think it is the latter, but it is not Withner's doing

Withner described *Encyclia* clearly in volumes IV and V and deals lightly with the subject here. However on pages 7-9 he goes into some detail regarding what to look for in using the key. This is a very useful feature. It is followed by diagnostic line drawings of perianth segments, a table which attempts to organize the South American species by region and keys to species of different regions. The outcome is welcome clarity.

Descriptions of species occupy most of the book. Many of these descriptions are accompanied by line drawings. Color illustrations (most of them good) are grouped in the center of the book. The result is a pleasing, clear, instructive and to all appearances accurate book which is a bargain at the price. In fact the entire series is a bargain.

As far as I am concerned the book has only a single major fault, one found in all other volumes of this series: "Common names" contrived by the author. No one makes up common names; they simply arise. But, for reasons known only to himself Withner insists on inventing "common names" He does that by translating scientific names or elaborating on selected features. The result is "common names" like Acute Encyclia for *Encyclia acuta* (what are the chances that a term like "acute" would be part of a real common name? cute perhaps, but the awkward "common name" is certainly not that), Goias Enclyclia for *Encyclia goyazensis* [why not Goya's and is that a robed or disrobed orchid painted by the famed Spanish painter Francisco Goya (1746-1828) one of whose paintings scandalized some contemporaries?], Remote-flowered Encyclia for *Encyclia remotiflora* (is that a tongue twister or an orchid whose flowering is controlled by a TV/VCR/ multifunction remote control?) and Xipheres-like Encyclia (is that a rare tropical diseases or a Xipheres- or a xiphisternum or a sword or a comb-look-alike?). If not silly and pretentious these "common names" are simply funny.

Funny or not, this volume and the entire series are a credit to the author and well worth having and/or giving. It is a post (or even pre)-retirement effort any orchid specialist can and should be proud of. – Joseph Arditti, Department of Developmental and Cell Biology, University of California, Irvine, CA 92697-2300.

Flora de Murcia. P. Sánchez Gómez, J. Guerra Montes, E. Coy Gómez, A. Hernández Gomzález, S. Fernández Jiménez and A.F. Carrillo López. 1998. 2nd edition. ISBN 84-89820-60-0(paper, price not stated) 439 pp. DM Librero Editor, Merced, 25. 30001-Murcia. –While publication of the Flora of the Iberian Peninsula is still in progress (Castroviejo et al. 1986 *et seq.*), floras of smaller regions of the peninsula are extremely useful. This is not only because of their coverage of all vascular plant families, but also because it is usually more convenient to use one-volume local floras in the field. Murcia is a medium-sized (11,320 km^2) province in southwestern Spain. The Flora de Murcia includes identification keys to families, genera, and species in this area. About 15% of species are illustrated by simple drawings of average quality. Even though both native and naturalized species are represented in this book, clear distinction of their status is not always made (*Amaranthus* spp., *Bidens pilosa*, *Conyza* spp., *Xanthium spinosum*, etc). – Marcel Rejmánek, Section of Evolution and Ecology, University of California, Davis, CA 95616.

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Castroviejo, S. et al. (eds.) 1986 *et seq.* Flora Iberica Plantas Vasculares de la Península Ibérica e Islas Baleares. Real Jardín Botánico, CSIC, Madrid. [Eight of the projected 21 volumes have been published between 1986 and 1999.]

Flora of China. **Volume 24, Flagellariaceae through Marantaceae.** 2000. Wu Zhengyi and Peter H. Raven, co-chairs of the editorial committee. Science Press (Beijing), 16 Donghuangchenggen North Street, Beijing 100717, China and Missouri Botanical Garden Press (St. Louis), 4344 Shaw Boulevard, St. Louis, MO 63110-2291, USA; Hardbound, ISBN 0-915279-83-5 (V. 24), 12 unnumbered pp. + 431 pp. $85. - This the sixth of a projected 25 volumes. The work continues apace, having begun in 1994. Yes, it is going to take some time. The sequence of families is a modified Englerian one, so that clarity requires a listing of what's included here, in

alphabetical order: Amaryllidaceae, Bromeliaceae, Cannaceae, Centrolepidaceae, Commelinaceae, Costaceae, Dioscoreaceae, Eriocaulaceae, Flagellariaceae, Iridaceae, Juncaceae, Liliaceae, Lowiaceae, Marantaceae, Musaceae, Philydraceae, Pontederiaceae, Restionaceae, Stemonaceae, Taccaceae, Xyridaceae, Zingiberaceae.

The Liliaceae include 57 genera and 726 species, easily the largest family treated here. The volume will be of special interest because so many of these are cultivated, and because so many have counterparts elsewhere in the Old World as well as in the New World. The family as treated here is admittedly artificial; a more modern treatment might separate these in China alone into 18 different families, as is acknowledged in the introductory material on page 73.

The range of the flora is given on both front and back endpapers, to include Tibet and Taiwan.

The formatting is identical to the previous five volumes. There are no illustrations (these will appear in a separate volume). There are no nomenclatural innovations, these having appeared in a number of other places, especially *Novon*.

