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Plant Blindness: “We Have Met the Enemy and He is Us”



The article on “Plant Blindness” by Wandersee and Schussler in volume 47 (1) of *Plant Science Bulletin* struck a chord with many readers. I continue to receive positive comments about the article and it was frequently mentioned at the Education Forum that preceded the Botany 2002 meeting in Madison. Although the article was directed primarily to those of us who teach, it also had wider interest and applicability. One could speculate, for instance, on the degree to which plant blindness afflicts our elected representatives and decision makers at funding agencies. To my eyes we clearly have a problem!

In this issue’s lead article, David Hershey provides some additional insight into the problem of “seeing” plants. David suggests that some additional related factors may be at least as important as “Plant Blindness” and makes some suggestions for things we can do as individuals to address the problem. More importantly, he has several suggestions for Society activities that could make a dramatic and positive impact on the public - - Executive committee take note! Wouldn’t it be fun, for instance, to periodically see Michael Christensen on the Jay Leno show “talking plants” with an exotic plant or two to show the audience or to hear Karl Niklas “talking plants” as a regular feature on “All Things Considered?” David may be correct in paraphrasing Pogo - - “We have met the enemy and he is us.” However, we are also the ones that can do something about it. Lets get started!

- editor

Wandersee and Schussler (1999, 2001) coined the term “plant blindness” to describe the widespread lack of awareness of plants and neglect of plants both in biology education and in the general population. This seems a very useful term to focus attention on those problems. It is well established that “plants are the most important, least understood, and most taken-for-granted of all living things” (Wilkins 1988).

However, Wandersee and Schussler (2001) have also hypothesized that plant blindness can also be taken almost literally as a human “default condition” due to limitations in human visual perception of plants. To avoid confusion, I will use the first definition of plant blindness in this article. Wandersee and Schussler (2001) make many interesting points in their discussion of visual principles relating to plant blindness, however, they do not eliminate plant neglect and zoochauvinism as causes of plant blindness.

Case for Visual Perception Causing Plant Blindness

The literature cited by Wandersee and Schussler (2001) on the limits to human visual perception apparently contains no specific experiments on human perception of plants. Zoochauvinism, plant neglect, and other causes of plant blindness have substantial concrete evidence to support them. Wandersee and Schussler (2001) present a very circumstantial case for a visual perception limitation as the main cause of plant blindness. Much of their evidence could also be used to support zoochauvinism and plant neglect as important reasons for plant blindness.

While the conclusion that people typically know less about plants than animals seems reasonable, it could be caused solely by plant neglect and zoochauvinism. It is not necessarily related to the figure that under 2.5% of the U.S. population is directly involved in raising farm crops. The percentage of the population

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involved in raising farm animals is probably not that far from 2.5%. The 2.5% figure may be misleading because it probably does not include people who process and sell farm crops; those who produce and sell flowers, turfgrass, nursery plants, bulbs, forest tree seedlings and gardening supplies; those who build and maintain landscapes, parks, arboreta, botanic gardens and golf courses; those who garden outdoors or indoors, those who make and sell fertilizers, pesticides, and other plant chemicals, etc.

Has there ever been a nationwide survey or test comparing student knowledge of plants versus animals? I have frequently heard of national tests of student knowledge in math, science, geography and history. Those reports usually seem to conclude that the majority of students are sadly deficient in the particular subject examined. It would be interesting to test the botanical literacy of biology teachers as well as students.

The argument that plants are nondescript when not in bloom ignores the fact that plants change dramatically with the seasons, more dramatically than animals in most cases. In the northern U.S., there is a nearly continuous change with the seasons starting with a burst of new plant growth in spring which is noticeable because of the new leaves on deciduous trees and the light green or sometimes red-tinted new leaves on evergreens. New leaf growth is accompanied and followed by a succession of blooming and fruiting from bulbs, trees, shrubs, vines, herbaceous perennials, bedding plants, weeds and wildflowers until frost. Then there are spectacular fall leaf colors followed in winter with deciduous tree and shrub branch silhouettes, colorful "berries" or intriguingly-shaped fruits, and textured or colored barks. Plant breeders have achieved nearly continuous blooming of many bedding plants so there is much less of a problem of plants being nondescript when out of bloom. Unlike animals, plants often possess pleasant fragrances.

The argument that people who have had few meaningful experiences with plants may pay little attention to plants seems reasonable but it could just be caused by plant neglect or zoochauvinism because the person never had a plant mentor.

The observation that although people see a lot of pennies during their lifetimes they cannot draw an accurate picture of a penny is not directly relevant to the situation with plants. To determine if students have a default visual limitation that prevents them from accurately drawing plants, but not animals, would require experimentation. For example, students could be given a lesson which focused equally on a plant and an animal, such as a bird nesting in a saguaro cactus or an ant and its myrmecophyte. Students would then be asked after the lesson to draw the plant and the animal. If they could accurately draw the animal but not the plant, then that might be evidence of a visual limitation specific to plants.

Preference Versus Interest in Plants

There are a few limited studies that indicate a majority of students prefer to study plants rather than animals. The largest study appears to be Wandersee and Schussler's unpublished survey of 274 grade four to seven students in one city which indicated that students preferred to study animals compared to plants by a "nearly" 2:1 margin (Wandersee and Schussler 2001). Considering how plants are virtually absent or in the background on most children's TV shows, cartoons, movies, books, and toys, having only two-thirds of students preferring to study animals over plants is surprisingly low.

One weakness of such surveys is that there has apparently been no attempt to determine if a preference for animals over plants is a default condition or a learned condition due to zoochauvinism or plant neglect in the school curriculum and media. Were any of the

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teachers of the surveyed students good plant mentors or were they too suffering from plant blindness?

Another important consideration is that a student preference for animals does not necessarily mean they have no interest in plants, nor do student preferences even seem that important in biology teaching. Biology curricula should not be determined by the preferences of the students but by what is important for students to know about biology. Many students object to animal dissections and teaching of evolution but biology teachers have strongly opposed changes in those areas. Thus, how significant to the case for plant blindness are surveys that say students tend to prefer animals over plants as objects of study?

In contrast to the student preference surveys is substantial evidence that many people are interested in plants. Plant curricula on Wisconsin Fast Plants, C-Fern, and gardening have proven popular with students. Gardening has often been named the top leisure activity in Gallup polls, and gardening is a huge, tens-of-billions of dollars per year business. There are thousands of gardening books in print. Cut flowers, flowering container plants, and other plant materials are standard gifts, symbols, and decorations for almost all occasions including holidays, birthdays, weddings, and funerals. There are hundreds of arboreta and botanical gardens, and many are popular tourist attractions. Each spring there are major flower and garden shows that draw large crowds. There are hundreds of gardening and plant-specific organizations plus thousands of local gardening clubs. The most visited exhibit at Walt Disney's EPCOT Center has often been the hydroponics display in The Land Pavilion. The flowering of the Washington, D.C. cherry trees is a major cultural event, as are similar festivals for blossoms of apple, peach, azalea, tulip, etc. in other areas. The fabulous flower-covered floats in the annual Rose Parade attract tens-of-millions of viewers each year. Excursions to see fall leaf colors are very popular. Wildflowers and other plants, such as redwoods and giant sequoia are big draws in parks. Each state celebrates Arbor Day, and trees are often planted as memorials. Every state has a state flower and state tree. There is a national flower and a campaign for a national tree. There is significant interest in champion trees (Jorgenson 1992), heritage trees (Meyer 2001) and exceptionally old trees (Lewington and Parker 1999). Plants are important elements in art, architecture, fashion and interior design. Two of the world's most expensive paintings are van Gogh's "Irises" and "Sunflowers." Plants are one of the most common themes on postage stamps.

Plant Mentors

It does seem very reasonable that having a plant mentor may be a key factor in preventing or overcoming

plant blindness by nurturing an interest in plants (Wandersee and Schussler 2001). However, the effectiveness of plant mentors is not direct evidence for a visual perception limitation causing plant blindness. Plant mentors could simply spark an interest in plants, thereby overcoming plant neglect or zoochauvinism.

I can personally add to the anecdotal evidence to support the value of plant mentors. When I was a child my mother and aunt encouraged me to grow plants on the windowsill. I still have a now forty year old grapefruit tree grown from a seed when I was a child. I remember being fascinated by the common philodendron my aunt grew in clear glass jars filled just with colorful glass marbles and water. Other positive experiences I remember were growing cotton and a sweet potato vine indoors, backyard gardening, making a weed collection in a high school biology class, and visiting Longwood Gardens. I remember being impressed by some of the plant activities described by Chesnow (1987). I also remember how boring a high school assignment on photosynthesis was because it involved no experimentation, but just looking up the answers to questions in the library.

Some examples of good plant mentoring would include the Wisconsin Fast Plants (Williams 1989) and C-fern (Renzaglia et al. 1995) curricula, Wandersee and Schussler's (2001) plant blindness poster, and "The Plant Lady", who visits 3rd and 4th grade classes to teach about plants (Rohrbaugh 1997). Other innovative examples of plant mentoring are Winterthur Gardens "Enchanted Woods" children's garden (www.winterthur.org/Enchanted/enchanted.description.htm) in Winterthur, Delaware and the May 11, 2002, Mini Page "A Kid's Guide to Flowers" which appeared in many of the nation's newspapers.

A unique example of plant mentoring is found at Bonfante Gardens (www.bonfategardens.com), a plant-themed amusement park in Gilroy, California which includes 25 of the world famous grafted "circus trees" created by Axel Erlandson beginning in the 1920s. The park opened on June 2001 and features gardens, a large greenhouse, educational exhibits and plant-themed rides, such as Garlic Twirl, Banana Split, Strawberry Sundae and Artichoke Dip.

Proven Causes of Plant Blindness

In contrast to the lack of specific evidence for a visual perception limitation as the cause for plant blindness, there is substantial concrete evidence that zoochauvinism and plant neglect are major causes of plant blindness. Zoochauvinism or animal chauvinism is the widespread tendency of biologists to consider it more important to study and teach about animals than

about plants (Bozniak 1994, Darley 1990, Greenfield 1955, Hershey 1996). Speaking for biology teachers, Maura Flannery, longtime *American Biology Teacher* columnist, has more than once stated the zochauvinist attitude. "I have to admit I don't give enough attention to plants ... in biology courses. ... I'm afraid this is a problem I share with many biology teachers. ... We are all more interested in animals: They react, they move, they even think. We can relate to them more easily because they are more like us." (Flannery 1991). "I am not alone in my prejudice; to many, botany is synonymous with what is dry, complicated, and uninteresting in biology" (Flannery 1987).

The high school biology text by Biggs et al. (1991) even had an anti-botany quotation by James Thurber, "I passed all the other courses that I took at my University, but I could never pass botany ..." Math teachers created a national outcry when the talking Barbie doll said that "Math class is tough" (Schroeder 1992) but biologists didn't make a peep when botany was maligned in the same way in a biology textbook. In sharp contrast, the quotation for the Human Biology unit of Biggs et al. (1991) was by Shakespeare, "What a piece of work is a man!" and the quotation for the Vertebrate unit was from "The Eagle" by Alfred Lord Tennyson,

He clasps the crag with crooked hands,
Close to the sun in lonely lands,
Ringed with the azure world he stands.

The wrinkled sea beneath him crawls;
He watches from his mountain walls,
And like a thunderbolt he falls.

Zochauvinism, which results in plant neglect in biology courses, is an extremely important problem in biology education because it distorts the reality of biology. "Our knowledge about the world around us is incomplete if we do not include plants in our discoveries, and it is distorted if we do not place sufficient emphasis on plant life" (National Research Council 1992). It is almost unbelievable that so many biology educators are apparently largely ignorant about and often biased against plants, which are such an essential component of life on Earth. However, they were taught that way by their biology teachers, and they will likely pass that ignorance of plants and bias against plants along to their students unless botanists work to break the cycle.

Contrary to Wandersee and Schussler (1999) who dismissed zochauvinism as a cause of plant blindness by calling it a "bugbear of zoological conspiracy", zochauvinism seems all too real. I have never heard zochauvinism characterized as a conspiracy. Nichols (1919) described how zoologists were the primary

instigators in combining separate zoology and botany courses into biology courses, presumably with the best of intentions. However, the more numerous zoologists wrote most of the biology textbooks and taught most of the biology courses. Therefore, it is not surprising that biology courses tended to ignore botany and overemphasize zoology. This "plant-lite" vision of biology in biology courses has apparently established great inertia over time. Botanists and botanical organizations have failed to mount a serious and sustained effort to reverse the situation and assure that biology courses give plants the attention they deserve. This has contributed to a downward spiral in plant biology research and education (National Research Council 1992).

Plant neglect is often the result of zochauvinism by biology educators but even botanists have sometimes been unwilling to do their share in teaching introductory biology courses (Greenfield 1955). Eliminating botany classes and replacing them with biology classes is an old and apparently chronic problem. Nichols (1919) described how botany course elimination resulted in "biology taught by a zoologist." In the late 1980s or early 1990s, the University of Maryland eliminated their introductory botany course, and the Horticulture Department had to establish a new introductory horticulture course to teach the basic botany that Horticulture majors needed for later courses. There has been a recent precipitous drop in introductory botany textbook sales attributed to the same type of replacement of introductory botany courses with introductory biology courses (Uno 2001).

Plant neglect is widespread in biology curricula at all levels (Flannery 1991, Honey 1987, Kurtz 1958, Stern 1991, Taylor 1965, Uno 1994, Walch 1975). Plant neglect is evident in many biology textbooks and many biology courses which have minimal plant coverage relative to animal coverage (Uno 1994). Plant neglect is evident in the course offerings of many college biology programs which offer few or no botany courses or offer botany courses much less frequently than zoology courses. Biology programs sometimes do not require biology majors to take any botany classes, yet typically do require one or more zoology courses. Few, if any, botany courses exist that are designed to fill the needs of education majors, so how can botanists expect precollege teachers to teach students much about plants or be good plant mentors?

Plant Neglect Outside Schools

There are many examples of plant neglect beyond schools and colleges but the Kew Mural (www.ibiblio.org/herbmed/pictures/misc/kew-mural.jpg) discussed by Wandersee and Schussler (2001) is not one of them as the Kew brochure on the After the Storm Trail explains (Kew 1994). The mural

was not commissioned by Kew Gardens but was a gift from a then 16 year-old Robert Games, who was impressed by the 1987 storm's destruction of Kew's trees. Games explained that he was inspired by a turkey oak that had fallen on Kew's two stone lions without damaging them. Wandersee and Schussler (2001) are incorrect that about two-thirds of the mural was covered by animals being displaced by the storm. Nearly two-thirds of the mural is the violent storm depicted as dark clouds and a giant man plus the two large stone lions that stood at the entrance to Kew gardens and figuratively defended it from the storm. There are a squirrel, rabbit and bird fleeing the storm but also a greenhouse and over ten trees or shrubs depicted. Games spent 1,000 hours making the mural and went to the trouble of using different types of wood from trees felled in the storm. It stands at the entrance to the After the Storm Trail which takes two hours to walk and visits thirteen of the tree species whose wood was used in the mural (Kew 1994). The spectacular Kew Mural is not an example of plant neglect but actually a good example of plant mentoring because it commemorates the sudden loss of a thousand trees at Kew and promotes an appreciation of trees.

Plant neglect is prevalent in science reporting. The June 6, 2002, demise of America's oldest white oak, the Wye Oak, was not intensely reported yet the April 26, 2002, rescue of a dog from a sinking ship was. May 2, 2002, was an unusual day for plant reporting because there were two botany stories on the internet wire services. The Associated Press reported on the discovery of the oldest angiosperm fossil, *Archaeofructus sinensis*, and Reuters reported on the blooming of *Amorphophallus titanum* at Kew Gardens (www.kew.org/titan/). Often, weeks or months go by without a single botany story appearing. There are certainly enough botanical discoveries that at least one or two plant stories should appear each week on the wire services.

A major aspect of plant neglect is the near total lack of plant characters in cartoons, movies, books, toys and games, which are filled with thousands of anthropomorphic animal characters. Mr. Potato Head is one of the few well-known plant characters. If there were some well-known plant characters on Sesame Street, at Disney studios, and in the newspaper comic pages, plants might be more popular with children. The VeggieTales video series is an example of how effective computer-animated plant characters can be in education. VeggieTales uses plants such as Tom the tomato, Larry the cucumber, Frankencelery, and Junior asparagus, to tell Biblical stories. The 19 VeggieTales videos have sold over 28 million copies and will soon spawn a movie, a book, a video game and other products (Luscombe 2002). It seems likely

that animated plant characters would be effective in teaching children about botany too.

Animals are the main focus on all of the many natural history TV series, such as *Wild Kingdom*, *Wild America*, *Animal Adventures*, *Zoboomafoo*, and *Crocodile Hunter*. Animal biology is a prime focus of the Animal Planet network and a major topic on the Discovery channel. The Home and Garden network focuses on gardening but not the scientific aspects of plants. There has apparently never been a long running TV series that featured plant science. The six-episode mini-series, *The Private Life of Plants*, is about the closest to a botany TV series. Only occasionally are there plant episodes on the PBS series, *Nature*, such as "Deathtrap", "Obsession With Orchids", "The Seedy Side of Plants" and "Sexual Encounters of the Floral Kind". The series, *Bill Nye the Science Guy*, had a memorable photosynthesis episode where Nye drove an old car covered with living lawn. There seems to be no good reason why an entertaining natural history or science TV series on plants would not be successful.

Zoos frequently get tremendous publicity from the birth of animals or acquisition of new specimens such as pandas or polar bears. However, botanical gardens and arboreta rarely seem to be in the news. Perhaps they could be if they had more unusual exhibitions, e.g. titum arums, parasitic plants, or Linnaeus' flower clock. Another marketing technique might use more of the fascinating stories behind many of their existing specimens, such as ginkgo, dawn redwood, handkerchief tree and carnivorous plants. It is unfortunate that more publicity has not been obtained for the recent discoveries of two new conifer species, Wollemi pine (*Wollemia nobilis*) in 1994 and golden Vietnamese cypress (*Xanthocypris vietnamensis*) in 2001.

Plant Neglect by Botanists and Biologists

Hoekstra (2000) identified the main culprit behind plant blindness, i.e. "Botanists work very hard to make their science second-rate in the eyes of the public." Or perhaps most botanists and botanical societies simply don't work much to promote botany or botany education (Hershey 1989, Mathes 1983). Hence, the title of this article, Plant Blindness: "We Have Met the Enemy and He is Us". The quote is by Walt Kelly from his famous Pogo cartoon for Earth Day 1971.

A dramatic example of plant neglect can be seen in the color covers of *American Biology Teacher*. Of the last 100 covers that featured nonhuman animals or plants, just 21 featured a plant while seven identified an animal and a plant. The remaining 72 featured animals. Several of the 72 animal covers also had a plant in the background, often occupying a greater area than the animal, but the plant was not identified.