It is important to stress that, as before, this is not just a translation of previous Chinese-language treatments into English. A great deal of re-study has gone into the work, and it is genuinely new and critical. Some taxa heretofore ascribed to the Chinese flora are remarked on and excluded, typically with the phrase ". . . but no specimens of these taxa have been seen by the present authors." Species known in China only from cultivation are not included. Horticultural and medicinal uses are mentioned briefly. Ranges outside of China are given, where the taxon is not endemic to China. There are occasional, brief nomenclatural notes here and there, which will be of interest to the specialist. As is usual in floras, issues of typification are not treated, these being left to the more technical literature.

The editors have taken pains to make the flora useful and practical; for example, in the treatment of dioecious *Dioscorea*, the yam, there is one key to staminate flowering material and a second key to fruiting material. Everywhere, the keys are absolutely parallel and the legs are extensive and descriptive.

The flora is very much a world-wide cooperative effort, including a great many Chinese botanists as well as specialists elsewhere. This may account for the pace at which the treatments are appearing; it surely accounts for the overall excellence of the work.

We are promised a seventh volume (volume 8) shortly, to include the Brassicaceae, Crassulaceae, and Saxifragaceae. – Neil A. Harriman, Biology Department, University of Wisconsin-Oshkosh, Oshkosh, WI 54901.

Flowering Plants of the Galapagos. Conley K. McMullen. 1999. Cornell University Press, Ithaca, NY. ISBN 0-8014-8621-1. 370pp. - Most people know the Galapagos because of their unusual animals, whereas their plant diversity is not commonly discussed in the popular programming and literature about this archipelago. Unfortunately, this means that a very important part of the Galapagos biota remains relatively unknown to the general public. Furthermore, it is difficult for biologists first visiting the Galapagos Islands to begin discovering their floristic diversity since they must use the excellent, yet large and heavy *Flora of the Galapagos Islands* by Wiggins & Porter (1971; Stanford University Press). Books of such stature make problematic field companions. Furthermore, such books are difficult to use by non-botanists, particularly for the majority of tourist visitors to the Galapagos Islands every year. An optimal reference would be one that could be easily carried in the field, provide good descriptions and illustrations of plants and habitats, and be easily usable by the botanist and layperson alike. All these criteria appear to be met by the book *Flowering Plants of the Galapagos*, by Conley McMullen.

Beginning with a foreword by Sir Ghillean Prance, this book contains introductory sections addressing many issues, from basic plant morphology to Galapagos natural history. In the first section, "How to use this guide," there is a general overview of plant morphology, and a discussion of the structure of the species entries found in this book. Additionally, there is an illustrated guide to basic flower structure, inflorescence types, and leaf shape and arrangement. This section is followed by another more extensive section detailing the natural history of the Galapagos Islands, focusing predominantly on the vegetation of the archipelago. Herein are discussed the history of European discovery of these islands, details of geography, geology and climate, and an overview of the history of botanical exploration of this area. In addition, there is a discussion of floristic details, focusing on endemic taxa, degrees of endemism, and the number of other native and non-native plants. The arrival and establishment of floristic elements are reviewed, centering on fruit and seed modifications that aid in dispersal, seed germination and dormancy, and reproduction with reference to pollination systems. Examples are given from the local flora. A discussion is given on the several vegetation zones on the islands, presenting the details of seven different community types, specifically the littoral, arid, transition, *Scalesia*, *Zanthoxylum*, *Miconia*, and the fern-sedge communities. A summary of the threats to the Galapagos vegetation is offered, primarily addressing the effects of introduced plants and animals.

The majority of the remainder of the book consists of descriptions and details about numerous plant species. This large section, however, is preceded by a relatively short and simple key to the species covered in this book, organized according to a combination of growth form, leaf arrangement, and flower color. Groups of species are then placed in separate subsections in the book according to this classification scheme.

For each species covered, many details are given. At least one photo is provided, and both the scientific and common names are presented (the former including authorities), as well as the plant family. The geographic range is described, with considerable attention given to the range within the Galapagos Islands. Habitat information is mentioned, as is a detailed morphological description of the plant species. Furthermore, other miscellaneous comments are offered pertaining to its biology, botanical history, or human usage. Other similar plant species are also often discussed.

A detailed and illustrated glossary of plant morphological terminology is posted at the end of the book. There are two appendices, the first one listing all Galapagos plant taxa covered in this book organized by family, genus, and species; and the second listing plants commonly seen at numerous specific localities on each of the different islands.

Overall, this is an excellent field guide, yet there are some minor problems. First, the habitat information given for the *Zanthoxylum* zone is rather sparse compared to that of the other zones described. Although it is a habitat that has suffered greatly since the arrival of European immigrants, it would be interesting to know more about this endangered community type. Next, the habitat description for each of the species entries is limited to a choice of "moist uplands," "arid lowlands," and "coastal zone," despite the fact that seven vegetation zones were described in detail early on in the text. The author explains this by stating (p. 37) "this system is more valuable for visitors to the Galapagos because the seven vegetation zones, although attractive in theory, are obvious on only a few of the higher islands." This simplified classification system is essentially based on that of Johnson & Raven (1973; *Science* 179: 893-895). Although there are subtle differences between some of these seven ecological communities, this does not mean that a more detailed and precise ecological description should not be given for each species covered, just because the majority of visitors to the Galapagos won't come in contact with many of these places. The more detailed ecological classification gives interesting and valuable information nonetheless, and perhaps at least an intermediate classification system should have been used.

Another difficulty with this book consists of the placement of photographs. Although all photos are numbered to correspond with specific species entries, I occasionally found it necessary to have to search for the corresponding illustrations, which are sometimes found on nearby pages. And lastly, on some rare occasions, the identity of the species within photographs may be incorrect (e.g., the photo of *Passiflora suberosa* is actually one of *P. tridactylites*).

However, these problems are really quite minor, and are greatly outweighed by the positive attributes of this text. The level of information provided is detailed and diverse, with scientific references often cited, yet with not so much detail as to be overwhelming to the non-botanist. This book is useful for people ranging from tourists with limited background in biology, to the expert botanist. The introductory sections themselves are interesting, summarized clearly, and give a solid basic overview of the botanical and natural history of these islands, along with important basics for plant identification. It is well illustrated, with many high-quality photos, and covers a large enough diversity of the flora of the Galapagos to be a good introduction for anyone. Even the selection of plants covered, although only a subset of the total flora, are well chosen for their taxonomic, ecological, and geographic diversity. Through this guide the user will become familiar with many endemic plant genera and species, as well as many widespread taxa. For example, I found it interesting that several species of familiar plants native to the southern and central United States are also native to the Galapagos, such as *Desmanthus virgatus*, *Rhynchosia minima*, *Sapindus saponaria*, and *Zanthoxylum fagara*. In addition, the floristic lists for many field sites presented in Appendix 2 is a real bonus in a field guide, allowing the visitor to the islands to make focused excursions to see specific floristic elements. This is something rarely offered in field guides. Finally, it is a relatively compact manual, making it easy to carry in the field, an attribute not to be understated. In summary, it is easy to recommend this book for anyone interested in natural history, or at least for anyone who plans to travel to the Galapagos Islands. Even for someone not traveling to the islands, it is a useful botanical resource. —Douglas Goldman, L.H. Bailey Hortorium, Department of Plant Biology, Cornell University, Ithaca, NY 14853.

Genera Orchidacearum. Volume 1. General Introduction, **Apostasioideae, Cypripedoideae**. A. M. Pridgeon, P. J. Cribb, M. W. Chase, and F. N. Rasmussen., eds. 1999. ISBN 0-19-850513-2 (hardcover £45.00) 197 pp. Oxford University Press, Great Clarendon Street, Oxford OX2 6DP, U. K. – "*Lindley certainly dominated orchid science for over forty years from 1920 . . . he effectively cornered the market in access to he new orchidaceous discoveries . . . his prolific writing and publication . . . ensured that others naturally deferred to his opinion . . . [his] last significant contribution to orchid taxonomy . . . was . . . an attempt to monograph the [orchid] family . . . Completing the task, even then, was beyond the capabilities of any one man*" (pp. 117 and 141 in Cribb, 1999).

The quote above describes John Lindley (1799-1865), "the 'founding father' of orchid taxonomy" (p. 141 in Cribb, 1999) whose orchid herbarium was acquired by the the Royal Botanical Gardens, Kew (RBGK) in 1864 (Stearn, 1999). It also provides an insight into recent orchid related activities, policies and attitudes at RBGK (Hansen, 2000). In addition, the quote explains an extensive "Index of Synonyms" published in a horticultural work (Bechtel, Cribb and Launert, 1986) and was obviously intended to establish nomenclatural dominance for its author. The current volume and the entire projected series are clearly the intellectual offspring of Lindley's *Folia Orchidacea* (1852-1858), "his last contribution." Given the excellence of the volume under review here this is a fortunate and scientifically important international undertaking. The editors include two outstanding American orchid science polymaths (both currently at RBGK). One of them is also a talented scientist and a very effective editor of orchid publications (AMP) whereas the other (MWC) can count among his many impressive accomplishments the founding of orchid molecular taxonomy. Of the other two one is a leading, but controversial (Hansen, 2000), British orchid taxonomist at RBGK who is also active in CITES related activities (PJC). The other (FNR) is a Danish orchid biologist who has published on floral structures of orchids and is also a taxonomist.

Fittingly the first volume of this major taxonomic undertaking is dedicated to Robert L. Dressler, the leading orchid taxonomist of our day whose phylogenetic ideas and classifications schemes (Dressler, 1981, 1993) have influenced and still influence the thinking of all who work with orchids at present. This volume is divided in two parts. The first part presents basic information on the development of orchid classification, morphology, anatomy, palynology, embryology, seed morphology, cytogenetics and molecular systematics. These chapters are excellent as they stand. They are well written, authoritative, rich in content, clear and easy to read. There are only a few problems with what is present (see below). The problems are with what is missing. This includes a chapter on physiology and development despite the fact that some physiological and developmental processes may be of taxonomic value. Examples are: 1) resupination which occurs in some species but not in others and may vary in extent when it does take place (for a review see Ernst and Arditti, 1994), 2) spontaneous and pollination-induced floral senescence which varies within and between genera (for reviews see Avadhani et al., 1999; Hew and Yong, 1997), 3) dependence on and requirements for mycorrhiza for seed germination (for reviews see Arditti, 1967, 1979, 1992; Arditti et al., 1982; Hadley, 1982; Arditti and Ernst, 1984; Rasmussen, 1995; Currah et al., 1997), and 4) carbon fixation pathways which may differ within and between genera (for reviews see (Avadhani et al., 1982; Arditti, 1979, 1992; Hew and Yong, 1997). Phytochemisty is also missing despite the taxonomic importance of some carbohydrates (it is interesting to note here that the term was formulated during research on the carbohydrates of European orchids; for a review see Ernst and Rodriguez, 1984), antocyanins (for reviews see Arditti and Fisch, 1977; Ernst and Rodriguez, 1984; Avadhani et al., 1994; Hew and Yong, 1997) and alkaloids (for reviews see Lüning, 1974; Slaytor, 1977). Phytoalexins, which were first, discovered in orchids (Bernard, 1911) and can be genus specific (Stoessl and Arditti, 1984) are also not covered. And, mycorrhiza, which plays a pivotal but variable role in the life cycle of orchids (for reviews see Hadley, 1982; Rasmussen, 1995; Currah et al., 1997) is missing too.