American Biology Teacher columnist Maura Flannery (1999) asked "Why deprive ourselves of the joy of learning about organisms [plants] that have come up with so many fascinating strategies to deal with the challenge of life on Earth." However, in over twenty years and over 160 *Biology Today* columns (through May, 2002), Flannery has had only ten columns devoted mainly to plants. A couple dozen other columns briefly mentioned plants so all told around ten percent of *Biology Today* has dealt with plants. That is too low a percentage to be considered anything but plant neglect. By comparison, Uno (1994) found high school biology textbooks devoted a meager 14% of their chapters and 20% of their lab exercises to plants and botanical topics, including algae, biomes and photosynthesis. It is rather ironic that over three years and 28 issues have passed since *Biology Today* was last devoted to plants (Flannery 1999), a column that discussed the problem of plant blindness.

The many plant errors in the biology teaching literature is another sign of plant neglect. Too few college-trained botanists write precollege botany books so many are written by botanically-illiterate authors. It should not be surprising that precollege botany books often contain many serious errors. For example, Bonnet and Keen (1989) has at least a couple dozens errors such as saying that xylem transports waste, that phloem transports starch, that chlorophyll is a catalyst, that celery is a monocot, that plants can exhibit hydrogen deficiency symptoms, and that iodine is an essential element for plants.

The National Gardening Association's Growlab elementary grade gardening curriculum (Cohen and Pranis 1990, Pranis and Hale 1988) has serious errors such as stating that plants only respire at night, that every seed is either a monocot or dicot, that a cotyledon is attached to the stem above a true leaf, and that the carbon dioxide level in the atmosphere was less than 50 ppm in 1850. The Life Lab curriculum (Jaffe and Appel 1990) also teaches elementary science through gardening but reinforces the long outdated view that plants eat soil in the song, *Dirt Made My Lunch*. Even a teacher who I had never met expressed her dismay at that song when it was sung at the National Science Teachers' Association national meeting. It certainly seems to be plant neglect by plant science societies when National Science Foundation funding for plant science curriculum development goes to nonscience organizations, such as the National Gardening Association, rather than to actual plant science societies.

The botany inaccuracy problem even extends to the refereed biology teaching literature apparently because too few botanists write or review teaching articles. A 1999 article on "Supermarket Botany" in *American Biology Teacher* (Avery and Smith 1999) was authored

by a Ph.D. herpetologist and a Ph.D. ornithologist and generated four letters-to-the-editor complaining of the numerous errors. Ironically, the "Supermarket Botany" article appeared in the same issue as Wandersee and Schussler (1999). A recent article by a Ph.D. animal physiologist (DeGolier 2002) contained several errors such as saying that all cold hardy plants thermoregulate. In truth, thermoregulation is a rarity in the plant kingdom, and only a few flowers, such as skunk cabbage, thermoregulate (Seymour 1997).

What to do to fight plant blindness?

If botanists want to overcome plant blindness then undergraduate and precollege education must be made a priority by professional plant science societies. The prevalence of "research chauvinism" in the scientific societies and universities also needs to be overcome (Hershey 1996). It seems logical that a lot of the education effort has to be aimed at precollege teachers, particularly elementary school teachers, who can act as plant mentors before students are turned off to plant study for life. Plant science societies could become important in the fight against plant blindness by having hands-on botany exercises and current information useful to precollege teachers. Currently, these websites have very little of use to precollege teachers, especially the 100,000-plus elementary school teachers. Plant science societies could fight plant blindness in the following ways:

1. Develop a curriculum for a service college course designed specifically for precollege teachers, especially elementary school teachers, which gives them experiences with innovative hands-on plant activities and curriculum materials about plants that they can use in their teaching. Assist college botanists to establish such courses nationwide.
2. Make sure that introductory biology textbooks at all levels have adequate and accurate plant coverage and place online model biology textbook chapters for plants. Biology textbooks with accurate and adequate plant coverage could be given some kind of a botanical society seal of approval.
3. Make the main page of every botanical society website a tool to fight plant blindness. It should visually and intellectually promote an interest in plants for nonbotanists. It should support precollege teachers and college biology teachers who are nonbotanists by providing the following:
 - a. Interesting, educational features that keep the website fresh, such as a daily birthday bio of a famous botanist in history, a daily botany quotation, botany question of the week, a weekly plant profile, weekly plant misconception, and plant-themed activities or games for children.

b. Simple, inexpensive, and fast hands-on plant exercises for class labs for all levels pre-K to college (Uno 1994).

c. Lists of plant examples for general biological concepts (Uno 1994).

d. An online glossary of botanical terms to help standardize botanical terminology and provide a ready reference for teachers and students.

e. Frequent teacher updates online for traditional plant teaching topics, such as photosynthesis, tropisms, fall leaf coloration, transpiration, and plant taxonomy and newer topics of great importance, such as phytoremediation, bioengineered plants, and ecosystem destruction by introduced plants.

f. Recognition of innovative and dedicated botany teachers and their innovative plant biology teaching methods.

g. Bibliography of botanically accurate teaching materials.

4. Publish plant teaching articles in the society's refereed paper journals or in an online teaching journal to show that botanical societies genuinely value teaching scholarship and to encourage more such scholarship.

5. Fund a special plant issue of *American Biology Teacher*.

6. Sponsor a plant science exhibit at major flower shows.

7. Have a botanist periodically appear on TV talk shows, such as *The Tonight Show with Jay Leno*, to show fascinating plants. Leno's show frequently features exotic animals.

8. Issue at least one plain English press release per month on a recent botanical discovery. Seasonal press releases should also be issued on seasonal topics such as pollen allergies, blooming of the Washington D.C. cherry trees, Arbor Day, fall leaf coloration, Christmas trees and poisonous holiday plants. Press releases on plant topics in the news should also be made available so that the public has some plant experts to rely on for situations such as the infamous *60 Minutes* Alar scare.

9. Offer annual awards for an excellent plant teaching article or website.

10. Reach out to instructors of introductory college biology courses who are not botanists to encourage

them to include an appropriate amount of botanical coverage so that "The first year course, then, should make a bright young student feel that this is the golden age in which to be a biologist and the golden age in which to be a botanist" (Steward 1967).

Conclusions

Plant blindness seems to be a useful and catchy term for widespread botanical illiteracy and neglect of plants in biology teaching but there is no concrete evidence that plant blindness is caused by a limitation in human visual perception of plants. In contrast, there is much solid evidence that zoochauvinism and plant neglect are widespread and are important causes of plant blindness. Therefore, to improve the state of botanical education, the most productive approach would be to work to reduce zoochauvinism and plant neglect. Greenfield (1955) provided good advice on these issues, "The wisdom of experience dictates ... a calm and realistic acceptance of any situation, however bad, with dedicated resolution to work towards solving the problems and improving conditions."

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News from the Society

I. Annual Reports of Executive Committee, Editors, and Webmaster

(note: below are summaries of report highlights. The complete reports may be viewed on the BSA website: www.botany.org.)

President's Report, 2001-2002

Retirement of Kim Hiser, BSA Business Manager, effective November 30, 2001. Temporary reassignment of responsibilities amongst Treasurer, CPA, Secretary, and Business Office staff.

Invitation from Peter Raven to locate BSA headquarters at the Missouri Botanical Garden, site visit Jan. 1-2, 2002, with Pres.-Elect Scott Russell, agreement between BSA and MBG signed March 21, 2002.

Renewal of MOU with Department of Plant Biology at Ohio State University, to house Meetings Office and Meetings Manager.

Job description, advertising and search for first BSA Executive Director; appointed Search and Screening Committee.

Agreement with Daniller + Co. for fundraising consultation, David Northington principle contact.

Appointment of joint *ad hoc* committee with American Association of Botanic Gardens and Arboreta (AABGA) to explore ways of collaboration and cooperation.

Appointment of Centennial Planning Committee.
-Judy Jernstedt

Past President's Report, 2002

Committee on Corresponding Members: this committee did not function this year as there is a full complement of Corresponding Members at present, and no new ones were to be added.

Elections Committee: As Chair of the Elections committee, I initiated solicitation for nominations, the committee established a list of potential nominees, these were contacted and a roster of candidates prepared. The nominees for President-Elect were Linda Graham* and Loren Reiseberg, and the nominees for Program Director were Jeff Osborn* and W. Carl Taylor. *elected

Plenary Speaker: After several tries, I invited Dr. Martin Apple, President of the CSSP (Council of Scientific Society Presidents) to be Plenary Speaker for Botany 2002. It is a good idea to start at least a year ahead on finding a Plenary Speaker. In the process we also invited Peter Raven to give a Special Lecture, and I invited Neil Campbell to be Speaker at the Forum.

Plenary Symposium: In consultation with the President's of participating societies in Botany 2002, the theme for the Plenary Symposium was selected to be "Evolution- highlighting plants". This is appropriate since plants provide many important insights into the pattern and process of evolution, and frequently are overlooked when examples of evolution are sought for teaching or research. Speakers for the symposium include: Dr. Michael Donoghue (systematic/phylogenetic perspective), Yale University, Dr. Loren Rieseberg, Indiana University (microevolution, processes, speciation), Dr. Gar Rothwell, Ohio University (contribution of the fossil record), Dr. Todd Vision, University of North Carolina at Chapel Hill (genome level evolution), and Dr. Anj Petto, University of the Arts (Evolution in the classroom).

Young Botanist's Awards.

Fourteen students were nominated for Young Botanist's Awards. After considering these, we determined that eight merited the Certificate of Special Achievement and 6 the Certificate of Recognition.

Following is a list of the awardees, their institution, and primary nominator.

Young Botanist Awardees for 2002 Certificate of Special Achievement

Name	Institution	Nominator
Carolyn Reilly	Ohio University	Dr. John Mitchell
Anna Sherwood	Washington State Univ.	Dr. Pam Soltis
Eva Hager	Miami University, Ohio	David Francko
Sabrina Byrum	Miami University, Ohio	David Francko
Katie Kettler	Miami University, Ohio	David Francko
Ryan Blenkush	Univ. Calif., Davis	Dr. James H. Richards
Selena Smith	Univ. Alberta	Dr. Ruth Stockey
Stephen Reynolds	James Madison University	Dr. Conley K. McMullen

Certificate of Recognition

Cary S. Miller	Ohio University	Dr. John Mitchell
Shannon Beach	Univ. of Illinois	Dr. Janice Coons
Pieter Badenhorst	Southern Ill. Univ.	Dr. Barbara Crandall-Stotler
Andrew Ertley	Miami University	Dr. David Francko
Karl Gustafson	Miami University	Dr. David Francko
Mark Tancig	University of Florida	Dr. Doug Soltis

-Patricia G. Gensel

President-Elect's Report, 2002

The major responsibilities of the President-Elect are: (1) to appoint committees that will be activated at the close of this meeting, (2) to prepare a banquet address for the BSA banquet, (3) prepare to take office and (4) perform demised duties as assigned by the President. Reports on these activities are available elsewhere or will be evident by the close of this meeting. In addition to these activities, I have also been involved in the decisions of the BSA to move its business office to Missouri Botanical Garden facilities in St. Louis, Missouri, which will occur soon. I also serve as a member of the search committee to name the BSA's first Executive Director and will serve as president when the Executive Director starts. Among my demised duties have been serving as liaison to libraries during the transition of the American Journal of Botany Online to controlled access. These discussions resulted in improved long-term strategies to achieve competitive pricing for the journal that will allow it to continue to flourish. In upcoming years, we have connections that we can use to continue to gather data on the impact of subscription increases.

-Scott Russell

Secretary's Annual Report, 2002

I served as the Society's Secretary at the BSA Annual Meeting in Albuquerque, NM, Saturday, Aug. 11 through Thursday, Aug. 16, 2001. In this

capacity I took minutes at the Executive Committee meetings Saturday night and Thursday morning, at the BSA Council meeting on Sunday, and at the BSA Business meeting on Tuesday. In addition, I served as the recorder for the BSA Strategic Planning meeting on Thursday, Aug. 16, and summarized and distributed to the meeting participants the results of this planning exercise. I also prepared the announcements for the Society Awards presented at the BSA Banquet. The award descriptions and winners were given to *PSB* Editor Marsh Sundberg and published in the *Plant Science Bulletin*, as were the BSA Council reports.

I participated in, took notes, and distributed summary minutes from the spring Executive Committee meeting in St. Louis, OH, April 5-7, 2002. I participated in the on-going Executive Committee discussions and decisions on BSA business, which occur via e-mail throughout the year. I also responded to inquiries and correspondence directed to the BSA Secretary. I sent out reminders to Committee members concerning deadlines for their Committee work. I have worked with Marsh Sundberg and Jeff Osborn to develop ideas for affiliated society memberships and begun to organize re-writing the Duties of Officers handbook.

With the help of Webmaster Scott Russell, I collected the annual reports of the Executive Committee, the BSA Council members, and the Committee Chairs, compiled the reports, and posted them on the BSA webpage. I helped President Judy Jernstedt and President-elect Scott Russell plan the agendas for the 2002 BSA Council and Business Meetings and the agenda for the BSA Banquet, as well as the agendas for the pre- and post-meeting Executive Committee meetings.

-Jennifer H. Richards

TREASURER'S REPORT

1. Assets of The Botanical Society of America (as of 30 June, 2002)

Endowment Funds (includes all sectional accounts and special funds)

Common stock & Options	\$1,514,061.29
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Money Funds	\$ 324,813.63
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Total	\$1,866,619.85
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Bank Accounts

Society's Checking	\$ 39,326.90
Society's Saving	\$101,389.63
Business Office Checking	\$ 80,050.00
Business Office Savings	\$129,654.16
Total	\$350,420.69

2. Allocation of funds to sections.

A proposal was presented to the Council for a more

equitable and flexible allocation of funds to sections. This proposal establishes eligibility standards (representation at the Council, an annual report, a business meeting) for receiving an annual allocation. Allocations will be based upon activity at the annual meeting rather than membership numbers. These changes are intended to give active sections more resources and encourage more activity at the annual meeting.

3. 2001-2002 Fiscal Year

As of 30 June, 2002, the end of the third quarter, the Society's revenues fell well short of their projections (budgeted - \$867,600, YTD - \$723,145.23, shortfall - \$144,454.,77). However Society expenses were also considerably less than anticipated (budgeted - \$897,600, YTD - \$447,827.93, shortfall - \$426,789.37). Since many expenses are incurred in the 4th quarter, I project that the Society will end the fiscal year with a budget surplus. Smile!

4. 2002-2003 Budget Proposal

The new initiatives undertaken may stretch the Society's resources in the short term, but a reduction in publication costs (30% reduction in number of printed copies since onset of online version) allows some redistribution to new expenses. These actions are anticipated to improve the Society's fiscal picture in the long term, but since fund raising and development activities have a lag time before realization, expenses and revenues will be watched closely.

The proposed budget is based upon anticipated revenues of \$881,700. The proposed expenses of \$880,000 would produce a surplus of \$1,700. Even if membership revenues fail to meet estimates, the deficit will be manageable, so generally speaking, the Society's finances are in good shape. If the 2002-2003 fiscal year follows patterns of recent years, both revenues and expenses will fall somewhat below targeted figures. The hiring of an Executive Director and new business office personnel, the move and setup of the business office, the addition of E-commerce capability for membership renewal, and the relocation of the web page and its management, means some new expenses will be realized and no large surplus can be expected. Excess funds from fiscal year 2001-2002 will be used if some of these transitional expenses threaten to generate too much red ink.

5. Annual Meeting – A Budgetary Perspective

Budgetarily the post-AIBS Annual Meetings have been a huge success. In simple terms they have paid for themselves while incorporating many costs usually borne by the Society's operating budget, e.g., plenary speaker and program director expenses. This year's Educational Forum appears to be improving upon

past years' successes. Presently meetings are budgeted on a break even basis: they are not a source of revenue. For next year's budget, this includes a shift of an additional 25% of Johanne Strogan's salary (Meetings Manager) and duties to the Meetings budget (proposed 75% meetings manager/25% business office) as well as the travel and other expenses incurred the by the Program Director.

-Joseph E. Armstrong

PROGRAM DIRECTOR'S REPORT

COORDINATION OF THE SCIENTIFIC PROGRAM FOR BOTANY 2002

NEWS COVERAGE. The news divisions of four national periodicals, *Science* magazine, *National Geographic*, *TheScientist*, and *Science News* were contacted with information about Botany 2002 and an inquiry about obtaining news coverage. At this date, reporters from *National Geographic* and *TheScientist* will be attending. A press release about Botany 2002 was also prepared for distribution to local and regional news outlets.

The Forum Program for Botany 2002

This year's inaugural Forum, focusing on botanical education and outreach, will begin on Friday evening, August 2, with early registration and an welcoming reception. The main FORUM program will occur on Saturday, August 3, with a Keynote Address by textbook author Dr. Neil Campbell titled "Botany Education in our Schools and Colleges: An Optimistic Forecast," and 23 one-hour sessions, including two on funding opportunities available at the National Science Foundation (NSF). The individual sessions are grouped within five topical themes, or 'threads,' that span the Forum program, and these have been scheduled such that those from the same thematic thread don't overlap at the same time slot. A range of topics will be addressed in interactive panel and roundtable discussions, breakout groups, as well as informational sessions.

On Sunday, August 4, the Forum is formally linked to the annual scientific meeting via workshops and field trips, for which attendees register separately. Sixteen hands-on workshops are available as two-hour, half-day, and full-day events. Two workshops are sponsored by the NSF and the Deep Gene Research Coordination Network, and these are free to registrants.

Although the principal focus of the Forum is undergraduate education and related outreach, K-12 teachers have been encouraged to participate, and several hands-on workshops are targeted for K-12 educators.

The Forum is sponsored in part by the National Science Foundation (NSF), Project Kaleidoscope (PKAL), the Council on Undergraduate

Research (CUR), the Deep Gene Research Coordination Network, and Prentice Hall publishers. There were approximately 300 participants.

The Scientific Program for Botany 2002

All BSA disciplinary Sections have some function(s) scheduled at Botany 2002 except for the Bryological and Lichenological Section (ABLS is meeting independently in 2002) and the Mycological Section. However, the Mycological Section is a co-sponsor of one symposium. Detailed schedules for the sectional programs are presented in the final Program, and summary information for the number of presentations and sessions for the entire conference is presented below. Approximately 1000 pre-registered.

Total number of presentations	748
Talks	570
Contributed papers	443
Symposium presentations	121
Special lectures and addresses	6
Posters	176
Regular submissions	143
Recent Topics	33
Discussion Sessions	2
 Total number of sessions	 61
Contributed Papers	43
Symposia / Colloquia	13
Special Lectures	2
Posters	1
Discussion Sessions	2

Future Annual Meetings

2003 – MOBILE, ALABAMA. Botany 2003 will be held from **July 26-31, 2003** in Mobile, Alabama. In addition to the BSA, other societies participating in the conference will include: the American Bryological and Lichenological Society (ABLS), the American Fern Society (AFS), and the American Society of Plant Taxonomists (ASPT). The theme for the conference is "Aquatic and Wetland Plants: Wet & Wild," and a logo has already been designed. In addition, Harvard biologist E. O. Wilson has accepted an invitation to deliver the Plenary Address.

Calls. The "Call for Symposia," "Call for Workshops," and "Call for Field Trips" for the 2003 Annual Meeting were distributed in the BSA-wide Spring 2002 mailing and posted on the Botany 2003 web site. Copies of these "Calls" were also sent to the Program Chairs of participating societies. Deadlines for submissions of on-line proposals are as follows: Symposia (July 15, 2002 for the Paleobotanical and Systematics Sections, and September 15, 2002 for all other Sections); Workshops and Field Trips: (October 15, 2002). The "Call for Papers" will be distributed in the BSA-wide Fall 2002 mailing, as well

as posted on the web site.

2004 – SNOWBIRD, UTAH. Botany 2004 will held at the Snowbird Conference Center in Snowbird, Utah from August 1-5, 2004. Programmatic Planning for this meeting has not begun in any significant way, but a Plenary Speaker will soon be invited.

2005 – Location not yet determined. 2005 is also the year of the next International Botanical Congress (IBC), and this may affect our annual meeting registration numbers.

2006 – Location not yet finalized. This is the BSA's Centennial year, and we're hopeful that the conference will be held at one of the Society's founding institutions. In addition, special programming will be included in the conference to celebrate the Societies 100 years.

-Jeffrey M. Osborn

The American Journal of Botany

1. Publication status

Year	MS Received	Total Pages	Publications
2001 – 2002	356	2,189¹	232²
2000 – 2001	347	2,184	224
1999 – 2000	325	1,804	189
1998 – 1999	301	1,820	181
1997 – 1998	325	1,802	212
1996 – 1997	323	1,728	181
1995 – 1996	325	1,618	176

2. Manuscript status

	2001–2002	2000–2001	1999–2000
Accepted or at Allen Press	116	147	166
Out for review	<u>110</u>	<u>45</u>	<u>47</u>
total	226	192	213

3. Production schedule

	2001–2002	2000–2001	1999–2000
Receipt to final editorial decision			
excluding split reviews	1.2	1.1	1.2
including split reviews	2.1⁴	3.5	7.4
Receipt to publication	4.5⁵	7.4	8.3

¹ On average, 182 pages per issue; 19.9 papers et al. per issue; 9.4 pages per paper (decline in the length of papers, e.g., 9.8 pages per paper in 2000 – 2001).

² 225 research articles; 8 brief communications; 3 special papers. An additional 7 book reviews were published. Total = 239 manuscripts.

⁴ ~17% of all manuscripts received a 'split decision'; 54% of all of these manuscripts were accepted; rejection rate for all manuscripts, on average, was ~ 41%.

⁵ Receipt of final manuscript to appearance in print. Time from submission to appearance in print ~ 11.5 months due to delay of authors providing revised manuscripts for 3rd

review or final manuscripts after successful first round of reviews. The time to appearance in print is governed by the number of manuscripts published per issue not by the efficiency of journal staff.

4. Highlights: Backlog of manuscripts reduced significantly since the adoption of new signatures. Turn-around time from receipt of final manuscripts to appearance in print reduced by ~60% (compared to August 2000 – July 2001). Special Papers and book reviews have not been actively solicited, although we continue to look for excellent SPs and will continue to publish reviews of important new books. Citation Index ranking of the *AJB* increasing. *AJB* has been mentioned in *Science*, *Nature*, and *Science News*.

5. Recommendations: Maintain current issue-size. Maintain manuscript backlog at ~100 manuscripts. Target 6–8 months as optimal turn-around time from submission to appearance in print. Maintain average manuscript length by continued rigorous review, encouraging authors to reduce length, and discourage publication of large data sets, voucher tables, and similar materials in bound-copy. Shift readership from bound- to electronic-copy. Support request for staff annual salary increments. Hire a copy editor at junior level (one of our staff has left for health reasons). Reduce institutional and individual subscription rates in developing countries (as defined by *NATO*). Raise an endowment for the *AJB*. Increase advertising in the *e-AJB*. Appoint *AJB* editor-in-chief as a non-voting member of the *BSA* EC.

-Karl J. Niklas

Plant Science Bulletin

Volume 47

1. Four issues, 180 pages, were published on schedule. This was 40 pages more than the previous volume. Half of this increase was due to an expanded annual reports section (Secretary Richards has been very successful in obtaining reports from almost all sections and committees). The press run was 4500 copies, 100 fewer than volume 46. It was distributed quarterly, packaged with the *American Journal of Botany*.

2. Production cost for volume 47 was \$14,301.37

3. Feature articles included:

-Toward a Theory of Plant Blindness 47(1)

-Ethics in Science: Preparing Students for their Career 47(2)

-Educational Program about Wildland Fire Integrates Plant Science into Curriculum 47(3)

-The E.A. McIlhenny Natural History Collection 47(4)

4. 160 books, CD's and Videos were received for

review; 83 reviews were published. In previous volumes only about 1/3 of the books received were reviewed; we would like to maintain at least 50%.

5. Both PDF and HTML electronic versions are posted on the BSA web page.

Volume 48

1. Two issues, 76 pages, have been published on schedule. The press runs were 3800 copies 48(1) and 4000 copies 48(2). The fall issue is in preparation. Mailing continues to be with *American Journal of Botany*.

2. Production cost for volume 48 (1&2) is \$5511.60.

3. Feature articles included:

- Why Botany;? The Future of Botany at the Undergraduate Level; Preparing a Grant Proposal for NSF 48(1)
- Reflections; Some Practical Bioethics for Botanists 48(2)

Upcoming articles will include: a response to "Plant Blindness;" articles on the Sarah P. Duke Gardens and Bellingrath Gardens (the latter as a promotion of our Mobile meeting in 2003).

4. 55 books have been received for review; 35 reviews were published.

Individuals interested in submitting lead articles or in suggesting future article topics should contact the editor.

-Marsh Sundberg

Webmaster's Report

Total page requests: Total hits: 1,644,458 hits (from March 4, 1997 through June 30, 2002). There were 571,948 in 2001 and so far 292,832 in 2002 (projection: 585,664), up 2.4%.

Main BSA Site (www.botany.org): In June 2002, there were 40,827 page requests, with logins from 13,719 distinct hosts, 2.275 Gbytes (77.657 Mbytes/day) downloaded from the main BSA site, 84 countries, 2,519 distinct files and 169,798 individual requests (one day over 2,000; five days under 1,000). Busiest day of the month: 20/Jun/02 (2,153 requests for pages). **All-time highs include:** 69,982 page requests (August 2001), 2.275 Gbytes (77.657 Mbytes/day) downloaded from the main BSA site (June 2002), and 240,853 individual requests (April 2002), 97 countries (November 2001), number of distinct hosts: 19,432 (April 2002), distinct files requested: 3,030 (September 2001). The second highest number of countries visiting was 94 (May 2002). The seven busiest days have been in August 2001: 3/Aug/01: 4459, 4/Aug/01: 4795, 5/Aug/01: 5799,

6/Aug/01: 5747, 7/Aug/01: 7154, 8/Aug/01: 5934

Requests from 84 countries were received in June 2002.

A total of 156 countries outside the U.S. have been logged on the BSA website, from January 1998 to the present (up from 141 last year).

Access statistics are available for the following BSA domains from the BSA home page: BSA Main Site = <http://www.botany.org/>; BSA Images = <http://images.botany.org/>; Botany 2000 (meeting site) = <http://www.botany2000.org/>; Botany 2001 (meeting site) = <http://www.botany2001.org/>; Botany 2002 (meeting site) = <http://www.botany2002.org/>; Botany 2003 (meeting site) = <http://www.botany2003.org/>; BSA Announcements site = <http://announce.botany.org/>; AJB Supplemental Data site = <http://ajbsupp.botany.org/>; McIntosh Apple Development site = <http://mcintosh.botany.org/>.

BSA runs its own web servers, domain name servers, email service and security systems. Steve Wolf runs the BSA Directory. This has not always been reliable (i.e., when the webmaster is out of town) and relies too heavily on volunteer effort. We are investigating moving all web service to Missouri Botanical Gardens and are also considering outsourcing an e-commerce site for membership dues and subscriptions to a company. The web versions of documents and membership are increasingly becoming the focal set of references for the BSA. Future web use should increasingly use the web to electronically archive digital correspondence as it serves as an ideal means of disseminating information within the BSA membership and leadership and to the outside world.

BSA Image Site: This site continues to be popular and fluctuates with the academic term. The server has provided up to 7746 pages of data in one month with almost 3 gigabytes of data downloaded. The home page was reorganized to emphasize the search feature. This has improved utility of the site somewhat. This was moved to a faster server in December 2001.

American Journal of Botany Online has now been in operation for over three years. Last year, over 500,000 page retrievals occurred with a total of 72.5 Gigabytes of data downloaded. Both of these are 100% increases. With access control instituted, we will find much lower data transfer rates. The average weekly number of PDFs downloaded has gone from 3000 per week to 300 per week, and data transfer rates are about 1/3 of what they have been. We are still building our online subscriber base, however, and they will never be this low again! Of the members, 1,027 have activated their accounts, whereas 1,270

have not. Of subscribing institutions, 48 have activated their subscriptions, whereas 42 are not activated.

-Scott Russell

Paul Wolf (2004)
Nancy Morin (2005)
Jon Shaw (2005)

II Committees

Committee on Committees

Almost all positions are filled. The entries below are color-coded: automatic appointments are blue, new appointments are green, important notes are red. Following is the constitution of committees as of July 26, 2002.

Standing Committees (Administrative):

COMMITTEE ON COMMITTEES (6 appointed members; 3 year terms) **(ONE OPENING)**

New President-Elect (2003), Chair, ex officio

Ned Friedman (2003)
Jerrold Davis (2003)
Missy Holbrook (2004)
Gar Rothwell (2004)
Bob Jansen (2005)

Jennifer Richards (2003), Secretary, ex officio

FINANCIAL ADVISORY COMMITTEE (3 members; 3 year terms) **(FILLED)**

Harry T. Horner (2004), (Chair)
Russell Chapman (2003)
Greg Anderson (2004)

Scott Russell (2003), President, ex officio

Joe Armstrong (2004), Treasurer, ex officio
Business Manager, ex officio

ANNUAL MEETING COORDINATING COMMITTEE (3 members; 3 year terms) **(COMMITTEE DISSOLVED)**

ANNUAL MEETING PROGRAM COMMITTEE **(NO OPENINGS)***

Jeffrey M. Osborn (2002) (Chair) — **New Program Director (2005), ex officio**
Program Organizer of each Section
Chair, Local Organizing Committee
Representatives of Other Societies meeting with BSA

ARCHIVES AND HISTORY COMMITTEE (2 appointed members; 5 year terms) **(NO OPENINGS)**

Ronald Stuckey (2003) (Chair)
Lee Kass (2004)
Pamela Soltis (2003), Immediate Past Secretary, ex officio

CONSERVATION COMMITTEE (6 appointed members; 3 year terms) **(FILLED)**

Tom Ranker (2004) (Chair)
Harvey Ballard (2003)
Diane Horton (2003)

EDUCATION COMMITTEE (6 appointed members; 3 year terms) **(FILLED)**

Rob Reinsvold (2004) (Chair)
Neil Sawyer (2003)
Stephen Scheckler (2003)
Margaret Kuchenreuter (2004)
Tom Rost (2004)
Gordon Uno (2005)

Scott Russell (2003), President, ex officio

Jennifer Richards (2003), Secretary, ex officio
J. S. Shipman (2003), Secretary of the Teaching Section, ex officio
Marsh Sundberg (2004), Editor of the Plant Science Bulletin, ex officio
David Kramer (2004), Immediate Pair Chair, Education Committee, ex officio

ELECTION COMMITTEE (3 appointed members; 3 year terms) **(FILLED)**

Judy Jernstedt (2003), Past President, Chair ex officio

Barbara Crandall-Stotler (2003)
Richard Olmstead (2003)
Steven Manchester (2005)
Jennifer Richards (2003), Secretary, ex officio

MEMBERSHIP AND APPRAISAL COMMITTEE (5 appointed members; 5 year terms) **(FILLED)**

Donald Hauber (2003)
Lyn Loveless (2004)
Massimo Pigliucci (2005)
Michael Mayer (2006)
Ruth Stockey (2007)

Business Manager, ex officio

PUBLICATIONS COMMITTEE (5 appointed members; 3 year terms) **(FILLED)**

Nancy Dengler (2003) (Chair)
Pat Herendeen (2004)
Andrea Schwarzbach (2004)
Mary Barkworth (2005)
Diane Marshall (2005)

Karl Niklas, Editor, AJB, ex officio
Marshall Sundberg, Editor, PSB, ex officio
Scott Russell, Webmaster, ex officio
Business Manager, ex officio

WEBPAGE COMMITTEE (5 appointed members; 3 year terms) **(FILLED)**

Scott Russell, Webmaster & Chair
Jim Reveal (2003)
Pam Diggle (2004)
James Mickle (2004)
Janice Glime (2005)
Carl Schlichting (2005)
Rob Reinsvold (2004), Education Committee

Chair, ex officio
Marsh Sundberg (2004), Editor, PSB, ex officio
Karl Niklas (2004), Editor, AJB, ex officio
Jennifer Richards (2003), Secretary, ex officio
Business Manager, ex officio

Standing Committees (Awards):

CORRESPONDING MEMBERS COMMITTEE (Past Presidents) (NO OPENINGS)*

Pat Gensel (2004), ex officio
Douglas Soltis (2003), ex officio
Judy Jernstedt (2005), ex officio

MERIT AWARDS COMMITTEE (3 appointed members; 3 year terms) (FILLED)

Chris Haufler (2003), **Chair**
Chris Campbell (2004)
Lynn Bohs (2005)
Scott Russell (2003), President, ex officio

DARBAKER PRIZE COMMITTEE (3 appointed members; 3 year terms) (FILLED)

Robert Bell (2003), **Chair**
Debabish Bhattacharya (2004)
Rick McCourt (2005)

ESAU AWARD COMMITTEE (3 appointed members; 3 year terms) (FILLED)

Geeta Bharathan (2003), **Chair**
Dennis Stevenson (2004)
Larry Hufford (2005)

KARLING AWARD COMMITTEE (6 appointed members; 3 year terms) (NO OPENINGS)

Gene Mapes (2003), **Chair**
Kathleen Pryer (2003)
Javier Francisco-Ortega (2004)
Amy Litt (2004)
James Quinn (2004)
Susanne Renner (2004)

MOSELEY AWARD COMMITTEE (3 appointed members; 3 year terms) (FILLED)

Kathleen Pigg (2003), **Chair**
Cindi Jones (2004)
Frank Ewers (2005)

PELTON AWARD COMMITTEE (3 appointed members; 3 year terms) (FILLED)

Elliot Myerowitz (2003), **Chair**
Darlene Southworth (2004)
Sarah Hake (2005)

Ad Hoc Committees:

MEMBERSHIP TIERS COMMITTEE (COMMITTEE DISSOLVED)

EXECUTIVE DIRECTOR SEARCH COMMITTEE

Ed Schneider, Chair
David Northington
Judy Jernstedt
Scott Russell

PUBLICATIONS OF THE SOCIETY

American Journal of Botany (**NO OPENINGS**)
Karl Niklas, Editor-in-Chief (2004)

Plant Science Bulletin (FILLED)

Marshall Sundberg, Editor (2004)

Editorial Committee for Volumes 47/48

Norman C. Ellstrand (2003)
James Mickle (2004)
Andrew Douglas (2005)
Douglas Darnowski (2006)
Andrea Wolfe (2007)

Representatives to Various Organizations:

AAAS COUNCIL (NO OPENINGS)

Patrick Herendeen

AIBS COUNCIL (NO OPENINGS)

Patricia Gensel

ASSOCIATION OF SYSTEMATICS COLLECTIONS (NO OPENINGS)

Laurence E. Skog (2003)

BIENNIAL INCORPORATION, STATE OF CONNECTICUT (NO OPENINGS)

Kent E. Holsinger

COUNCIL OF SCIENTIFIC SOCIETY PRESIDENTS (EACH PRESIDENT-ELECT) (NO OPENINGS)*

New President-Elect (2003)

NATIONAL RESEARCH COUNCIL COMMISSION ON LIFE SCIENCES BOARD OF BASIC BIOLOGY (NO OPENINGS)

Jennifer Richards (2003), Secretary, ex officio
-Scott D. Russell

BSA CONSERVATION COMMITTEE

At the request of President Judy Jernstedt, the Conservation Committee reviewed a proposal by the US Department of Agriculture, Animal and Plant Health Inspection Service to modify certain phytosanitary rules, a summary of which follows.

"SUMMARY: We are proposing to revise our regulations regarding the movement of plant pests by adding risk-based criteria for determining the plant pest status of organisms, establishing a notification process that could be used as an alternative to the current permitting system, providing for the environmental release of organisms for the biological control of weeds, and updating the text of the subpart. These proposed changes would clarify the factors that would be considered when assessing the plant pest risks associated with certain organisms, facilitate

the importation and interstate movement of regulated organisms, and address gaps in the current regulations.”

After reviewing the entire proposal, the Conservation Committee informed President Jernstedt that the proposed changes seemed relatively insignificant and should have a minor impact on the botanical community.

-Tom A. Ranker

Darbaker Prize Committee

The Darbaker Prize for 2002 will be awarded to Dr. Arthur R. Grossman at the 2002 BSA Banquet. This prize includes a certificate and check for \$1000.

-Louise A. Lewis

Education Committee

The Education Committee sponsored workshops for K-12 teachers at the Texas Regional Science Convention and the National Science Teachers Association Annual Meeting in San Diego. We also sponsored a booth at the NSTA Convention where over 20,000 teachers from across the nation attended. The two workshops organized by Tim Gerber and Rob Reinsvold were well received and well attended (in both cases we exceeded the seating capacity of our assigned rooms). At the booth we had an interactive activity to help teachers explore more ways to incorporate more plants in their teaching of biological concepts. Based on our records we talked with nearly 1500 teachers and administrators. The new apple development posters were a big hit and will be in classrooms across North America (we gave out nearly 1000 poster in the first couple of days.)

The Education Committee also commends Jeff Osborne and the Forum Committee in organizing the first Pre-conference Forum in Madison. Based on the initial plans this looks like it will be a success.

In the past several years the Education Committee has help lead the botanical educational outreach efforts for the nation. We have collaborated with other societies to prepare materials and sponsor workshops for teachers. We have concentrated on NSTA and NABT national meetings to get the most “bang for the buck”. We are requesting \$10,000 for next year to continue the educational outreach activities.

-Rob Reinsvold

Elections Committee

This year election of President-Elect and Program Director was needed. A call for nominations by the

membership was conducted and their reponses tallied. The Elections Committee generated a list of names of possible candidates for election to the offices of President-Elect and Program Director. Potential candidates were contacted and the following ballot list resulted: President-Elect: Linda Graham, University of Wisconsin, Loren Rieseberg, Indiana University; Program Director: Jeffrey Osborn, Truman State University, W. Carl Taylor, Milwaukee Public Museum. Results of the voting is: President-Elect- Linda Graham and Program Director- Jeff Osborn.

Some discussion took place, within the Election Committee, and in conversations with potential candidates, which raised points we consider important for future consideration:

1. What characteristics should we be looking for in a potential President? Here, name recognition, knowledge of how BSA works, contribution to the society were some attributes mentioned. Some prior experience, such as having served on one or more committees or on the Council, or holding a previous office was judged important by some but not all individuals. Commitment to the society is important.