The second part of the book is devoted to the Apostasioideae and Cypripedioideae. The taxonomic treatments are detailed and complete dealing as they do with many aspects of each group including descriptions, distribution, keys, cytogenetics, phylogenetics, name derivations, synonymy, anatomy, morphology, palynology, phytochemistry, ecology, pollination, uses, cultivation, propagation, extensive listings of literature and much more (but not physiology). This renders the volume not only a convenient and rich source of information but also a scholarly well-synthesized treatise on an interesting group of plants.

As mentioned above there are only (remarkably) few errors in this book, but for me at least (given my specialty areas in orchids and activities as editor and reviewer for 40 years) they are worth noting. The first two are on page 22 of the morphology chapter

(written P. J. Cribb, one of the four editors). One of these is the statement that descriptions of protocorms are available only for a limited number of species in five reports, which are cited in the chapter. This is absolutely not the case. Descriptions and illustrations (both photographs and line drawings) of protocorms of many species abound in the literature of the last century. The list is simply too long to cite here. Some of the best are in a book by a Russian embryologist (Poddubnaya-Arnoldi and Selezneva, 1957). Even if the text presents problems since it is in Russian, the illustrations are easy to identify and the captions contain scientific names in Latin letters.

A second error on page 22 is the assertion that "the term 'protocorm' was coined by the French botanist Bernard . . ." In fact the term was proposed by the Dutch botanist and long time director of botanical gardens in Bogor, Indonesia, Melchior Treub (1851-1910) to describe a stage in the germination of club mosses: ". . .*je propose de donner au tubercule embryonnaire des Lycopodes le nom de p r o t o c o r m e"* (spacing of letters in the last word as in the original, Treub, 1890). The orchid seedlings Noël Bernard observed in 1899 looked very much like the lycopod structures (Bernard, 1899; for illustrations see Treub, 1890) and he used Treub's term to describe them (Arditti, 1989). As a result the term entered the orchid literature (but with time the "e" was dropped) and became established to the point of leading to errors in attribution like the one here.

Another problem is an incomplete discussion of the phytochemistry of *Cypripedium* and *Paphiopedilum* (for some of what is missing and reviews see Ernst and Rodriguez, 1984; Hausen, 1984). The uses section on page 127 could have benefited from additional details (they can be found in Lawler, 1984).

On page 131 seed propagation is called "micropropagation." This not a proper use of the term which was originally defined "as any aseptic procedure involving the manipulation of plant organs, tissues and cells that produces a population of plantlets thereby making it possible to by-pass conventional sexual of vegetative propagation" (for reviews see Krikorian, 1982; Arditti and Krikorian, 1996). Seed germination is both conventional and sexual propagation and should not be referred to as micropropagation even if the techniques are aseptic and similar to tissue culture.

Also on page 131 the culture of immature seeds is referred to as "green pod method." This term is used by practical growers, but should not have used in a scientific book without a comment that the fruit of *Cypripedium* is actually a capsule. Regardless of terminology the section does not mention that the best time to culture immature seeds of *Cypripedium calceolus* is 40 days after pollination (Wagner and Hansel, 1994; Hansel-Hintner, 1996). This information (which is not mentioned in the review by H. Rasmussen, which is cited by the author) is important because it pertains directly to one species and may provide guidelines for other members of this genus.

Are the problems outlined in the paragraphs above critical or major? No, especially since this is the first volume in a series. There is plenty of time and probably enough space in forthcoming volumes for additions, errata lists and chapters on subjects that are missing now. Therefore I hope that my comments will prove to be helpful and constructive. In fact that is why I concentrated on areas in need of improvement rather than on the many positive aspects of this volume (also my list makes for a shorter review because it is not nearly as long as an enumeration of positives would be). This is also the reason for the many reviews I cited. A work like this was needed in Lindley's time and is even more welcome now. I am sure that by the time the entire six-volume series is published it will be complete, well rounded and a pleasure to both read and behold. It will contain more than enough good information to become the standard work in its field for many years to come and required reading for all who work with orchids. – Joseph Arditti, Department of Developmental and Cell Biology, University of California, Irvine, CA 92697-2300.