2. It has been suggested that the Program Director should not be an elected position, but an appointed one.

-Pat Gensel

Financial Advisory Committee (FAC)

The FAC has the responsibility for managing the BSA Endowment Fund. The BSA assets are invested through Salomon Smith Barney (SSB) under a management group (managed funds). About 23 percent of the endowment is retained in an unmanaged money market fund within SSB. Normally this percent is maintained at 15 percent, but the decrease in the value of the stocks has changed this percent. All of these funds are divided among the following categories (as of June 28, 2002):

Managed money funds –

Cash balance	\$	155.40
Money funds	\$	20,406.00
Accrued dividends.	\$	11.84

Common stock & options . . \$1,386,565.18

Unmanaged money funds		
Money funds	\$	324,982.46
Accrued dividends.	\$	<u>168.55</u>
Total		\$1,732,289.23

The present BSA Endowment fund (\$1,732,289.23) is less than at the end of June 2000 (\$1,867,492.41). However, the fund has grown 95.6% since its inception 8.5 years ago (12/93; \$884,317). This represents, with this year's losses, an average increase of 11.28%

per year.

The economic events prior to and following September 11, 2001, and the continuing volatility in the stock market, especially this past June, have affected the growth of the BSA endowment. However, financial restructuring of these funds in 2000 greatly reduced the impact of these more recent events.

Last August, two recommendations were approved: \$27,400 was recommended for use from the Endowment Income for the 'special initiatives' during the 2001-2002 fiscal year, as determined by the Executive Committee and Council per Guideline 4. (see Guidelines below); and both section and special accounts are to have an interest rate equal to the endowment interest rate.

Daniller + Company was hired for at least a three-year period to aid the EC and Council in a strategic plan to increase the visibility of the BSA and to enhance its gift-giving for society initiatives.

Recommendation: The FAC recommends that **\$13,700** be used from the Endowment unmanaged money market portion of the endowment for the 'special initiatives' during the 2002-2003 fiscal year, as determined by the Executive Committee and Council per Guideline 4 (see Guidelines below).

Rationale for Recommendation: The severe economic conditions of the past year have affected the stock market significantly. Fortunately, the BSA Endowment Fund was reasonably protected because of its reorganization and restructuring the previous year. Nonetheless, the losses that have been incurred are reflected in the reduced amount recommended by the FAC for the 2002-2003 fiscal year. Even though there was a loss, the FAC feels that BSA 'initiatives' for the 2002-2003 fiscal year are vitally important to the continued growth and development of the Society and need to be supported, even at a reduced level, through the Endowment Fund.

The Endowment Fund Guidelines and Interest Earnings for Special and Section Accounts are available on the web to clarify decisions related to the operating procedures of the FAC and the determinations by the BSA Treasurer of how 1) the annual amount for BSA initiatives is determined; and 2) the annual interest percentages for the special and section accounts are determined.

Karling Awards Committee

Karling Awards were made to the following students. The list gives the student's name, university, title of the project, and award

amount.

Name	University	Award
Alvarez, Aida.	New York Botanical Garden	"Phylogeny of Prescotttinae and systematics of Gomphichis (Orchidaceae)" \$500
Baumert, Anthony.	University of Pittsburgh	"Application of resource competition theory to ecosystem succession" \$500
Bell, John.	University of Wisconsin, Milwaukee	"The effect of interspecific competition for pollinator service on the mating patterns and pollen dispersal in Mimulus ringens"\$500
Cortes-Burns, Helen.	University of Texas	"Phylogenetic and biogeographic study of Bell-flowers (Walhlenbergia) in the southern hemisphere of Oceanic Islands" \$500
Cortes-Palomec, Aurea.	Ohio University	"Reproductive systems and population genetics of a Mexican Viola species" \$500
Cronin, James.	University of Pittsburgh	"Herbivory and the top-down regulation of terrestrial plant communities: A test of two prominent theoretical lineages" \$500
Dunn, Michael.	Ohio University	"The Mid-Carboniferous Floral Break: a crucial and enigmatic episode in the evolution of the terrestrial ecosystem" \$500
Forest, Felix.	Royal Botanic Gardens, Kew	"A molecular systematic study of the South African endemic genus Muraltia (Polygalaceae)" \$500
Hernandez-Castillo, Genaro.	University of Alberta	"Taxonomic reevaluation and systematics of primitive conifers from Euramerica" \$500
Karst, Lisa.	Portland State University	"Phylogeny of Sysrinchium (Iridaceae), genetic and morphological" \$500
Moody, Michael.	University of Connecticut	"Phylogenetics, hybridity and aquatic origins in the angiosperm family Haloragaceae"\$500
Moore, Michael.	University of Texas	"The roles of edaphic shifts and long distance dispersal in the evolution of the American desert genus Tiquilia (Boraginaceae)" \$500
Morris, Ashley.	University of Florida	"Exploring the biogeographic history of eastern North American trees: a comparative phylogeographic approach" \$500
Roncal, Julissa.	Florida International University	"Evolution of the Geonoma macrostachys (Palmae) complex" \$750

Rydholm, Carla. Duke University

Lichenicolours fungi systematics and the transition from mutualism to parasitism in Ascomycetes" \$500

Specht, Chelsea. New York Botanical Garden
"Systematics and evolution of the tropical plant family Costaceae" \$500

Steets, Janette. University of Pittsburgh
"Ecological correlates of Pollen Limitation" \$500

Thompson, James. University of Florida
"Phylogeny and the evolution of breeding systems in the moss *Pohlia Cruda*" \$500

Thompson, Stacey. University of British Columbia
"Transmission of apomixis in a *Townsendia* hybrid zone" \$500

Wu, Carrie. University of California
"Ecophysiological variation among natural hybrids in an *Ipomopsis* (*Polemoniaceae*) hybrid zone." \$500

-Gene Mapes

Membership and Appraisal Committee

Membership in the Botanical Society has been fairly constant over the last ten years, with total membership fluctuating from a high of 2902 in 1997 to the current membership of 2282. There were 2363 members in 2001. The year 2002 was the first year with the printed journal was separate from membership and 959 members received the printed journal.

Suggestions for revising the poster and brochure primarily include adding changes in fee structure, now that the hard copy of the journal is separate from membership, and making the poster more colorful with less text. Past photos from AJB covers could be added to the poster. The membership web site (<http://www.botany.org/#membership>) should be highlighted as providing more information and downloadable membership forms. Another suggestion is to have the brochures available in an attached envelope on the poster, instead of the tablet of tear-off application forms.

-Kathleen Shea

Merit Awards Committee

The Committee included myself as Acting Chair, Maxine Watson, Christopher Campbell, and Judy Jernstedt, BSA President, *ex officio*.

We received only one Merit Award nomination this year, and that was one that was being reconsidered from 2001. This nomination was submitted before last year's meeting, but it arrived quite late in the process and because there was only one

supporting letter, the committee decided that more extensive documentation would be needed before rendering a decision. Unfortunately, no more letters were included with the resubmitted nomination.

Therefore no Merit Award will be presented this year.

-Christopher Haufler

Jeannette Siron Pelton Award

The Jeannette Siron Pelton Award is made by the Conservation and Research Foundation of New London, CT through the Botanical Society of America for sustained and creative contributions in experimental plant morphology. BSA appoints the committee and gives the award at the annual meeting. Beginning in 1998, the awarding of the Pelton has included an invitation to provide a special address. The Pelton Award is made irregularly based on availability of funds and an appropriate candidate. For 2002, there will be an award.

The awardee will be Karl J. Niklas. The inscription of the award is as follows: "The Conservation and Research Foundation through the Botanical Society of America is pleased to present the Jeanette Siron Pelton Award to Karl J. Niklas for his sustained and imaginative contributions in experimental plant morphology, especially for his theoretical and experimental examination of plant form, strategy, and evolution. His pioneering studies applying mathematical and structural modeling to describe plant geometry have provided a strong basis for understanding the optimization of plant form. He has effectively applied this approach to the three basic vegetative structures as well as to flowers, strobili, and inflorescences. His studies have produced an extraordinarily rich and diverse series of publications that will serve the field for many years to come." A special lecture is scheduled for Tuesday afternoon.

-Scott Russell

BSA Publications Committee

The BSA Publications Committee discussed four proposals related to electronic publication of the American Journal of Botany and made recommendations to the Executive Committee. Other issues relating to BSA publications, such as the revised pricing schedule for online subscriptions, will be presented by the Executive Committee. The Editor-in-Chief will report on the current status of manuscript backlog reduction.

1. e-letters. The committee supported the proposal to initiate electronic letters to the editor of the American Journal of Botany. Highwire Press will offer for each paper a hyperlink to an e-letters site where readers

can submit comments, criticisms, and questions about that specific paper. The AJB Editor-in-Chief, Karl Niklas, in consultation with the Editorial Board, submitted a draft policy for e-letters that was ratified by the Executive Committee.

2. CiteTrack. The committee supported the proposal to purchase (\$1500) the CiteTrack utility that allows registered viewers to sign up for a daily watch on specific keywords or authors names in about 200 HighWire Press journals. This feature is to be inaugurated with online subscriptions.

3. Hold-back charge for pay-per-view. The committee supported the proposal for a \$2500 hold-back charge to cover costs incurred by HighWire Press for developing the AJB pay-per-view site. According to this model, HWP would hold back the first \$2500 of revenue and then share subsequent revenue on a 50:50 basis with the BSA.

4. eIFL (Electronic Information for Libraries Project) HighWire Press is joining other publishers (Blackwell, Elsevier, Harcourt, Springer, Wiley, etc.) in providing discounts for online subscriptions for countries in 3 categories ("developing", "impoverished", and "not well off"). An advantage of joining this initiative is that AJB will be exposed to institutions that might not subscribe to AJB individually, but would wish to receive it as part of a package.

Web Page Committee

This year a major milestone was met as the main BSA web server served its *millionth page*. So far, as of June 30, 2002, 1,644,458 pages have been served from the main site

American Journal of Botany Online service: Here is a summary of the activity of the *American Journal of Botany Online* server run by HighWire Press on behalf of the Botanical Society of America. The free period of web service ended June 12, 2002. After that time, access is by password for individual users and by IP blocks for institutional members. This clearly reduced the usage of the site. The experience of other HighWire Press journals, however, has been that usership rapidly increases to free levels once users are used to it being a paid site.

Week Requests	Requests-OK	Requests-Fail	Distinct Files
Totals 1999			
657,469	315,491	52,435	193,376
Totals 2000			
1,060,440	395,342	18,246	341,997
Totals 2001			
1,653,407	517,583	52,295	555,074
Totals 2002 so far			
917,358	329,036	31,871	301,209
Total			

3,371,316 1,228,416 122,976 1,090,447

This represented an increase in usership of over 100% per year for each of the last three years. HighWire Press finds these statistics surprisingly high when we were compared among clients of similar size and mission.

-Scott Russell

II. B. Sections

Bryological and Lichenological Section

The Bryological and Lichenological Section participated in the American Bryological and Lichenological Society (ABLS) Meeting at the University of Connecticut, Storrs, 26-28 July 2002. To encourage student participation in the annual meeting, ABLS provided travel awards for graduate students and presented the A. J. Sharp Award for the outstanding student presentation. Twelve students competed for the 2002 award, which was won by Rebecca Yahr (Duke University) for the presentation "The structure of symbiotic communities: Population-level patterns of association between lichen fungi and their algal photobionts." Honorable mention went to Linda Fuselier (University of Kentucky) for the presentation "Growth and reproduction of *Marchantia inflexa* from single-sex and bi-sex populations," and to Frank Bungartz (Arizona State University) for "Biologically-induced mineralization by the endolithic lichen *Verrucaria rubrocincta* Breuss in the Sonoran Desert." The annual Tuckerman and Sullivan Awards (best lichen and bryophyte papers published in *The Bryologist* during the last year) went to Dianne Fahselt, Susan Madzia, and Vagn Alstrup for "Scanning electron microscopy of invasive fungi in lichens" (*Bryologist* 104: 24-39) and to D. Nicholas McLetchie for "Sex-specific germination response in the liverwort *Sphaerocarpos texanus* (Sphaerocarpaceae) (*Bryologist* 104: 69-71), respectively.

-Paula de Priest and James Bennett

Developmental and Structural Section

At the 2002 BSA meetings the Developmental and Structural Section will sponsor three symposia: 1) Generating diversity: The link between developmental morphology and phylogeny (co-sponsored with the CBA). 2) Conifer reproductive biology: A tribute to Dr. John N. Owens (co-sponsored with the CBA). 3) Biocomplexity in mycorrhizae (co-sponsored with the ecology section) In addition, we will sponsor the Pelton Award Lecture to be given by one of our members, Karl J. Niklas of Cornell University, Ithaca, NY. The title of his lecture is Plant morphogenesis: Logic and mechanism.

The "Open Space" forum that was initiated by our section several years ago has now become

the "Discussion Sections" sponsored by the Society. This year there are two scheduled Discussion Sections:

- 1) Forensic botany, led by Jane H. Bock and David O. Norris.
- 2) Uses of nuclear ribosomal RNA repeats, ITS2 sequences, led by Annete W. Coleman, and Mark W. Chase.

Members of our section will present 32 contributed papers distributed among three sessions, and fifteen posters.

The Katherine Esau Award goes to the graduate student who presents the outstanding paper in developmental and structural botany at the annual meeting. The 2001 Award went to Steven Jansen from the Institute of Botany and Microbiology, K.U. Leuven, Kasteelpark Arenberg, for his paper "Vestured pits: a wood anatomical character with strong phylogenetic signals at high taxonomic levels." Co-authors were Pieter Baas and Erik Smets.

The Maynard Mosely Award recognizes a student paper that best advances our understanding of the anatomy and/or morphology of vascular plants within an evolutionary context. Two awards were presented in 2001. 1) Genaro Hernandez-Castillo from the University of Alberta, Edmonton, Alberta, Canada for his paper "Evidence for compound pollen cones in Paleozoic conifers". Co-authors were Gar Rothwell and Gene Mapes, and 2) Maria Von Balthazar from the University of Zurich, Zurich, Switzerland, for her paper "Floral structure and phylogeny of Buxaceae." Her co-author was Peter Endress.

The section also presented travel awards to six student members: Athena McKown, Jennifer Winther, Erin Bissell, Ken Chapman, Caroline Mitchell, Allena Volskay.

-Pamela K. Diggle, Chairperson

Ecological Section

The Ecological Section has new officers this year, each beginning a 3-year term: Suzanne Koptur (Chair), Tim Bell (Vice-Chair) and Joe Colosi (Secretary). Normally elected prior to the annual meeting, these new officers were elected in November 2001 and will serve through summer 2004, with new officers elected prior to the meetings in 2005.

We received 45 contributed papers and 27 poster abstracts for the Madison meetings, and Joe Colosi organized these into 4 contributed papers sessions.

Membership in our section has decreased substantially in the last few years, reflected in the smaller section budget. We will be seeking ways to encourage increased membership in the BSA by ecologists of all kinds who work with plants. This year our section is sponsoring two symposia

(Evolution of mating systems in the genus *Mimulus*, and Biocomplexity in mycorrhizae) and will present monetary awards and banquet tickets for best student presentations.

The Ecological Section will soon have a list-serve to promote the sharing of news, notices, and discussion of potential interest to members of the section. Please contact us with any ideas you have for ways in which the section can better serve the BSA.

-Suzanne Koptur

Economic Botany Section

For the 2002 Economic Botany Section of the Botanical Society of America Meeting in Madison, a Symposium was organized by David Spooner on the Ethnobotany of the Solanaceae. The Section's annual allotment will support the Luncheon and its speaker. Prof. Emeritus Hugh Iltis will speak following the luncheon on, "Domestication of Zea: first for sugar, only then for grain? A novel idea with vast implications".

-, Daniel Harder, Secretary/Treasurer

Genetics Section

Briana L. Gross received the 2001 Margaret A. Menzel Memorial Award at the BSA banquet in Albuquerque, NM for her paper entitled "Potential multiple origins for *Helianthus deserticola*, a diploid hybrid species." The paper was co-authored by Andrea Schwarzbach and Loren Reiseberg. The award included a certificate, \$200.00, and a ticket to the BSA banquet.

Hannah Thornton received the 2001 Genetics Section Poster Award for her work entitled "Genetic variation in fragmented populations of an endangered dune plant: implications for its conservation." The poster was co-authored by Cynthia Lane and Javier Francisco-Ortega. The award included a certificate, \$100.00, and a ticket to the BSA banquet. Lena Hileman received the 2001 Graduate Student Research Award of \$500.00.

-Jeri W. Higginbotham

Phycological Section

The Darbaker Prize for 2002 will be awarded to Dr. Arthur R. Grossman at the 2002 BSA Banquet. This prize includes a certificate and check for \$1000. The Darbaker Committee consisted of: Bob Bell, Debashish Bhattachayra, Louise Lewis (chair).

-Louise A. Lewis, Chairperson,

Physiological Section

The Physiological Section met in Albuquerque, New Mexico in August 2001 with two contributed paper sessions and a poster session. The paper sessions were chaired by Peter Straub

of Richard Stockton College of New Jersey and Bruce Smith of Brigham Young University of Utah. Tara Lin Greaver from the University of Miami received the Li-Cor Prize for the best student paper for her presentation entitled "The effects of reflected light on the anatomy and photosynthesis of *Ipomoea pes-caprae* (L.) R. BR. (Convolvulaceae), a tropical sand dune vine."

For the 2002 meeting in Madison, along with the usual contributed paper and poster sessions and the annual business meeting luncheon, a symposium on restoration of major plant ecosystems is being organized by Anitra Thorhaug and Henri Maurice. This symposium is being co-sponsored with the teaching section.

-SDenise Seliskar, Chairperson

Pteridological Section

At the Botany 2001 Meeting in Albuquerque, NM, the Pteridological Section of BSA cosponsored with the American Fern Society a symposium entitled, "Evolution and adaptations of pteridophytes in dry climates", in which 7 papers were presented. In addition, 19 contributed papers and 3 posters were presented.

The Edgar T. Wherry Award for best paper presented was given to Sabine Hennequin and Jean-Yves Dubuisson for their paper entitled, "Systematics of the fern genus *Hymenophyllum* s.l. (Hymenophyllaceae) inferred from *rbcL* and *rps4* nucleotide sequences and morphology."

The Pteridological Section contributed \$400 to the publication of *The Annual Review of Pteridological Research*, Volume 14, 2000.

-Tom A. Ranker, Secretary-Treasurer

Tropical Biology Section

For the Madison meeting, the Tropical Section received six paper abstracts and one poster abstract, and these will be presented in a session, followed by the Section's annual business meeting. The Section's chair will also be attending the BSA council meeting.

The Section's annual allocation will support a symposium on "Tropical intercontinental disjunctions: Gondwana break-up, immigration from the boreotropics, and transoceanic dispersal".

-Susanne Renner

Pacific Section

A meeting was held for Pacific Section members at the Botany 2001 meetings in Albuquerque. Twenty-seven members of the Society from states represented by the Pacific Section attended, during which a lively discussion was held regarding the Section and potential activities

During the past year, the Interim Chair has contacted BSA members in areas comprising the

Pacific Section, soliciting their ideas and willingness to participate more activity. Some interest has been expressed, especially with regard to coordinating events in their respective areas.

-Dieter Wilken

C. Representatives to other Organizations

CSSSPREPRESENTATIVE'SREPORT

The Council of Scientific Society Presidents (CSSP) met Nov. 16-19, 2001 in Washington, DC, at the American Chemical Society headquarters

a) Much discussion about terrorism, counter-terrorism, security, what scientists can do to help, etc. No discussion of alternative energy sources, increasing gas mileage standards, etc.

b) An interesting talk by Marsha Landolt, Dean of Graduate Studies and Vice-Provost, Univ. of Washington, about re-envisioning doctoral education.

(www.grad.washington.edu/envision).

c) Electronic publication: one of the most interesting talks was by someone from the Association for Computing Machinery, who discussed the pros and cons of electronic journals, member services, etc. ACM now has about 50% of their approx. 800 institutional subscribers also receiving the e-subscriptions. ACM publishes 22 journals and charges \$4,500 for print subscription and \$7,800 for online (my notes are not clear whether this is in addition to or for both print and e-).

d) Rita Colwell gave a nice talk about the need for scientists to get involved in K-12 education, teaching teachers, increasing under-represented groups, interdisciplinary research, etc.

Virtually all societies are seeing a slow decline in membership and institutional subscribers—nothing dramatic but just a gradual erosion. It seems that the younger set is less likely to join a scientific society than in earlier generations, which troubles a lot of us. I met Richard O'Grady and see in him a new attitude at AIBS. He was very complimentary about and appreciative of the BSA members who have served AIBS over the years (cheers to Pat!). No sign of ASPB the entire meeting. Crop Science Society and Agronomy Society were closest to BSA, with similar organismal interests and challenges.

-Judy Jernstedt

Natural Science Collections Alliance

During 2001-2002 the Association for Systematic Collections changed its name to be-

come the Natural Science Collections Alliance, which is believe to more fully represent the goals of the membership of institutions, societies, and individuals. The further reason for a name change was to make the organization and its aims more understandable to the lay public, policymakers, and other scientists.

Throughout the year NSC Alliance continued to distribute, in addition to the printed monthly newsletter, called the Alliance Gazette, an on-line bi-monthly newsletter of NSCA activities, called Washington Initiative, which highlights of recent news about systematic collections, as well as actions in Congress affecting members. The electronic newsletter is available to NSCA member institutions and societies, and can be sent to interested recipients on request. This source is particularly valuable in highlighting funding for and available from NSF.

The major activity of the current year was the annual meeting of NSCA held in Washington, DC 6-8 June at the Smithsonian Institution. Information on the meeting is available at the NSCA website at www.nscalliance.org. Over 200 members and VIP guests attended from the US and nine other countries. 120 speakers and presenters from museums and organizations participated in two days of panel meetings, and breakout sessions dealing with communicating science, permitting, digital libraries, etc. The opening reception was held at the National Geographic Society with a presentation on the Megatransect in Africa. The plenary session was a panel of distinguished speakers discussing how natural history museums are shaping the future. The new president of NSCA is Dr. John E. Heyning of the Natural History Museum of Los Angeles County. The 2003 meeting is planned for Berkeley, California sponsored by the U.C. Berkeley Museums.

-Larry Skog

Letters to the Editor

Congratulations to the organizers of the first ever Teaching Forum that took place at Botany 2002. I sincerely hope this is an annual event.

I live in three worlds. I am a botanist who is also a campus executive, and who still has the luxury of being able to teach a general botany course each year. From my vantage point, the Teaching Forum is a critical component of the mission of BSA. Neil Campbell's plenary remarks, linking the forum to *Botany for the Next Millennium* were right on the mark. The *Millennium* call for promoting "excellence in teaching and its recognition as the co-equal of research" has yet to be achieved.

I have three challenges for all botanists who wish to achieve the vision of *Millennium*.

1. More botanists should consider serving a portion of their career as college and university administrators, be that as a department chair or president of the institution. When more plant biologists take on this burden, efforts to gain parity with other disciplines will advance. Far too many administrators come from disciplines outside the natural sciences, and as such lack a central understanding of how science and the teaching of science takes place most effectively

2. There has been a historical disparity in faculty workload given for teaching "lectures" versus the laboratory. This is counterintuitive to what we know is the best method for teaching science – active learning, the type of learning that takes place in the laboratory is more likely to be deep and meaningful learning. Yet most administrators take it for granted that teaching a lab "counts" only a fraction of what teaching the lecture portion of a course "counts." Perhaps this is a carry over of the old days when faculty told students what they should do and left students to their own devices. You and I know that teaching a laboratory – guiding young students to think outside their boxes, generating experimental design and testing hypotheses – takes more, not less effort than delivering a lecture. I challenge you to challenge your administrators to give credit where credit is due. Ask them to justify why they do things the way they do, and don't accept the answer "because that's how every other school does it."

3. My final challenge is to departments who educate graduate students, particularly those with Ph.D. programs. Preparation for teaching at all levels of higher education should be a component to the graduate program. For several years, Dr. Wayne Becker in the Department of Botany at the University of Wisconsin-Madison has offered a summer course for students in the sciences who wish to learn about teaching and develop teaching philosophies. There are similar courses elsewhere, but they are too few in number. Simply because there are far more PUI's (Primarily Undergraduate Institutions) than Land Grant Research Universities there is a great chance that today's graduate students will have a career that requires excellence in teaching as well as research. Our graduate students need these courses. As an administrator hiring faculty, I actively seek individuals who have taken courses such as this, as well as those who have some teaching experience.

The vision of *Millennium* is alive and growing. With help from all of us now, we can ensure that plant biologists will achieve the vision.

-James W. Perry, Professor of Biological Sciences, University of Wisconsin-Fox Valley, Menasha, Wisconsin

Judith Lee Gerow Croxdale, Plant Morphologist, 1941-2002.

Judith Lee Gerow Croxdale of Madison died suddenly of a heart attack on June 14, 2002. Judy was born on August 27, 1941 and grew up in Modesto, California. Judy began work on a degree in English at the University of Colorado and then married Michael Croxdale in 1960 and had a son. Upon her divorce in 1966 she resumed her academic studies, this time in Botany at the University of California-Berkeley. She got an A.B. and then Ph.D. from Berkeley under Professor Donald Kaplan. Judy's first professional position was at the Virginia State University but in 1979 was recruited to UW-Madison. She rose through the ranks of Assistant, Associate, and Full Professor of Botany.

Judy's research focused on plant morphology. In the 1970s she worked on morphogenesis in the fern *Davallia* followed by work on the formation of submerged leaves in *Salvinia*. In the 1990s Judy started an extensive investigation of pattern formation in leaves, especially the patterns that determine the spacing of stomata. In the most recent work from Judy's lab it was shown that genes that affect trichome development also affect stomatal patterning, indicating that these genes affect development in the epidermis more than simply affecting trichomes.

Judy was frequently invited by leading journals to write on pattern formation in plants. A fun part of Judy's research was applying her expertise to pattern development under altered gravitational conditions. She was part of a team that was involved in perhaps the first crop produced in space when potato tubers were grown on the space shuttle. Judy analyzed the structure of the tubers grown in space. Judy's research program attracted many visiting scientists and provided many opportunities for undergraduates to participate in her laboratory. Judy was also recognized for her general scholarship with an invitation in 1999 to become Editor-in-Chief of the Journal of Plant Growth Regulation. Judy taught Principles of Plant Development, Structural Plant Development, and Plant Microtechnique courses. She also participated in a Colloquium in Teaching College Biology each fall, a course to help Teaching Assistants prepare for teaching.

Judy was very active in university service. Among the 20 committees that Judy served on at one time or another is the Faculty Awards Committee. In this role Judy nominated many of her colleagues and was very effective in presenting their accomplishments. At the University level Judy participated in a wide range of

committees including the Undergraduate Teaching Improvement Council Committee. Judy was perhaps most active in college committees. As Chair of the college Curriculum Committee Judy guided the college through important reforms. Judy was active in groups such as Women in Science and Engineering and worked hard to encourage women graduate and undergraduates' participation in the sciences.

Judy was a very independent, adventurous woman. Like many academics she spent a lot of time on her career but she also had many other interests. Judy was a pilot for a number of years. She had a particular love for contemporary and emergent art. Judy rode her bicycle as often as she could and advocated for the rights of bicyclists. Judy was particularly committed to exercise and a healthy lifestyle, for several years teaching aerobics, making the circumstances of her death so surprising to those who knew her.

Judy is survived by her son Leyton and daughter-in-law Lisa of Seattle, WA, and brother Michael Gerow and mother Winifred Liberini of Modesto, CA. She was preceded in death by her father, Harold Gerow. There will be a celebration of Judy's life September 18, 2002 at the Botany Department, UW-Madison. A fund has been established to help support women beginning research careers, one of Judy's passions. Donations may be sent to "UWF/Croxdale Scholarship Fund", PO Box 8860, Madison WI 53708.

-Tom Sharkey



Sherwin Carlquist Awarded Linnean Medal

Dr. Sherwin Carlquist, Research Botanist at the Santa Barbara Botanic Garden has been awarded the 2002 Linnean Medal for Botany. Dr. Carlquist was cited for being "...pre-eminent as a plant biogeographer and island biologist and the leading living authority on wood anatomy... When viewed as a part or as a whole, Dr. Carlquist's career is one of magnificent achievement in terms of his innumerable intellectual contributions to biology and in shaping the thinking of generations of biologists."

"Carlquist is the author of numerous and highly acclaimed books as well as the primary author of hundreds of publications, many of which are recent. Dr. Carlquist's voluminous publications reveal previously undetected trends in the evolution of wood of dicotyledons. ...His legacy continues to be felt in such diverse fields as cladistic analyses, by virtue of the hard anatomical data amassed by this studies, and plant biomechanics, by virtue of his pioneering functional morphology and anatomy. As a teacher, he continues to inspire students by emphasizing the need for careful observation and analytical thinking. As a scholar, he serves as a role model by showing organismic and molecular data are essential aspects of the same discipline such that neither can be ignored and both must be embraced. As a scientist, he epitomizes love of scholarship and enthusiasm for careful but creative thinking."

Dr. Sherwin Carlquist is professor emeritus of Botany at Pomona College. After his retirement from Pomona he served as adjunct professor of biology at the University of California, Santa Barbara, and today continues his pioneering research under the auspices of the Santa Barbara Botanic Garden. He is noted by the Linnean Society for being "...as productive at 71 years of age as any younger colleagues, and continues to contribute significantly to a broad range of biologically important research areas, spanning plant diversity, ecology, and evolution."

The Linnean medal for botany is awarded annually, but rarely to Americans. It is the highest honor of the Linnean Society of London, a leading forum for contemporary discussions on genetics, natural history, systematics, biology, and the history of plant and animal taxonomy. The world's oldest extant biological organization, the Society was founded in 1788, and takes its name from the Swedish naturalist Carl Linnaeus, the father of modern plant and animal classification.



Announcements

Special Opportunities

Biology and Systematics of the Saprolegniaceae

Terry W. Johnson, Jr., Roland L. Seymour, and David E. Padgett are pleased to announce the on-line publication of their Treatise entitled *Biology and Systematics of the Saprolegniaceae*. This work includes a critical interpretation of world literature (in all languages) dealing with all aspects of water-mold morphology, physiology, and ecology (30 Chapters) as well as a comprehensive revision of the systematics (with keys and extensive illustrations) for all genera and species (20 Chapters). In excess of 2800 reference are cited. This Treatise is made available (on or before 1 August 2002) to the scientific community at no cost and can be accessed on-line using the URL <http://www.iluminadilib.org>. Select "advanced search" (bottom of first screen). In the advanced search screen enter the contributor name "Padgett" in the "search for" window, check "Book" in the "Learning Resource Type" section, then click on "submit" at the bottom of the same screen.

Plant Anatomy Images Available

Nels Lersten, Mike Nowak and John Curtis placed a set of approximately 1500 plant anatomy teaching and research images on the internet at:<http://botweb.uwsp.edu/anatomy>. There are no restrictions on the use of these images.

Diversity and diversification processes in high mountain ecosystems: bridging the gap between population, phylogenetic and ecological approaches.

International meeting. Aussois (France) June 23-27, 2003

Per unit land area, some data suggest high mountain biota can be biologically as rich as surrounding lowlands. What makes many high mountain ecosystems so diverse, and is there a common set of historical, ecological and evolutionary characteristics shared by biologically-rich high mountain ecosystems?

Mountains and highlands cover about 25% of the earth terrestrial surface, and represent islands of colder climate in seas of tropical, desert or temperate areas. They therefore harbor both refugial (from glaciation periods), and locally adapted floras and faunas. Moreover, mountain and highland biota are highly fragmented: mountain ranges are usually separated by deep (and large) valleys, and within ranges, there are very sharp variations in exposition, slope, soil type, etc. leading to high local habitat diversity. Human activities are increasing the fragmentation of mountain habitats.

The aim of this workshop is to bring together scientists working on different types of organisms (plants, animals and microorganisms), at different biological scales (communities, species and populations) and using different approaches (phylogeny, phylogeography, ecology and population biology), all addressing diversity and diversification in montane habitats.

The workshop will be organised over 3 days of plenary sessions, contributed papers, posters and discussions, and a one-day field trip in the French Alps. Aussois is an old traditional French alpine village located east of Chambéry at 1500m asl, very close to the Parc National de la Vanoise, where marmots, ibex and Chamois can be easily observed, in addition to a rich flora.

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**Janet Meakin Poor Research
Symposium: Invasive Plants-Global
Issues, Local Challenges
Chicago Botanic Garden, Glencoe,
Illinois
October 27-30, 2002**

Invasive species are an enormous threat to native plants, animals and ecosystems all around the world. In the United States, invasive plants and animals are threatening the environment and economy. Nearly half of the species listed as threatened or endangered under the Endangered Species Act are at risk due to competition with or predation by non-native species, and the non-native species are costing the country more than \$125 billion per year.

The Center for Integrated Conservation Science and the School of the Chicago Botanic Garden welcome you to this international symposium, where you will have the opportunity to discuss the issues, develop strategies for improvement and debate the methodology for reducing the threat of invasive plants. Join key international terrestrial and aquatic plant scientists and land managers for three days of informational programming.

For registration information, visit our Web site at <http://www.chicagobotanic.org/symposia/jmpsym.html>.

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Wetland Stewardship: Changing Landscapes and Interdisciplinary Challenges

24th Annual Conference of the Society of Wetland Scientists
June 8-June 13, 2003, New Orleans, Louisiana, USA.

The conference will address interdisciplinary, innovative approaches and technologies that are currently being applied to sustaining wetlands across diverse environments and spatial scales of the world. Symposia and workshops should combine traditional and applied wetland sciences with ecological, physical, engineering, economic and/or social sciences.

The deadline for submittal of symposia and workshop proposals is **September 30, 2002**. For detailed information on the requirements and format of proposals, please see the 2003 New Orleans meeting website (<http://www.sws.org/neworleans/>) or contact Dr. Robert R. Twilley, Program Co-chair, Center for Ecology and Environmental Technology, University of Louisiana at Lafayette, PO Box 42451, Lafayette, LA 70504 USA; Email: ceet@louisiana.edu; Phone: (337) 262-1776; Fax: (337) 262-1866.

SSB/SSE/ASN Joint Annual Meeting, Chico, CA, 2003.

The joint meetings of the Society of Systematic Biologists, the Society for the Study of Evolution and the Society, and the American Society of Naturalists will be held in Chico, CA from the 20-24 June, 2003 hosted by California State University, Chico. Please check the meetings' web site at <outbind://20/www.evolution2003.org> www.evolution2003.org. Starting in January, the site will accept title submissions for presentations and abstracts. Titles will be accepted on a first-come-first-serve basis and the number of slots available for talks will be limited by the number of concurrent sessions being held. Title submission will end on March 31, 2002. The site will have a link to the registration page. You must register in order to submit a title. Early registration will terminate on March 31, 2002. Late registration will be available until the time of the meetings. For any additional information, contact

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Positions Available

Cycad Biologist

Montgomery Botanical Center in southern Miami, a 120-acre scientific botanical institution with extensive collections of palms and cycads, is seeking a full-time Cycad Biologist. Biologist must commit to enhancing the scientific, education, and conservation value of the cycad collection. Graduate degree in botany and experience with cycads are preferred, but not required. Fax (305-661-5984) or email (walters@fiu.edu) resume and cover letter to Dr. Terrence Walters. For additional information, call him at 305-667-3800 ext. 22.

HARVARD UNIVERSITY BULLARD FELLOWSHIPS IN FOREST RESEARCH

Each year Harvard University awards a limited number of Bullard Fellowships to individuals in biological, social, physical and political sciences to promote advanced study, research or integration of subjects pertaining to forested ecosystems. The fellowships, which include stipends up to \$35,000, are intended to provide individuals in mid-career with an opportunity to utilize the resources and to interact with personnel in any department within Harvard University in order to develop their own scientific and professional growth. In recent years Bullard Fellows have been associated with the Harvard Forest, Department of Organismic and Evolutionary Biology and the J. F. Kennedy School of Government and have worked in areas of ecology, forest management, policy and conservation. Fellowships are available for periods ranging from six months to one year and can begin at any time in the year. Applications from international scientists, women and minorities are encouraged. Fellowships are not intended for graduate students or recent post-doctoral candidates. Information and application instructions are available on the Harvard Forest web site (<http://harvardforest.fas.harvard.edu>). For additional information contact: Committee on the Charles Bullard Fund for Forest Research, Harvard University, Harvard Forest, P. O. Box 68, Petersham, MA 01366 USA or email (drecos@fas.harvard.edu). Annual deadline for applications is February 1.

Book Reviews

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Elements of Mathematical Ecology. Kot, Mark. 2001. ISBN 0-521-80213-x (Cloth US\$80.00) ISBN 0-521-00150-1 (Paper US\$39.95) 452 pp. Cambridge University Press, 40 West 20th Street, New York, NY 10011-4211 -Recently, I have been reading a number of textbooks on Population Biology, looking for one that I could use in an introductory undergraduate (junior/senior level) course. Among the possible candidates have been Hastings "Population Biology: Concepts and Models (1998), Gotelli's "A Primer of Ecology, 3rd edition (2001), and Alstad's "Basic Populus Models of Ecology (2001). Each of these books attempts to explain mathematical models to biologists and each has strengths and weaknesses. Kot's book, also published in 2001, takes a different approach-it is primarily a book about the math behind the models, with the intended audience mathematicians and theoretical biologists, rather than the general undergraduate biology major. Of the aforementioned books, it is by far the most detailed and challenging mathematically and this likely limits its application as a textbook to advanced courses with considerable math prerequisites. It is unlikely that I will be using this book for an introductory course.

Kot divides the book into two sections, the first dealing with unstructured population models and the second with structured population models. The unstructured population models include single-species models (growth, harvest, stochastic, discrete-time, delay, and branching process) and interacting population models (predator-prey, competition, and mutualism) while the structured population models include both spatially structured and age-structured models. Kot uses the book in a two-semester course with one semester for unstructured population models and the second semester for structured population models.

Each chapter begins with a description of the model and an analysis of the model, with emphasis on both the stability and dynamics of the model. Numerous figures as well as detailed numbered equations illustrate the text. Included in most chapters are problem sets, historical notes, and mathematical meanderings that provide additional information about the particular model, its development, and use. Each chapter concludes with a concise list of recommended readings.