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Investigations into the Systematic Botany and Phylogenetic Relationships of *Takhtajania perrieri* (Capuron) Baranova & J.-F. Leroy (Winteraceae). Annals of the Missouri Botanical Garden, Vol. 87, no. 3. ISSN 0026-6493 (paper, US$35.00). 136 pp. Missouri Botanical Garden, St. Louis, MO 63110.——Shades of *Pakaraimea*, *Ticodendron,* and *Wollemia:* the discovery, rediscovery, or belated recognition of new taxa in small families, or those that are geographically isolated from their nearest relatives can generate intense interest, especially if the plant belongs to a group with botanical cachet. Such discoveries are now often used as opportunities for multidisciplinary studies that can catapult the subject from obscurity to being among the best known of their group. The discovery and resulting studies can also serve to improve understanding of the group as a whole.

So it is with *Takhtajania*, the only African member of the "woody ranalean" Winteraceae. Collected once in 1909, but not assigned to

Winteraceae until 1963 nor to its own genus until 1978, the plant was intensively but unsuccessfully sought at its type locality in Madagascar while the meager specimens of the original gathering were picked apart for their secrets. It finally turned up, some 150 km away, in 1994 (although not recognized until 1997) and the newly discovered large population of these understory shrubs or small trees has subsequently filled the research coffers of a whole slew of specialists who were sought out for their interest in "basal" angiosperms.

The results of their investigations are presented in this issue of the Annals of the Missouri Botanical Garden, which organized the work through the personal interest of George Schatz, who introduces the volume with an account of the growth of knowledge about *Takhtajania* and the search for more plants. Some of the studies focus on *Takhtajania* itself, including wood and bark anatomy (S. Carlquist), young shoots (R. C. Keating), flower structure (P. K. Endress et al.), pollen (F. B. Sampson), embryology (H. Tobe and F. B. Sampson), and fruit vasculature (T. Deroin), all studies based on fluid-preserved material. The remaining papers review the rest of the Winteraceae as well and their relationships to Canellaceae and beyond. These include the (largely micro-) fossil record (J. A. Doyle), water relations (T. S. Feild et al.), flower development (A. N. Doust), cytology (F. Ehrendorfer and M. Lambrou), and some molecular (nuclear and chloroplastal) data (K. G. Karol et al.). Missing are field studies on *Takhtajania*, such as pollination biology and regeneration ecology, as well as studies of secondary metabolites, especially alkaloids and flavanoids.

Although the Winteraceae is a small family of only about 60 species in 5 genera (or up to 8 depending on how much you split *Zygogynum*), there is no unanimity among the authors here on their mutual relationships. The floral data of Endress et al. identify two weakly structured clades in the family and link *Takhtajania* with *Pseudowintera* and *Zygogynum* rather than with *Drimys* and *Tasmannia*. The molecular data of Karol et al., on the other hand, support a stepped phylogeny with *Takhtajania* (usually) sister to the remaining genera, followed by *Tasmannia, Drimys, Pseudowintera,* and *Zygogynum*. This phylogeny is well-supported but represents only one fifth of the species in the family and less than 1.8 kbp of sequence. The data set includes a substantial number of parsimony informative indels, which were mapped onto the final cladogram *a posteriori* rather than contributing to its construction. Interestingly, these indels are almost all on the branches subtending the members of individual genera rather than within the genera or on the branches linking them. Thus, although potentially powerful, they actually provide almost no support for relationships among the genera.

As usual, more data would be helpful and an integration of more extensive molecular data with a broad spectrum of morphological characters for a larger sample of the family should lay to rest uncertainties about the intrafamilial relationships. Despite the enduring appeal of the "primitive" angiosperms, however, I can't help but feel that *Takhtajania* itself offers no key insights into angiosperm evolution. Other than the romance of its rediscovery after long years of concerted searching and its geographical isolation from the other genera, it appears (except for a very few features, like the bicarpellate, unilocular ovary) to be an astonishingly unexceptional member of its family. Still, the detailed studies in this volume present an enormous amount of new information on *Takhtajania* and also correct some of the errors that had arisen from study of the much more limited original material, as well as bringing together some handy review material on the Winteraceae as a whole. ——James E. Eckenwalder, University of Toronto, Department of Botany, 25 Willcocks St., Toronto, Ontario, Canada M5S 3B2.

Passion Flowers, 3rd ed. Vanderplank, John. 2000. ISBN 0-262-72035-3 (paper US$29.95) 224 pp. The MIT Press, 5 Cambridge Center, Cambridge, MA 02142-1493. - John Vanderplank is the curator of the National Collection of *Passiflora* at Greenholm Nurseries in Kingston Seymour, Clevedon, Bristol (UK). His third edition of *Passion Flowers* is an incredibly beautiful book that seeks to "…encourage readers to cultivate one of these lovely vines and enable them to identify any of the many species or cultivars growing all over the world". Toward this goal, the book consists of five chapters focusing on the classification, structure, cultivation, propagation, hybridization and history of this fascinating group of plants. He includes a chapter on passion flower butterflies (subfamily *Heliconiinae*), as passion flowers are the almost exclusive larval hosts for over seventy species of these tropical and neotropical butterflies. There is also a chapter on the pests and diseases commonly associated with these plants and the ways to control them. However, the majority of the book focuses on the description and discussion of 151 passion flowers, 30 of which are hybrids or cultivars. Most of the plant descriptions covered in the book are accompanied by a line drawing of a leaf and two stipules along with a color photograph. The discussion accompanying each description includes information regarding its natural distribution, specific cultivation strategies, uses and local name(s). There is an identification key toward the back of the book, a glossary of botanical terms and a list of suppliers, organizations and individuals interested in the cultivation of passion flowers.