Overall, I found the book well written although the number of equations does mean it is not an easy read. Most of the chapters are brief in the review of a particular model-for many models, the recommended readings might be needed to flesh out the utility and application of the model to biological questions. A couple things that would be nice in the 2nd edition would be a glossary, the answers to the problem sets (perhaps these could be put on a password protected website?), and a few more examples of the use of the models to flesh out the mathematics. - John B. Pascarella, Valdosta State University, Valdosta, Georgia 31698

Faunal and Floral Migrations and Evolution in SE Asia-Australasia. Ian Metcalfe, Jeremy M. B. Smith, Mike Morwood, and Iain Davidson. 2001. ISBN 9058093492 (Cloth US\$130.00) 416 pp. A. A. Balkema Publishers, Lisse/ Abingdon/ Exton (Pa)/ Tokyo; c/o Ashgate Publishing Company, 2252 Ridge Road, Brookfield, VT 5036-9704. - During the presentation of his paper in 1863, Alfred Russell Wallace indicated the biogeographic separation of the western Indo-Malayan and the eastern Australo-Malayan regions with a red line passing down the Makassar Strait on the map. The Wallace Line, as Huxley called it in 1868, has held its significance for the last 140 years despite intense debates and proposals of alternative lines. Wallace based the line of demarcation on his study of modern birds, whereas other lines, such as Lydekker's or Weber's lines, are based on various other criteria. The composite transitional area encompassing all these lines has been named Wallacea.

At the time of Wallace's study of vertebrate fauna, the only definitive work available on geology was Lyell's three volumes published from 1830-1833. Plate tectonic theory had not been envisaged. Biotic migrations were explained by imaginary bridges, narrow water-gaps or low sea-levels, and disjunct distributions by long-distance dispersal mechanisms. Wallace's genius lies in observing a distinct separation of two faunas and in considering that it was due to the past geological history of the continents. The faunal separation has been confirmed by a restudy of the birds collected by Wallace which are preserved in various museums (p. 113).

This book consists of six sections with each section dealing with related geological or biotic subjects. The first section has two papers on Paleozoic to Cenozoic paleogeography and biogeography of the area. The continental paleogeography of SE Asia is complicated due to many large and small land fragments in the area. To determine the evolution of each piece is like a jig-saw puzzle where many pieces may have been lost or newly appeared during the processes of geological history. Thus, the up to date descriptions of the Paleozoic-Cenozoic tectonic evolution of the area and its changing patterns of land and sea given here form the basis of the information necessary to test the validity of the Wallace line as discussed in the following sections.

In the Paleozoic and Mesozoic geology and biogeography section, the first paper considers conodonts which are an extinct group of enigmatic marine microfossils. The conodonts of East Asia terranes have biogeographic affinities with those of Australasia from the Cambrian to Permian. The second paper uses a single group of brachiopods, benthonic marine animals, to define Permian provinces of Gondwana and demonstrates a "Wallace line" in the geological past. The next paper reviews the Early Permian flora from Papua and concludes that the flora has affinity with both the Gondwanaland and Cathaysian

floras. A comparison of dinosaurs and associated vertebrate faunas from the Mesozoic of Australia and Southeast Asia showed almost nothing in common of biogeographic significance. In the last paper of this section, deep marine pelagic radiolarian fauna from the early Middle Jurassic Xialu chert in the Yarlung Zangbo Suture Zone indicates that the Ceno-Tethys was a wide ocean far from southern continents by the early Middle Jurassic.

The validity of the Wallace line is the subject of discussion in the six papers of the third section. On the basis of various biogeographic separation lines and a transition area, it is deliberated whether the Wallace line should be erased. Biogeographic lines differ from each other depending on taxa and spatial scales used. One cannot expect that all taxa will march together for migration to another area at the same time. Thus, it is considered that biogeographic lines have a heuristic value and should be evaluated in that context. On the basis of a cladistic study of certain genera of recent butterflies, it is inferred that during their evolution, these butterflies have been crossing the water barrier between Asia and Australia in both directions since the Tertiary. Reasons for honeyeater birds conforming to the Wallace line are analyzed and none appear to explain the phenomenon. Human influence in animal translocation across and east of the Wallace line since prehistoric time is also analyzed. The final paper in this section examines the validity of the Wallace line in the context of marine organisms by examining the distribution of staghorn corals (*Acropora*) which have their highest worldwide diversity in the Wallacea region.

In the section on plant biogeography and evolution, the first paper concludes that the primitive angiosperm flora of the rain-forest of the Asia-Australasia area is the relict flora of Cretaceous-Tertiary floras that originated in various parts of the world. The next paper reviews Australian Paleogene vegetation and environments and provides evidence for paleo-Gondwana elements in the fossil records of Lauraceae and Proteaceae. The following paper describes the vegetation and climate during the Last Glacial Maximum on the basis of the study of pollen data from terrestrial and marine cores in lowland southeast Asia, and, comparing to the present time, concludes that the precipitation was 30-50% lower; the mean temperature was 6-7°C lower; montane forest elements had somewhat descended to lower levels; and the sea level fell almost 120 m. The next paper discusses the distribution of the Restionaceae and claims that it is almost exclusively restricted to the southern hemisphere. The last paper in this section traces the evolutionary history of *Alectryon* of the family Sapindaceae in Australia.

The section on non-primates consists of seven papers. An analysis of the distribution of Trichoptera, an aquatic insect order, concludes that only a minor part of the Asian and Australian groups

are involved in the Austral-Asian interchange. The distribution of butterflies in the context of the Wallace line is analyzed without the emergence of any distinct pattern. The third paper analyzes the possible reason for the depauperate nature of vertebrate fauna in Wallacea. The fourth paper shows that the opposition between dispersal and vicariance is an artifact of poorly defined concepts and identifies five processes that affect plant and animal distribution but operate over different time scales. The time scales discussed are ecological time, geomorphological time and geological time. Examples illustrating dispersal as a process are: introduced species that modified the New Zealand avifauna operated in ecological time; transitional biota in Wallacea operated in geomorphological time; and the paleobiogeography of the gymnosperm genus *Agathis* (family Araucariaceae) in geological time. Discussing the Australian rodent fauna on the basis of fossil evidence, three phases of immigration were found - two from SE Asia directly and one from New Guinea. In the sixth paper, the occurrence of Early Cretaceous fossils from Australia, possibly an erinaceid *Eutheria*, is described. The final paper of this section discusses the origin and dispersal of mammals in Sulawesi which was a cluster of separate islands until quite late in geological time.

The final section has six papers on primates of the area. The study of the radiation and evolution of three species of macaque monkeys indicates that crab-eating monkeys (*Macaca fascicularis*) may have originated in Sri Lanka or southern India; they first dispersed eastward until they met the geographical barrier of the rising Qinghai-Tibetan Plateau in the Pleistocene, then turned south to penetrate southeastern Asia. The next paper analyzes the Quaternary ecology of the area and discusses various barriers formed during the glacial and interglacial periods which affected the migration pattern of primate fauna of the area. The next paper analyzes divergence, interbreeding and migration by mathematical models, and concludes that results based on interpretation of fossils may be incorrect in some cases. The next paper considers implications of Early Pleistocene hominid colonization of Flores Island in Wallacea. It is proposed that hominids crossed the deep water barrier to the island by watercraft. The following paper assesses the requirements for humans to colonize Australia and argues that humans developed many abilities, including language and the ability to build watercraft, at the time of the sea crossing to Australia, not Flores. The final paper of this section considers possible methods that could have been employed by hominids to cross sea gaps, and, taking inspiration from non-human primates, concludes that natural rafts may have been employed by *Homo erectus* to colonize Flores, and *H. sapiens* to colonize Australia.

The readers are told in the introduction that two of the editors conceived this book over a shopping cart in a supermarket on a Saturday

morning. The result was an international conference, *Where Worlds Collide: Faunal and floral migrations and evolution in SE Asia-Australasia*, held in the University of New England Asia Center, Armidale, New South Wales, Australia from November 29 - December 2, 1999. The thirty-one papers of this book were selected from forty-five oral and six poster papers presented in this conference. This multidisciplinary book has sections dealing with relationships and interactions between paleogeography, biogeography, dispersal, vicariance, migrations and evolution of organisms in the SE Asia-Australasian region. The book is well organized and the editors have done a commendable feat in putting together such a wealth of data from a geologically and geographically complex area that has an interesting but challenging flora and fauna. This book will be interesting to geologists, botanists and zoologists alike, particularly those interested in paleogeography and/or biogeography of the world. Everyone's pocket may not bear the steep price of this book but all libraries should have it on their shelf so that everyone interested can refer to this excellent book. - Satish K. Srivastava, Geology Consultant, 3054 Blandford Drive, Rowland Heights, California 91748-4825.



Flammable Australia the Fire Regimes and Biodiversity of a Continent. Ross A. Bradstock, Jann E. Williams, and A. Malcolm Gill (eds). 2001. ISBN 0-521-80591-0 (Cloth US\$130.00) 462 pp. Cambridge University Press, 40 West 20th St, New York, NY. - Bradstock et al. present copious background information and new theory on the role of fire in Australian ecosystems. The editors are among the thirty authors of the eighteen papers, grouped into eight parts, contained in this volume. Besides providing overviews of history and future perspectives on fire in Australia, these papers deal in turn with grasslands, shrublands, woodlands, and forests, as well as practical applications of knowledge about the effects of fire on Australian ecosystems for the management and wise use of these lands.

Australia is widely recognized as the driest of the seven continents, having this character in part because it has most closely reached geological equilibrium. Thus, it comes as no surprise that fire plays a significant role in Australia's landscape and biogeography, affecting among other factors the species composition of various ecosystems.

A work on fire and its importance for these matters is especially important when one considers that the highest rates of botanical endemism in the world occur in the

Southwest of Western Australia and that other areas of the island continent also show very high rates of endemism and species diversity. Thus much can be learned about fire-affected ecosystems and biodiversity worldwide by considering the Australian examples.

The importance of the products and the effects of fire range from clearing of brush to the importance of compounds produced by fire which promote germination and flowering. King's Park Botanical Gardens in Perth, Western Australia, has done significant work on the role of smoke in the germination of Australian native plants, and the Garden even sells smoke water extract for use in restoration of native bush plants.

The importance for the content of these landscape and the nature of the species of natural fires and of fires set by Aboriginal peoples is well documented, with documented changes in species composition at a given site, for example in certain areas of South Australia, accompanying changes in fire regime that followed the drying of Australia and the arrival of humans during recent prehistory. More recent fire suppression techniques after European settlement have caused controversy as well as changes in Australian biodiversity.

All of these topics receive a thorough and current treatment throughout *Flammable Australia the Fire Regimes and Biodiversity of a Continent*, with the focus of chapters varying within the eight parts—e.g. the consideration of fire in shrublands contains separate chapters on heathlands, mallee ecosystems, and Acacia-woodlands. Throughout, the illustrations, mostly tables and graphs, are clear and very helpful, well supported by a text that is clear and readable, though not outstanding for attracting the reader's attention.

Who should purchase a copy of *Flammable Australia the Fire Regimes and Biodiversity of a Continent*? Certainly college and university libraries should include this work in their collections, given the fundamental importance of understanding Australian ecology for similar fire-prone areas of Mediterranean climate around the world. So too should it be purchased by those interested in ecology of these Mediterranean areas, and also by anyone wanting to increase undergraduate excitement and interest in ecology. This last is true because of the level of interest that anything Australian excites in undergraduate students, as anyone teaching undergraduates will recognize. - Douglas Damowski, Washington College, Chestertown, MD 21620.

The World According to Pimm: A Scientist Audits the Earth. Pimm, Stuart. 2001. ISBN 0-07-137490-6 (Paper US\$24.95) 304 pp. McGraw-Hill, Two Penn Plaza, New York, NY 10121-2298. - This book is for Mr. Smith, Mrs. Jones, and Dr. Brown, three fictitious travelers Pimm introduces in the Epilogue of this book. Smith is the businessman familiar with economics "who knows the price of everything but the value of nothing." Throughout the book, Pimm derives numbers for our environmental resources and how they are used. This provides tangible data to which Mr.

Smith can relate. But more importantly, Pimm develops an appreciation for the value of the various resources he describes. The first third of the book develops, in some detail, how we can determine that approximately 2/5 of terrestrial plant production is utilized by humans. Pimm introduces the reader to a variety of ecosystems and describes the human impacts on each in terms that both Mr. Smith (and undergraduates aspiring to be Mr. Smiths) can understand. What is the economic value of an ecosystem and how can that value be maximized?

Mrs. Jones "...is like 50 percent of the undergraduates in the University of Tennessee biology class that I used to teach. She does not believe in evolution, despises those who teach it, and retains a special venom for those who teach it and who attend churches more accommodating than the one she attends." But Pimm acknowledges that her idealism and ethical concerns are important factors that can help raise public environmental consciousness and outrage against waste and plunder. It may be because of Mrs Jones that Pimm frequently cites *Joy of Cooking* (JoC) for numerical date. For instance, the second third of the book concentrates on aquatic ecosystems and a simple way of noting depletion of major fish stocks is to compare the recipes in his 1997 edition of JoC with his 1974 edition. Of the four most common fish listed in 1974, only herring also appears in the later edition (but with only 1 recipe instead of 11!). On the other hand, orange roughy, unknown in 1974, is included in the later edition (but is currently being replaced in restaurants by the Chilean sea bass!)

Finally there is Dr. Brown and Dr. Brown is us! Can we answer our students' simplest questions - - how many species are there? How much fresh water is there? How large will our population grow? And so on. More importantly, what are we doing to communicate some of the answers to the public and to public policy makers? The final third of the book addresses biodiversity as related to the earlier sections. Why are some spots hot and others not? And what, in fact, is a species?

I teach an honors biology course that foregoes a traditional textbook in favor of four or five "general interest" focused texts. *The World according to Pimm* will be my ecology reading next year. It demonstrates the power and limits of quantitative data, but in an engaging and non-technical format that could easily lead to group projects to verify or extend claims. It covers many of the key concepts of introductory ecology with timely and relevant examples. One could easily be pessimistic about human impact on the planet, but Pimm is not, as evidenced by his last two sentences. "Our world is a spectacularly beautiful, interesting, and diverse place. Only by attending to its problems will it remain so." That is a challenge for us and a charge for our students. - Marshall D. Sundberg, Department of Biological Sciences, Emporia State University, Emporia, KS 66801.

Botanical Dietary Supplements: Quality, Safety and Efficacy. Mahady, Gail B., Fong, Harry H.S. and Farnsworth, Norman R. 2001. ISBN 9-026-51855-2 (cloth US\$) 271 pp. Swets & Zeitlinger Publishers, Lisse, The Netherlands. - Primarily geared to medical practitioners, this book will be attractive to anyone interested in modern herbal ("botanical dietary supplements") usage. Students of botany, ethnobotany and pharmacology, among others, will refer to the hundreds of references and thousands of years of history.

The book is arranged in two main parts. First, there is a short but informative section about the marketing, regulating and standardizing of botanical dietary supplements. The remainder and bulk of the text, concise alphabetical synopses of 22 of arguably the most popular botanical dietary supplements follow this. The reader is introduced to familiar and new species from black cohosh (*Cimicifuga racemosa*) to valerian (*Valeriana officinalis*). The general format of the specific summaries is: *Synopsis, Introduction, Quality Information* (taxonomy, parts used, native range, chemical summary), *Medical Uses, Summary of Clinical Evidence, Pharmokinetics* (warning, not available for all species), *Mechanism of Action, Safety Information* (includes contraindications, drug interactions and toxicology and dosage - extremely important for the countless people self-medicating) and *References*.

Readers familiar with North American literature and clinical studies will be exposed to a wealth of new literature. Of the 22 species reviewed, there are enough warnings and contraindications to question the popular press endorsement of many supplements. For example, Chaparral (*Larea tridentata*), long-used for various ailments with "no clinical or scientific data to support these claims" has also been shown to be hepatotoxic. Horse chestnut extracts (*Aesculus hippocastanum*) may be useful for venous and circulatory function but should be avoided if renal health is compromised. A theme emerges: over the counter is not equivalent with safety nor does a long history of use indicate efficacy. The phrases "use of products containing ... should be avoided" "therapeutic indication is not justifiable" "no controlled clinical trials for..." and "potentially serious threat to public safety" appear often in this book. This is a cautionary tone.

On the positive side, there are supplements that do not pose a health threat according to the latest clinical trials. Feverfew (*Tanacetum parthenium*) may help migraine sufferers. Cranberry (*Vaccinium macrocarpum*) is growing in popularity for the prevention of urinary tract infections and carries "no contraindications, precautions or side effects." The beneficial blood-thinning properties of garlic (*Allium sativum*) are real but supplements should be avoided

prior to surgery. Other potentially beneficial supplements include kava (*Piper methysticum*) (recent news articles mention caution), ginkgo (*Ginkgo biloba*), ginger (*Zingiber officinale*), nettle (*Urtica dioica* and *U. urens*), and saw palmetto (*Serenoa repens*), to name a few.

The production of this book is excellent. Only rare typographical errors were found (examples: “maybe” instead of *may be*, “a tea prepared from nettle tea”) and these did not distract from the value of this book. I was disappointed that the attractive cover photographs are the only illustrative materials contained in Mahady, Fong and Farnsworth’s fine book. I wonder if line drawings of each species could be included in future editions. This may be helpful when identifying botanical products or verifying the often-questionable package artwork on many of these over the counter products. Furthermore, species illustrations would complement nicely the “Introduction” and “Quality Information” provided for each dietary supplement. Finally, amazingly, there is no index. Perhaps each chapter is meant to stand alone, and they do very well. However, I wanted to look up several properties and compare across the taxa but could not without an index. For example you could not compile a list of all supplements that are potential carcinogens or cause adverse reactions with medications without reading each summary. I kept thinking that an index would be a boon to emergency room personnel.

This book should serve its intended medical audience well but this does not limit its utility or appeal. Undergraduate and graduate courses in herbal remedies as well as pharmacology and regulation would benefit. Will casual readers relish a cover-to-cover reading? Probably not. Will a book like this affect traditional herbal remedy practices? Perhaps not but Mahady, Fong and Farnsworth’s book is an invaluable reference that should open the eyes of many doctors, patients and pharmacists. This is a valuable addition to the debate about herbal supplements. – Scott Ruhren, Department of Biological Sciences, Ranger Hall, University of Rhode Island, Kingston, RI 02881.



The Desert Smells Like Rain. Nabhan, Gary Paul. 2002. ISBN 0-8165-2249-9. (Paper US\$16.95) 148 pp. The University of Arizona Press, 355 E. Euclid, Ste. 103, Tucson, AZ 85719. - It is reassuring to learn that *The Desert Smells Like Rain* has been reprinted,

presumably for use as a supplementary text book. Originally published in 1982, this new paperback edition is affordably priced for student budgets. It reveals, in a few pages, a naturalist’s appreciation for the cultural and biological richness of the North American desert.

The title itself presents a seemingly contradictory assertion, a device that Nabhan enjoys. It represents a paradox: deserts, by definition, lack substantial rainfall. How then, could the desert smell like rain? Nabhan evokes a fragrant response, the scent of the creosote bush after a storm, aromatic oils released by the rains. Thus Nabhan introduces an example of a Papago outlook, intrigue by the unpredictability rather than the paucity of rainfall.