The cultivation and propagation techniques outlined in *Passion Flowers* are very accurate and useful to the temperate zone gardener attempting to cultivate these wonderful plants in the greenhouse or garden. The chapter concerning the legend of the passion flower is well written and includes translations of Jacomo Bosio's origi-

nal work of 1609. Floral diagrams that accurately illustrate the structure of two commonly cultivated passion flowers and a glossary of terms enable the reader to understand the descriptions that are included in the book. In addition, the novice will find the identification key, which is based upon leaf shape and size, flower size, petal color and coronal filament color, easy to use.

Taxonomists familiar with *Passiflora* species will find problems with the descriptions and discussions included in the book. The treatment of each species, hybrid or cultivar varies in the depth of coverage and the author uses scientific terminology inconsistently. For example, in his description of *P. kalbreyeri* Mast. the author writes, "Vine Densely ferruginous-tomentose" whereas in the description of *P. karwinskii* Mast. he states "Vine Weak". In addition, although many of his descriptions are quite accurate, problems can be found when comparing some of them to the actual herbarium specimens and field records of botanists. For instance, in the author's description of *Passiflora tridactylites* Hook. he states, "It (*P. tridactylites*) is most distinct and easily identifiable by its small, tough, simple leaves and tiny yellowish flowers". He also reports that the plant grows wild in Jamaica. However, the leaves of *P. tridactylites* are tri-lobed, sometimes very deeply so, and the plant is endemic to the Galapagos. Furthermore, some forms of *P. suberosa*, admittedly a very closely related species, perfectly fit his description of a plant with "small, tough, simple leaves and tiny yellowish flowers". Field botanists will also find that the identification key, because of its limited species coverage (the genus comprises over 500 species) would not be very useful. However, the gardener who is interested in identifying one of the many cultivated passion flowers available in the horticultural trade will find it very helpful. Lastly, although the second and third editions of *Passion Flowers* are greatly improved over the first, many of the sweeping and sometimes misleading statements that Linda Escobar found bothersome in her review of the first edition (*Systematic Botany* 17:340) still exist.

In conclusion, this book should be of interest to passion flower enthusiasts who will be impressed and intrigued by the beautiful photographs and drawings of this interesting and diverse group of plants. The cultivation practices will also be invaluable to anyone wishing to grow passion flowers. If you have the second edition of *Passion Flowers*, keep it and enjoy it, but I cannot suggest that you rush out to buy this newest version. This is the "third edition" of this book. However, there were no major changes in the text or format of the book relative to the second edition. It would be best to call this a second paperback printing of the second edition. However, if you would like to learn more about passion flowers, and don't already own the second edition of *Passion Flowers*, you will thoroughly enjoy this book. – Kristen Porter-Utley, Department of Botany, University of Florida.

Pictorial Guide to the Common Woody Plants of the Northeastern United States. 2000. D. Kimbler, M. Clayton, & M. Adams. (CD US $20.00) University of Wisconsin-Madison, Department of Botany, Attn. Mike Clayton, 430 Lincoln Dr., Madison, WI 53706. - One of the challenges in teaching courses addressing plant diversity is to find the right sort of demonstration material. For much of the academic year it is difficult to take advantage of the native plant diversity for those residing at more northerly latitudes, since typically from October through April there is little native flora available. And even if the time of year or climate are more favorable, not everything that one might need or want is close at hand. Hence a compiled set of images can be an invaluable resource. And as computers have become indispensable teaching tools, the presentation of sets of plant images using this tool can be quite convenient, both through the diversity of images that can be saved, and the minimal physical space required for electronically archiving these files.

The Pictorial Guide to the Common Woody Plants of the Northeastern United States by Kimber et al. is one such computerized botanical resource. Developed for use with a botany class at the University of Wisconsin (Botany 402, Dendrology), this is a compilation of projects developed by instructors and undergraduates. It covers not just native woody plants, but also those naturalized and cultivated. The Pictorial Guide actually consists of separate collections of software and images of plants, usable both on a Macintosh (minimum of OS 8) or PC (minimum of Windows 95). All software required to view these images is contained on the CD. Through an introductory Adobe Acrobat Reader document, one can access the different elements of software, which are a catalogue of images using Portfolio Browser, and an interactive guide to winter twigs and a pictorial guide to trees designed with Macromedia Authorware.

The catalogue of images accessed through Portfolio Browser allows the user to, in theory, scan through all images files on the CD using sorting keywords of genus, species, and morphological features. The interactive twig guide through Authorware provides the details on winter twigs from 56 species representing 37 genera. An alphabetized list of these taxa is provided, and the user clicks on the name of the taxon of interest, which is followed by an image of a winter twig of that species. The image has labeled arrows pointing to positions of interest, i.e., the terminal bud, leaf scar, bud scales, cross-section, etc. Upon clicking on the points of interest the user is provided with a close-up image of that feature. The Authorware pictorial guide to trees presents a dichotomous key of several woody plant species based on several vegetative features, i.e. leaf shape and arrangement, and plant form. Choices are typically illustrated with a representative photographs, one couplet presented at a time. The user navigates through successive illustrated couplets, eventually arriving at an image of the species of interest.