Lecturers in courses about Botany, Economic Botany and Environmental Science wishing to use rich supplementary readings that extend beyond the standard textbooks should seriously consider choosing *The Desert Smells Like Rain*. It strikes me as a stunning work to use in a scientific writing course. Nabhan sets a valuable example to students as well as to his colleagues, emphasizing his reliance on local informants for the content, and introducing himself in the role of narrating their knowledge. We readers travel with Nabhan to the Papago Reservation in Arizona, onto land that is set aside for their exclusive use, requiring a special permit for access.

Nabhan’s natural folksy writing style incorporates numerous Papago legends, superstitions, and beliefs about the natural world. His book is well crafted and unlike any other botany textbook. Interspersed among occasional photographs, are environmental lessons such as the ecological consequences of irrigation by pumping instead of rain fed agriculture. Nabhan introduces fundamental subjects that open an opportunity for the course instructor to provide additional theoretical background and details in lectures. These include the subject of crop evolution, by understanding the role of wild progenitors of cultivated plants, and physiological and morphological changes such as the loss of seed dormancy and alteration of seed color, upon domestication.

The Desert Smells Like Rain should be a welcome primary source that can complement the usual texts and will certainly offer students an enriching experience. Additionally, it has the advantage that it represents diversity in source material, offering an unusual perspective, of early native Americans who practiced agriculture long before the arrival of European colonists. - Dorothea Bedigian, Washington University, St. Louis and Missouri Botanical Garden.

Evolution of Wild Emmer and Wheat Improvement. Population Genetics, Genetic Resources, and Genome Organization of Wheat's Progenitor, *Triticum dicoccoides*. E. Nevo, A. B. Korol, A. Beiles, and T. Fahima. 2002. ISBN 3-540-41750-8. (Cloth US \$219.00.) 364 pp. Springer-Verlag New York, P.O. Box 2485, Secaucus, NJ 07096

The tetraploid *Triticum turgidum* group (AABB) plays a pivotal role in the evolution of wheats. This group contains a range of forms from wild emmer (*T. dicoccoides* or *T. turgidum* var. *dicoccoides*) through primitive cultivated emmer (*T. dicoccum* or *T. t.* var. *dicoccum*) to advanced cultivated durum (*T. t.* var. *durum*) and other cultivars with free-threshing grains. The emmer wheats are also the donors of the A and B genomes to hexaploid bread wheat (*T. aestivum*, AABBDD).

Eviatar Nevo and his associates in Israel have spent 30 years studying wild emmer and its relatives from every standpoint. This book presents their many findings, both new and previously published, and the findings of others.

The book begins with the cytotaxonomic and cytogenetic background of *Triticum*. The archaeology of the cultivated forms is reviewed. The geographical distribution of *T. dicoccoides* in the Near East from Israel north to Turkey and east to Iran is described.

Following this introduction is a large section describing population variation in wild emmer. Polymorphisms are found in allozymes and various kinds of DNA: RAPD, microsatellites, and ribosomes. Genetic variability is common. Furthermore, the frequencies of the variants in many cases are correlated with environmental variables when plotted on a macrogeographical or microgeographical scale. The best explanation for the observed variation patterns in many or most cases is control by natural selection, with or without the influence of other factors. The authors return to the modes of selection found to be operating in wild emmer in a final section of the book.

These findings have important practical as well as theoretical implications, as the authors point out. Much natural variation in domesticated wheats has been lost in modern cultivation and pure-breeding. But wild emmer maintains a rich pool of adaptive and preadaptive variations which can be tapped in the breeding of cultivated emmer and durum and their hexaploid derivative, bread wheat.

A third large section discusses variation in several physiological traits of emmer such as drought tolerance, salt tolerance, pathogen resistance, herbicide resistance, protein content of grains, etc. Some of this variation can be useful in wheat breeding.

A fourth section covers genome organization. The distribution of QTLs for agronomic traits among the chromosomes of the two genomes is shown, and genetic maps for molecular markers are presented. It is fascinating to see homologous genes on partially

homologous chromosomes of the A and B genomes. Also very interesting is a comparison of the chromosomes of the A genome in wild emmer (AABB) with those in its diploid ancestor *T. urartu* (AA). The A chromosomes of wild emmer, unlike their counterparts in *T. urartu*, contain scattered segments of repetitive DNA derived from the B genome. Apparently DNA has infiltrated from B chromosomes into A chromosomes in tetraploid emmer since its formation. Little infiltration in the opposite direction from the A to the B genome has taken place. This process of intergenomic invasion has also been found recently in tetraploid cotton.

This book presents a tremendous amount of molecular and physiological information about wild emmer and places the information in an evolutionary-biological context. It shows how much can be accomplished by a multidisciplinary approach to the biology of a single plant species. – Verne Grant, Section of Integrative Biology, University of Texas, Austin, Texas 78712.



Insects and Gardens. Grissell, Eric. (Photographs by Carll Goodpasture). 2001. ISBN 0-88192-504-7 (Cloth US\$) 345 pp. Timber Press, Grissell is a research entomologist working for government. His book on insects, which are found only in ordinary gardens, is written in an entertaining language and given in three parts. In the first part, after the definition of an insect is given, orders in the garden are introduced.

Four pages of classification with colored drawings are also given, which helps one to identify which is which in a garden. It is stressed that class arachnida and class insecta are quite different from each other. A spider is not an insect! (I have been trying to explain this to people for ages.)

The next two chapters in this first part deal with the subjects like growth, metamorphosis, social interaction and habitats of "class insecta". In part two of the book, the ecology of gardening is discussed. The interactions of the insects with the garden and its plants, as well as with each other are described in this part. In the last part of the book the author presents the methods of

increasing the diversity in the garden and how to invite insects to the garden. At the end of the book 62 references for further reading are provided, where some of them are www sites. Most people like to get rid of the insects in the garden, however this book tells you how to invite them and why you should invite them.

There are 106 color photographs in the book by Carll Goodpasture, which I think would urge someone to be an insect fan. Some of the close-up pictures are so wonderful that one might want to have one of these cuddly creatures as a pet at home. A photograph of a butterfly on page 101 made me laugh and I was amazed with the photograph of a ladybird beetle on page 208 taken while it is taking off. There are many interesting data in the book as well, like "the estimated weight of the insects outweigh the human population by six times"!!!!. The main idea, which is intended to be given in this book is, to have more plants and habitat diversities in order to have more natural controls in the garden. The author is strongly opposed to chemicals and recommends biological control in a garden.

As a whole, the content of the book is neither comprehensive nor particularly specialized. Every gardener or anyone who has a garden can easily read and should read this book. I am sure much less pesticides will be used with the help of this book, well, at least I will be more concerned in the future. I strongly recommend this book especially to people with entomophobia. I believe they will be more confident and feel more secure once reading it. There are actually important messages given in this book. Insects are creatures of this planet and they were here millions of years before us. There is nothing to be afraid of nor to be alarmed. - Agah Uguz, Uludag University, Muhendislik-Mimarlik Fakultesi, Gorukle-16059, Bursa-Turkey. e-mail : uguz@uludag.edu.tr



The Looking Glass Garden: Plants and Gardens of the Southern Hemisphere. Thompson, Peter. 2001; ISBN 0-88192-499-7 (Hardbound, \$39.95) 451 pp. Timber Press, Inc, 133 S.W. Second Avenue, Suite 450, Portland, OR, 97204-3527. - The Looking Glass-Garden by Peter Thompson is a book written for those wishing to extend their knowledge about plants found in the Southern Hemisphere. More so, it is a book that provides gardeners and horticulturists with valuable information on numerous species that are, per chance, dramatic and exciting, especially in contrast to plants most often found in conventional Northern Hemisphere gardens.

The premise to the Looking Glass-Garden is straight forward enough: Émigré's of the northern hemisphere brought to the South conventional notions of gardening: roses, daffodils, tulips, lilacs, lupins, oaks and other northern hemisphere plants. Of course, these plantings first eradicated and then overlooked the strange and peculiar beauty of the indigenous plants. Given that there is now copious information on indigenous species found in South America, South Africa, Australia and New Zealand, and that there is widespread enthusiasm for the preservation of indigenous species, it is now time to reconsider the conventions of orthodox Northern Hemisphere gardening styles.

Balance of the book describes those plants considered most dramatic and popular, with an emphasis on many species that are overlooked. When lesser known species are discussed, references are given to species presently cultivated.

This book is organized by areas found in gardens: 'Gardens in Sunshine', 'Gardens in Shadow,' and 'Gardens in Containers,' and the last part, 'Through the Looking-Glass in the Northern Hemisphere: Case Studies,' discusses various possibilities for gardens in California, Mediterranean Europe, the Pacific Northwest and Britain.

Some of the chapters inspire delight: 'Oases with Trees,' 'Plants with Attitude,' and 'Tropical Drama.' Others get more to the point: 'Shrubs for Sunlit Spaces' and 'Flowers of the Forests.'

Hardiness Zones, Maps, and a thoughtful Bibliography are also provided. The Hardiness Zones chapter list over 800 species mentioned in the text. Species are largely from South Africa, Australia and New Zealand with some inclusions from South America and Tasmania.

This book possesses a number of unique positives: It presents a comprehensive (though not exhaustive) read on plants not often utilized because of their obscurity or uniqueness. This information is presented in a prose that reads more like a travel journal than a

manifesto to use plants from the Southern Hemisphere. In the end, the reader is given a sense of the nuance for the plant—which can be exciting and perhaps create a desire to learn more. This is accomplished, to a large extent, by Mr. Thompson's thorough and accurate knowledge of his subjects and descriptions.

This book contains numerous glossy color photographs designed to entice the reader—which is done admirably. Regrettably, the number of species mentioned in the book is so vast that very few of the species mentioned in the book are presented. As such, further knowledge or other texts would be needed to fully understand the habit of a given plant or plant species.

This is not a book for beginners. Mr. Thompson makes many references to plants related to those being discussed and if the reader is not well versed in a given species or cultivar, an alternative text must be used to sort out the reference, or the nuance is often lost. Fortunately, the bibliography provides titles of books with a more practical approach.

As such, this book is not a How-to book on growing Southern Hemisphere plants. Readers may find its extensive prose heavy going if they are looking to propagate a desired plant. I was at first frustrated with this format until I realized that this is a book one 'dips into' when either further information is needed or a comprehensive perspective for the habit and habitat of a given plant is being researched. As such, *The Looking Glass-Garden* acts more as a companion to other texts on specialized plantings.

As a final note, *The Looking-Glass Garden* did inspire my desire to learn more about the indigenous plants of South Africa. Together with my wife and two small children, we 'truthed' the book by exploring the fields of Namaqualand in bloom, hunted for cycad 'treasure' in Stellenbosch Botanical Gardens and discovered fields of *Welwitschia mirabilis* at the foot of the Brandberg massif in central Namibia.

My eye is now tuned to those who use indigenous plantings for their gardens here in Johannesburg and above all, I now more fully appreciate the fabulous beauty and uniqueness of plants otherwise pushed aside for more common Northern Hemisphere plants. Further, this book conveys a sense of limitless possibilities, textures and intrigue through the sheer quantity of 'undiscovered' plants that can be used in gardens.

While this book does not follow a conventional, albeit, practical approach, I am sure our ramblings were due to the nature of Mr. Thompson's discussions with us through his writings about the many amazing plants discussed. - Gregory J. Moncada, Middle School

Principal and Biology teacher, The American International School of Johannesburg, Pvt bag X4, Bryanston 2021, Gauteng Province, South Africa.

Plants and People of Nepal. Manandhar, Narayan P. 2002. ISBN 0-88192-527-6. (Cloth US\$69.95) 636 pp. Timber Press, Inc. 133 S.W. Second Avenue, Suite 450, Portland, Oregon 97204-3527. - With this work, Timber Press continues its superb tradition of publishing scholarly titles about ethnobotany. This comprehensive work, written by a native of Nepal and based on more than 30 years of field study, documents the various uses of 1517 taxa belonging to 858 genera and 195 families. The author's 3-page preface is reading worth requiring of all students and colleagues who intend to embark on field studies. His field method put a premium on establishing a firm rapport with his informants, mostly healers over 60 years of age. Manandhar was determined to avoid using paid informants, as he found that in Nepal at least, payment is counterproductive and negatively affects the accuracy of findings, since payment evoked obligation by the payee to provide long lists of plants and their uses, which were largely fabricated.

Plants and People of Nepal opens with an introductory chapter about the geography, climate, vegetation zones and a history of plant collecting in Nepal. A short introduction to the peoples of Nepal is next, followed by a general introduction to the ethnobotany of Nepal in food, beverage and medicine. Perhaps this section's most admirable feature is the series of color photographs, on 36 pages, of fuel wood stacks, market scenes, spinners and weavers of baskets and cloth, winnowing, herbal medicines, terraced agriculture, and fish trappers, printed on glossy paper, inserted into the opening essay on the ethnobotany of Nepal.

The bulk of the book (420 pages) is a dictionary devoted to summary plant descriptions and details about each plant's use. The arrangement is alphabetical by genus. Vernacular names are provided in a variety of Asian languages. Edible, medicinal and other uses are portrayed briefly. The author's attractive line drawings of many taxa enhance the text on nearly every page, and enable the book to be used as a field guide. A short glossary, a list of references, and lengthy indices of common names and Latin names close the volume.

Well-bound for continuous use, and attractively priced for individuals and libraries, this book opens a window on a world and cultures still hidden to most Americans. - Dorothea Bedigian, Washington University, St. Louis and Missouri Botanical Garden.

Intrinsic Value and Integrity of Plants in the Context of Genetic Engineering. 2001. David Heaf and Johannes Wirz, eds. Published by: *Ifgene*—International Forum for Genetic Engineering, Hafan, Llanystumdwy, LL52 0SG, UK. ISBN 0-9541035-0-5.

-For three days in March 2001, forty participants from six countries participated in a workshop to undertake a formidable task—exploring the multitude of issues arising from the use of plant genetic resources in the context of genetic engineering. Upon reviewing the list of participants I found that none were Americans, in fact, there was no representation from North America, nor from the other world leader in plant biotechnology, China. This was, a European affair, a fact that I find not so surprising. The biotechnology industry in Europe has faced a fully engaged (and often outraged) public and debate among policy makers in countries such as Sweden, The Netherlands, Germany and the United Kingdom is dynamic. Meanwhile, in the United States the public reaction to genetically modified organisms has been comparatively mild, generally ignored by the press and with the exception of standards for organic farms dealt with quietly by policy makers. Many readers may experience a ‘culture shock’ while reading these proceedings. I certainly did, even though I felt that I was somewhat better acquainted with the cultural and philosophical milieu surrounding plant biotechnology. Twelve short papers provide the bulk of these proceedings followed by discussions edited from recorded sessions. Both the subject matter and those presenting come from diverse fields including (broadly) philosophy, law, business, anthropology and biology. I would suggest that the appendix of the volume (a discussion document prepared by the editors) be read first as this provides a most helpful context for the papers.

The general theme to which every paper devotes attention is defining what is *intrinsic value* and *integrity* regarding plants and how this is (or could be) understood legally, philosophically, ethically, and biologically. Not surprisingly, we do not get very far with defining terms. I am not surprised because these sorts of metaphysical questions never have simple answers. Yes, you will find a lot of metaphysics here but I don’t state this to be derogatory. My only criticism would be that the existing metaphysics of seminal philosophers such as Immanuel Kant seem to have been overlooked, but perhaps this is the subject of a future workshop. Klaus Peter Rippe who provides a straightforward analysis of ethical problems that arise when we ascribe such terms to non-human organisms presents the most lucid philosophical discussion. This is not a new problem in bioethics and while other presentations are intriguing, e.g., Jeremy Narby’s ethnobotanical work with the Ashaninca Indians in the Peruvian Rainforest, they fail to convey the importance of their contribution to the overall theme.

The two papers dealing with legislative aspects of plant integrity and dignity are excellent and anyone seeking to understand the European debate regarding genetic engineering should spend some time reading these well-referenced papers. Hans Verhoog examines the ethical structure of Dutch laws regarding “the intrinsic value of animals” and the implications for plants. Hanspeter Schmidt examines the constitutional law of Germany and Switzerland regarding the “intrinsic value of the creature” outlining the ethical as well as the political and semantic issues arising as the result of the use of the phrase “*Würde der Kreatur*” which depending upon the translation may mean: dignity of living creatures; dignity of creation; integrity of living organisms and so forth.

Also at issue is the sustainable use of biotechnology and conflicts with the biotechnology industry. The outstanding contribution is by Florianne Koechlin who provides a compelling example of conflicts arising between biotechnology (Bt-corn) and traditional, so-called ecologically sustainable agriculture in Africa. Koechlin clearly illustrates the power of plant biotechnology to impact the lives and livelihoods of farmers in developing countries.

For myself, the paper by Michel Haring, a plant physiologist, was enlightening, not so much for the step-by-step description of the process involved in producing transgenic tomatoes (which is in and of itself educational) but for his deep interest in the causes of genetic failures which occur as the result of the procedures.

In summary, those expecting to find an analysis of risk factors accompanying genetic engineering will not find it. The difficulty with this volume is not so much found among the individual papers but rather that it attempts to cover so much intellectual ground. The full scope of the presentations take on broad issues in moral philosophy, bioethics, cultural and societal attitudes towards biotechnology, legal issues, organic farming as well as criticism of American agriculture, agribusiness and reductionism in science. This volume will have limited usefulness as reference material in courses covering bioethics and environmental science. - Christopher Frye, Maryland Department of Natural Resources, Wildlife and Heritage Service, Annapolis, MD 21401.

The Alfred Russel Wallace Reader a Selection of Writings from the Field. Jane R. Camerini, editor.

2002. ISBN 0-8018-6789-4 (Paper US \$18.95) ISBN 0-8018-6781-9 (Hardcover US \$48.00) 219 pp. The Johns Hopkins University Press, 2715 North Charles Street, Baltimore, Maryland 21218-4363. -It is fair to say that, for many of us, Alfred Russell Wallace's significance is as the force that finally precipitated Charles Darwin's publication of his observations that natural selection serves as the machine of evolution. Beyond that we know little. Recognizing this shortcoming, Jane Camerini edited a series of Wallace's writings that tantalizes readers to learn more about the life and complex interests of this important figure.

In her opening note Ms. Camerini states that her goal is to introduce the reader to the life and work of Alfred Wallace. She proves true to her stated purpose, beginning with a short biographical sketch that forewarns of intricacies, idiosyncrasies, and contradictions that were part and parcel of Alfred Russell Wallace. Here the reader gets a first glance at the intellect that was shaped by society but not constrained by it. We learn that Wallace was the product of a lower-middle class family, an individual reticent to be self-promoting but vocal in opinions, a social activist, and an inquisitive mind whose personal philosophy sometimes led away from recognized and accepted scientific pursuits.

The main text is subdivided into four sections, each representing a chronological interval and, in most cases, a location significant in Wallace's life. Editorial, introductory remarks provided by Camerini give context to the selected writings appearing in each section.