Also on this CD-ROM are several folders con-

taining a multitude of pictures, these folders with contents organized by twig photos, family, genus, common name, or geography. There are two folders with respect to geography, one of plants native to the Northeastern U.S., and another of those not native. Within the latter folder, images are sorted by those native and not native to the U.S. overall, and within the folder of non-U.S. woody plants images are sorted by those of plants from China and Japan, those from Eurasia, and those that are "hybrid cultivars." This represents a lot of images, specifically over 1,400, representing 50 families, 113 genera, and greater than 230 species and some hybrids. These are the images viewed through Portfolio Browser, or can easily be viewed with JPEGView, which is included on the CD.

All these images presented in so many ways clearly provide a good teaching resource. The interactive Authorware resources integrate many of these images into an easily usable guide that illustrates morphology and the construction of dichotomous taxonomic keys. And the large collection of images in general provide a greater diversity of woody plant species than can be found within the immediate vicinity of most teaching institutions in the northern United States and southern Canada. Furthermore, many of these photos were carefully composed to illustrate interesting aspects of morphology, variation, and even human uses of a number of plant species. For example, a there is photo of the leaf variation present in *Acer negundo*, close-ups of the resin dots in the leaves of *Myrica pensylvanica*, cross-sections and details of the twigs of many species, and several photos of a cranberry farming operation. There are also useful composite images presented, such as one of the leaf attachment of several needle-bearing conifer genera. And with these images, instructors can create further composite images to use with teaching.

Unfortunately, despite the promising potential of this software package, there are an enormous number of problems. To begin, there are a surprising number of misidentifications or photos placed in the wrong folders. For example, the image provided of a fruiting branch of *Paxistima* (=*Pachistima*) *canbyi* (Celastraceae) is actually that of *Comptonia peregrina* (Myricaceae), and the image of a flowering branch of *Viburnum dentatum* is actually *V. farreri*, an uncommonly cultivated eastern Asian species. The image identified as *Quercus marilandica* is probably that of a hybrid between *Q. ilicifolia* and perhaps *Q. velutina*, and the habit image of *Kalmia angustifolia* is actually *Rhododendron catawbiense*, and the habit image of *R. catawbiense* is actually *K. latifolia*. An image of *Acer saccharum* leaves is placed in the *A. rubrum* folder, and there are other examples of this sort of problem with other taxa.

There are a large number of spelling errors throughout this package. *Acer ginnala* is spelled three different ways, *Aralia spinosa* is incorrectly spelled "*spinulosa*", *Sassafras* is misspelled, and other errors like this abound, which makes it difficult to search for images using Portfolio Browser.

Many images are problematic, often being too dark or blurry, the latter being true for many close-up photos. The size scale presented in the photos is often unclear as to the definition of the type of units. And many of the photos are not properly representative of the plants. For example, several photos were taken at the wrong time of year to be representative, e.g., almost all the acorn photos, which were photographed in the early summer when the fruit was about 20-30% full-sized. Furthermore, a surprisingly large number of photos were taken of senescent Autumn leaves or those that are diseased or otherwise damaged, none of which accurately represent the plants.

In some photos the nature of some morphological features is not clearly defined. For example, the photo identified as an inflorescence of *Acer saccharum* would be more accurately identified as being an inflorescence of male flowers. Likewise, the photo of immature catkins of *Alnus rugosa* is actually one of the immature female flower-bearing catkins.

Many genera in this package are represented by numerous photos from several species. Yet all too often proper comparisons can not be made because images of equivalent morphological features are not available. To make the proper comparisons one needs to have photos of flowers, fruit, buds, bark, cones, or other applicable features for all species represented. In this package, however, such morphological features are typically presented for only a subset of the species within a genus. For example, it would be good to see the bark of all species of *Quercus* presented in this package, and cone photos of both *Picea glauca* and *P. rubens* would have been useful. Furthermore, some common species were omitted from this package which would have provided useful comparisons with their congeners, such as *Picea mariana* and *Taxus canadensis*.

The folders with image files sorted by geographic range are full of inaccuracies. Several species are incorrectly placed in the folder of plants that are not native to the Northeastern U.S., such as *Aralia spinosa*, *Corylus cornuta*, *Kalmia latifolia*, *Quercus prinus* (better called *Q. montana*), *Rhododendron maximum*, and several others. Furthermore, several species are incorrectly placed in the folder of plants that are native to the Northeastern U.S., such as *Cladastris kentuckea* (= *C. lutea*), *Halesia carolina*, *Maclura pomifera*, *Paxistima canbyi* (which is also placed in the folder of plants that are not native to the Northeastern U.S.), *Tilia cordata*, *Viburnum opulus* (the latter two are Eurasian species), and several others. Quite frankly, these errors leave me wondering what the authors mean by "Northeastern U.S."

As handy as the two Authorware guides are, they represent merely a small subset of the species depicted in the 1,400 image files. This is unfortunate since it renders the Authorware applications to be of limited utility considering the diversity of woody plants within the Northeastern U.S. In addition, this guide has some errors with characters presented for identifying plants. For example, in order to correctly identify *Sorbus acuparia* in the pictorial tree guide, one would have to determine that

it has opposite compound leaves, despite the fact that the species (like most other members of Rosaceae) has alternate leaves. And in fact if one chooses alternate compound leaves they will not end up with this guide giving an identity of *S. acuparia*, but will meet with a photographic example of a tree with alternate compound leaves, which happens to be one of *S. acuparia*! Other such character-based problems exist with this guide. And some characters in this guide are poorly described, such as the key choice for the shape of the leaf bases of plants with opposite, simple, and entire leaves, given as "petiole bases of leaves joined by a transverse line or meeting" versus "petiole bases of leaves not joined by a transvers[e] line." Although this suggests that the authors may be trying to avoid more technical botanical terminology such not to overwhelm the layperson, it might be better to just use such terminology and provide a simple glossary with the software package.

Also disappointing with this Authorware pictorial guide is that it does not take the keying process to completion, often ending with a sizable list of taxonomic names to choose from at random to see what matches the plant in hand. This greatly limits the utility of this piece of software, and it would have been better to design the keys such that they get the user to exactly one plant.

And lastly, the interactive twig guide, although being a nice resource for identifying many species, has the problem of incomplete labeling. Many twig images are unlabeled at the points of interest that one can click on to see up-close, whereas many other images are properly labeled.

This Pictorial Guide to the Common Woody Plants of the Northeastern United States has a great deal of potential, and obviously a lot of work went into it. But it was quite disappointing to note all the errors and inconsistencies in this software package. For the user, such problems will invariably lead to abundant misidentifications and misinterpretations about the plants being covered, which is not what a teaching resource should do. Unfortunately it gives the impression that this was a project thrown together rapidly, yet which needed further refinement; consequently I find it difficult to recommend. However, if the problems outlined above can be resolved, and the entirety of the huge image collection can be integrated through the Authorware applications, or at least the pictorial tree guide, it would be a most remarkable teaching resource. —Douglas Goldman, L.H. Bailey Hortorium, Department of Plant Biology, Cornell University, Ithaca, NY 14853.

Sage. The Genus *Salvia*. Kintzios, Spiridon E., ed. xix + 297 pp. ISBN 90-5823-005-8, hardcover, US$110 at amazon.com. Harwood Academic Publishers, Amsteldijk 166, 1st Floor, 1079 LH Amsterdam, The Netherlands.- The generic name is derived from the Latin "salvare," "to be saved." This reflects its ancient role in medicine, and the roster of ailments for which it is sovereign is very long indeed: cardiac problems, eye afflictions, all manner of brain problems (including Parkinson's disease), kidney ailments, and so forth. The classical herbalist Gerard recorded that "Sage is singularly good for the head and brain, it quickeneth the senses and memory, stengtheneth the sinews, restoreth health to those that have the palsy, and taketh away shakey trembling of the members."

I took the title to mean that this was some sort of taxonomic monograph. Emphatically, it is not. There are neither keys nor descriptions. There are estimates of the size of the genus, which vary from 400 to 700 to 900 species. There is a list of some hundreds of species in one contribution, with many of the binomials unadorned with authors. The genus is worldwide, both naturally and in cultivation, but the emphasis in this volume is on a few species of Europe and Asia. One of these is *Salvia miltiorrhiza* Bunge, an Asian species long valued for its medicinal properties. The epithet at first glance looks misspelled, but it is not – it is a combination of Greek roots meaning "red root," I learned from an appropriate dictionary.

There are 32 contributing authors. Their expertise is in physiology, biotechnology, pharmacognosy, and agronomy. Their treatments are highly technical and the book is laden with chemical names and formulae.

A visit to a large grocery store, and never mind a health food store, will reveal a large public interest in what is here termed "phytomedicine." (The term is an illegitimate combination of a Greek with a Latin root, but it is probably too late to scrub it from the language.) It is evident from this book that such interest is taken very seriously, and it is heartening to see that folk medicine is being rigorously tested in some laboratories.

It is evident from the extensive references cited at the end of each chapter that there is a very large literature the expert needs to consult. Indeed, the concluding chapter in the book, "Scientometric analysis of science and technology bibliographic information sources with regard to genus *Salvia*," concerns itself with just this issue: how to find out what you need to know. There are 13 major databases which the authors concern themselves with. Some charge a fee so high that the authors could not consult them. They assess the various sources for their efficiency in unearthing references on *Salvia*, and they warn the reader against mistyping the search word as "saliva." The use of "sage" in the searches is also discouraged, because it turns up "sagebrush" (which is *Artemisia*, Asteraceae) and "Sage Grouse." It seems that some of the search machines charge you for each "hit," whether it is useful or not, and you can run up a heavy tab rather quickly.

This volume is the fourteenth in a series, with earlier volumes devoted to exhaustive studies of Black Pepper, Basil, Ginkgo biloba, and a number of others. There are twenty more volumes in preparation, including treatments of Licorice, Cinnamon, and Artemisia.

There is a concluding index, but it is by no means complete. For example, the quote from Gerard (*supra*) is cited on p. 11, but you' ll have to remember that, because there is no reference to it in the index. Most of the authors are not native speakers of English, and the editor is to be congratulated on rendering the various treatments into serviceable, if not entirely colloquial, English. – Neil A. Harriman, Biology Department, University of Wisconsin-Oshkosh, Oshkosh, WI 54901, USA; harriman@uwosh.edu

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