The book's first section excerpts Wallace's autobiography and focuses on his experiences as a land surveyor. Each passage is subtitled, alerting the reader to the specific topic contained within, but it is not entirely clear whether the subtitles are Wallace's or Camerini's. While this is of little practical concern, it did leave me wishing I had a copy of the autobiography readily at hand to satisfy my curiosity while I simultaneously wondered if this wasn't the editor's specific intent. Regardless, the autobiography's material illuminates Wallace as a personality seemingly predisposed to a scientific career; one almost senses that any science would have done. In a particularly striking excerpt, Wallace tells of his delight in accurately determining land area by trigonometric calculations, fascination with geology and recognition that geologic formations differed from one place to another, increasing interest in things botanical, and his realization that fossils alluded to local environmental and organismal change over time. I read this section thinking that Wallace's powers of observation would have lent him well to anthropology, archaeology, geology

or any of the ologies. By luck and fortune he chose to focus his attention on species that would lead him to formulate a view later recognized as evolutionary theory. We should all be thankful that it was biology that won out.

Continuing through the book and Wallace's life, the middle sections represent the height of Wallace's field naturalist career. The Amazonian passages suggest the exhilaration Alfred Wallace must have felt as he, his brother Herbert, friend Henry Bates, and botanist Richard Spruce explored and collected along the Amazon, Rio Negro, and Rio Uaupé. Even more telling about Wallace's character are sections detailing the arduousness of the journey and troubles obtaining supplies and local workers. What rightly might have degenerated into a self-pitying recounting appears here as matter-of-fact information for explorers who might follow afterward. This section serves as a good cautionary tale for any field biologist, aspiring or otherwise, reminding the reader that field work has always been a combination of inspiration, perspiration, and an absolute unwillingness to quit. Travel in what was then called the Malay Archipelago coupled with his experiences in Amazonia yielded the most seminal of Wallace's work, including the essays that would shake Darwin's placid progress on evolutionary theory. "On the tendency of varieties to depart indefinitely from the original type" appears as published in 1858 and is still stunning in its clarity and simplicity. I only regretted that Camerini chose not to include Wallace's earlier, companion work "On the law which has regulated the introduction of new species," and I wondered again whether the omission was intended to send the reader in search of other Wallace sources.

In her introductory comments to the last section, Ms. Camerini cautions that the writings contained within diverge somewhat from the book's main theme. Included are selections that bracket the 50-year span of Alfred Wallace's writings on human evolution, commentary on his tour of North America, and an excerpt of a remembrance by his daughter and son. The scattering of topics proves far less dismaying than what the pieces reveal about the adventurous, intellectual Wallace present in early sections of the book. Suddenly we are confronted with a man who, in his later years, contended that the human brain and its function could not be the result of cumulative, selective advantages but must be the product of some higher, guiding force. Adding insult to scientific injury, we also find that, in his North American travels, Wallace was best compensated monetarily not for any lecture on natural selection but for a discussion on spiritualism, the alleged ability to communicate bi-directionally with the deceased. Surely, after the build up of Wallace as a consummate field naturalist and scientific thinker, these last readings provide a dramatic crash. Saving utter distress, Camerini includes a family

remembrance as the last piece of edited text. This passage, written by William and Violet Wallace, paints a fond portrait of homes, habits, fatherly attentions, and ever-new delight at discoveries near family dwellings.

In my opinion Ms. Camerini has done an excellent job of revealing just enough of Alfred Wallace to make any reader ready to search for more. In the accompanying notes, list of books by Wallace, and bibliography Camerini provides ample sources for further reference. The edited selections contained in *The Alfred Russel Wallace Reader a Selection of Writings from the Field* convey the complexity of a powerful, scientifically philosophical mind rife with contradictions. As such, the book provides lessons for anyone with an interest in the history of biological thought. The text makes for enjoyable reading and the occasional illustrations and photographs are informative without being distracting. — Nancy E. Cowden, Biology Program, Lynchburg College, Lynchburg, VA 24504.

Illustrated Dictionary of Mycology. 2000. Ulloa, Miguel and Richard T. Hanlin. ISBN 0-89054-257-0 (Cloth US\$99.00) 448 pp. American Phytopathological Society Press, 3340 Pilot Knob Road, St. Paul, MN 55121-2097. - Every botany/mycology teaching laboratory should have a copy of this resource available for its students. It is not a taxonomically oriented dictionary, such as *Ainsworth and Bisby's Dictionary of the Fungi* (Hawksworth *et al.*, 1995), but instead it focuses on more than 3800 terms relating to anatomy, morphology, physiology and ecology of fungi. There is a brief outline of fungal classification at the end of the book, based primarily on Alexopoulos *et al.* (1996) with some additions from Hawksworth (1995).

Each entry begins with a complete etymology of the word and most end with a specific taxonomic example of occurrence. Synonyms and antonyms are also listed. For instance, "**Heliophilous** (Gr. *hélíos*, sun + *phílos*, have an affinity for + L. *-osus* > OF. *-ous*, *-eus* > E. *-ous*, possession the qualities of): that which prefers sunny habitats, or which requires them in order to develop: e.g., such as species of *Mycena* (Agaricales). Also called **anheliophilous**. Cf. **heliophilous**. Of the 12 botanical and mycological dictionaries and glossaries I have examined, this is the only one to include an example with nearly every definition.

The definitions are usually more complete, and always more clearly written, than corresponding definitions from other dictionaries. This may be a result of its

unusual genesis. The dictionary is based on the first author's *Diccionario ilustrado de micología* (1991) which was prepared to provide a Spanish language resource for students of mycology. The terms chosen were derived from several, mostly English, sources including Snell and Dick's *A Glossary of Mycology* (1971) and *Ainsworth and Bisby's....* Specifically omitted were terms related to the color, taste, or odor of metabolic products (which are included in Snell and Dick) and taxonomic names below the level of class (which are included in Hawksworth *et al.*). The definitions had to be carefully translated into Spanish to be clear, precise, and useful to students. In preparing the present volume, the definitions were re-translated back into English while preserving their accuracy and usefulness. At the same time the number of terms was nearly doubled.

The most useful feature of the *Illustrated Dictionary...* for students at all levels is the illustrations. More than 1300 original photographs, photomicrographs, line-drawings or diagrams accompany and clarify a corresponding term. Invariably the caption identifies the organism being illustrated.

I have only two suggestions for improvement - and I have mixed feelings about one of these. One definite improvement would be to include an index to illustrated taxa. Students appreciate well-illustrated texts to help them work through laboratory materials, but the illustrations in most texts are restricted to common examples and a relatively few structures. The illustrations provided in this dictionary are a wonderful resource that could be more effectively used by students in the laboratory if such an index was provided. Second, all illustrations are black and white. Photographs and photomicrographs may (or may not) benefit from reproduction in color. For instance, in some cases where labeling an area or tissue with an arrow may be slightly ambiguous, being able to refer to a particular colored region may be useful. All-in-all this is an extremely useful reference and well worth the cost. - Marshall D. Sundberg, Department of Biological Sciences, Emporia State University, Emporia, KS 66801.

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Phytoliths: Applications in Earth Sciences and Human History.

Jean Dominique Meunier and Fabrice Colin. Editors. 2001. ISBN 90-5809-345X (Hardbound, cloth US\$123.75) 378 pp. A. A. Balkema Publishers, Lisse/ Abingdon/ Exton (Pa)/ Tokyo; c/o Ashgate Publishing Company, 2252 Ridge Road, Brookfield, VT 5036-9704. - Forty-five years ago I entered the field of palynology applied to oil exploration. In those days anything smaller than 150µm was included in palynology. Around 1960, I received a paper describing phytoliths from Australia which introduced me to the subject and the possibility that it could be useful in stratigraphic correlations. However, at that time only spore-pollen and dinoflagellates were used as palynology items in oil exploration. Intense debates about the limitations of palynology in the 1960s restricted paleopalynology to acid-resistant organic microfossils. Phytoliths of opaline silica became a separate independent discipline. However, as demonstrated in a couple of papers in this book, a synergistic approach between palynology and phytoliths works well in the Quaternary and in archaeological problems. Rovner (p. 119) considers his description of phytolith analysis in his 1974 paper as "second palynology" his unfortunate mistake.

This is a much awaited comprehensive book on applications of phytoliths in diverse fields, such as, paleoclimatology and paleoecology; diet and health; archaeological structures and ancient agriculture; and soil-plant interactions. The book is a compilation of thirty review and original papers. Most of the papers were presented at the Second International Meeting on Phytolith Research held in Aix-en-Provence (France) in August 1998.

Phytoliths are microscopic minerals that are precipitated in plant tissues for various physiological functions in the life-time of plants. Unless phytoliths are fossilized, they cannot be called fossils as they are defined in the preface of this book. Readers may find that authors of various papers in this book have made their own efforts to identify fossil phytoliths with extant ones. Bowdery et al. have made a preliminary effort to propose a morphological classification scheme and phytolith identification keys which eventually may lead to a binomial nomenclature of phytoliths. In spite of considering himself a lumpen, Twiss classified 56 phytolith forms from grasses into 6 classes and identified differences between phytoliths from C3 and C4 grasses.

Various methods have been employed in isolating phytoliths in various chapters of this book, but the sample processing method employed by Wang et al. produced complete and clean phytoliths from Quaternary laterite in South China. The illustrated SEM photomicrographs of several types of phytoliths from various extant plants by Bowdery et al. indicates

that their phytolith extraction technique is suitable for SEM illustrations although the technique is not described. Their illustrations also indicate that phytoliths are present in a variety of plant species and are not restricted to grasses.

Phytoliths are shown to be an excellent tool in refining biostratigraphy and interpreting paleoclimatology and paleoecology. A rich phytolith assemblage from a 12.5 m thick late Pleistocene section of loess in the Columbia Basin shows a greater proportion of *Artemisia tridentata* and *Stipa* phytoliths in the late Pleistocene assemblages than in those of the modern grassland indicating a cooler and drier climate in the late Pleistocene. Phytolith assemblages of the last Interglacial, last Glacial, and the Holocene are distinguished from the eastern region of Towada Volcano in northeastern Japan, and their paleoclimate interpreted. The study of two slope soil profiles from the eastern Kivu region of Congo, Africa, yielded well preserved phytoliths from a 1000 year old soil layer indicating that opal phytoliths can be well preserved in tropical soils.

Three papers illustrate the application of phytoliths in diet and health. Morphologically different phytoliths that occur in durum wheat and bread wheat were used to detect the adulteration of pasta. Phytoliths are microscopic so can be deposited in very fine cracks and crevices and remain preserved for millions of years. A method to examine exogenous deposits on archaeological teeth is described which may be useful in determining subsistence patterns and interpreting past environments. Another paper compares dental microstriations and calculus of two populations from different periods and socio-cultural backgrounds and interprets food habits on the basis of recovered phytoliths and fragments of starch and cellulose.

Several papers in this book show the usefulness of phytoliths in precise micro-stratigraphy and for interpreting ancient agriculture practices. Phytolith analysis of samples from small places and narrow intervals are shown to be very useful in gaining archaeological information which may be very difficult to get by any other means. Identification of maize phytoliths proves that the cultivation of maize started about two thousand years ago in eastern Uruguay. Similarly the maize phytolith identified from an archaeological Andean "kitchen" indicates the use of maize for food about 1500 yrs BP in northwestern Argentina. The fourth paper analyzes phytoliths in Neolithic ploughing areas at the Zagaje Stradowskie site in the loess zone of western Malopolska in southern Poland. A combined use of phytoliths and palynology provides the history of the agrosystem in the Rhône mid-valley of southern France indicating that an agrarian practice was maintained from 2000 to 200 yrs BP with the abandonment of the drainage system during 476-

1000 yrs BP. On the basis of phytoliths it is determined that the numerous pits found scattered in the iron age site of Kilise Tepe in Turkey were primarily used for grain storage and then recycled for garbage disposal at the end of their original use. The history of agropastoral economies from about 350 to about 40 yrs BC in southern Kazakhstan is deduced on the basis of phytolith assemblages from two Iron Age Saka-Wusun sites.

A phytolith study of the earliest ash deposit from the Chalcolithic level (Copper Age; 3000 yrs BC) at Balathal, Rajasthan (western India), indicates a practice of farming rice and millets in that area. Holocene phytolith assemblages from soils of 29 sites in West New Britain, Papua new Guinea, shows that phytoliths can be used to successfully differentiate vegetation communities according to levels of anthropogenic disturbance. Phytolith analysis from three discrete areas of a 3,400 year old stemmed obsidian artifact and a soil sample from the same stratigraphic horizon from Bitokara Mission, West New Britain shows three distinct assemblages indicating three micro-environments.

Proficient methods have been devised to identify phytoliths in sediments and interpret their significance. A phytolith from the assemblage recovered from a sample taken from a first century hearth structure in front of a temple at ed-Dur, U.A.E. is identified as that of *Phoenix dactylifera*. In another study, phytoliths in prehistoric ash layers from the Lower-Middle Paleolithic Tabun Cave and Middle-Upper Paleolithic Kebara Cave are identified with extant taxa by statistical analysis. The morphological data of 69 extant species of Cyperaceae and Gramineae identified by optical and scanning microscopes and subjected to cluster and canonical correspondence analysis shows that some sedges and cereal grasses possess fairly specific phytolith spectra that can be used for their taxonomic identification. In an effort to find a way to identify phytoliths at species level, inflorescence-bract-produced phytoliths from four species of wheat and two species of barley are analyzed by computer-assisted image and statistical analysis and a classification key is developed. This method appears to be useful to reliably identify phytoliths at the generic level. Phytolith study from two Middle Archaic Period hunter-gatherer sites in eastern USA, shows a warming trend over a wide geographical area. An analytical study of occluded elements in phytoliths shows that the phytoliths from the leaves of two plant species growing on the same sediment occlude elements in different amounts. This differential concentration may lead to methods to identify the source of phytoliths in sediments. Methods are being improved for resolving phytolith $\delta^{13}C$ to identify C3 and C4 grasses for paleoecological reconstruction. Raman spectroscopy is used to detect occluded organic and coaly matter in

phytoliths to interpret paleo-fires in archaeological samples.

Experiments have been conducted to determine soil-plant interaction and its effect on phytolith morphology. Leaves of several gymnosperm genera, studied by x-ray microanalysis through scanning electron microscope, shows that silicon and aluminum co-deposited in the outer layer of the needles. It is suggested that the higher aluminum content in fossil phytoliths may indicate their gymnospermous source. Biodegraded beech leaves collected and subjected to microanalysis by transmission electron microscope indicate that bacteria may be involved in the biogeochemical cycle of silicon. A study of phytolith assemblages from two profiles taken from a larch forest of the Far East of the former USSR indicates the existence of stable and unstable phytoliths. Phytolith assemblages studied from two laterite profiles in the middle and lower reaches of the Yangtze River shows their great potential for reconstructing the past vegetation and climate.

The editors have done an excellent job in putting these thirty papers under one cover. The book provides a glance at recent advances in phytolith research and application. In spite of its steep price, the book will be interesting to botanists and geologists alike. All libraries should have this book on their reference collection shelf. - Satish K. Srivastava, Geology Consultant, 3054 Blandford Drive, Rowland Heights, California 91748-4825



Environmental Physiology of Plants, 3rd edition,

Alastair H. Fitter and Robert K.M. Hay. 2002. ISBN 0-12-257766-3 (paper US\$) 367 pp. Academic Press,, 525 B Street, Suite 1900, San Diego California 92101-4495. This is the latest edition of a text that has been popular for use in advanced undergraduate and graduate courses in plant ecophysiology and related areas. The 2nd edition was published in 1987, and considering the many developments in this field since then, an updated version of this text will be highly welcomed by instructors who have used this text for their classes.

The third edition largely retains the structure and content of the 2nd edition. Chapters on Energy and Carbon; Mineral Nutrients; Water; Temperature; Toxicity, and An Ecological Perspective provide a broad survey of plant environmental physiology. The text takes an ecological perspective on these topics, focusing on those aspects of physiology most relevant to plant adaptation to differing natural environments, and to coping with real-world stresses.

While the coverage of the classical core of plant environmental physiology (topics such as adaptation/ acclimation to sun and shade, or ion transport in soil) is very solid, I would have liked greater coverage given to some areas that have become of major interest in the field in recent years. This edition does include discussion of such "newer" topics as stable isotopes and the use of phylogenetic information in comparative physiology. However, there are also a number of other topics that might have been covered in greater depth, such as the function of the xanthophyll cycle in photoprotection, or the role of volatile organic compounds (e.g. isoprene) in plant carbon budgets and in protection against high temperature damage.

By the authors' own admission, the physiology of responses to global changes is not "treated in full in this book", although this edition does feature new sections on "Responses to elevated carbon dioxide concentrations" and "Life in a warmer world: the case of the Arctic Tundra". Instructors who wish to emphasize topics such as rising atmospheric CO₂, climate change, or increased UV radiation will need to provide extensive materials to supplement this text.

Apart from the partial neglect of topics such as these, this is a very fine introduction to the field. The chapters are well-organized and full of pertinent examples and references to the primary literature, and the writing is clear and lucid throughout. The coverage of most topics is at a level of detail that is appropriate for an audience of capable, advanced undergraduates or beginning graduate students. This book might also be useful to plant biologists from other disciplines looking for a brief introduction to or refresher on general plant ecological physiology. – Daniel Taub, Biology Department, Southwestern University, Georgetown, TX 78627.

Seeds of New Zealand Gymnosperms and

Dicotyledons. Colin J. Webb and Margaret J.A. Simpson. 2001. ISBN 0-9583299-3-1 (Cloth NZ\$90) 428pp. Manuka Press, P.O. Box 12 179, Christchurch, NZ. - Sometimes as I attempt to identify a *Carex* or *Cyperus* specimen or as I set up a germination experiment, I am awed by the beauty of a seed or fruit. As a child I helped in the family garden and can still remember handling calendula, beet, and carrot seeds that came in small brown paper packages from the Burpee Seed Company. Seeds are tiny miracles, not only for the embryo that they contain, the mysteries of why, when, and where they germinate, but for themselves. This book by Webb and Simpson illustrates the diversity of New Zealand gymnosperm and angiosperm seeds and celebrates seeds.

There are 165 plates accompanied by text that describes the seeds or fruit, including color and size, and provides taxonomic synonymies. The text also makes other relevant observations about variability that might make identification difficult, geographical differences, and range and age-related changes in seed color. The book includes 94 families, 255 genera, and 1058 species. Where variation in a genus is slight, only representative species are shown. The plates are preceded by keys to nine groups, e.g., cypselas or mericarps, and within groups to genera. Gymnosperms precede angiosperms and arrangement is alphabetical by family, subfamily, and then genus and species. Care was taken to make difficult genera accessible. For difficult-to-identify species of *Coprosma* (Rubiaceae), for example, tables provide information about operculum ornamentation and pyrene length that allow species to be segregated so that they can then be identified using individual descriptions, illustrations, and distribution information. Although I have not used the keys, they seem clearly written. There is a short introduction that describes the scope of the book and features information about NZ seeds, referring to pertinent NZ publications. There is also a section covering conventions and abbreviations.

Unlike other seed floras of which I am aware, *Seeds of New Zealand* makes extensive use of scanning electron micrographs as well as light microscope photographs. Many of the SEMs of small seeds (< 1-2 mm) of families, of, for example, Ericaceae, Loganaceae, and Scropulariaceae, are themselves works of art. The SEMs are of entire seeds or provide enlarged detail of seed coats. In some cases, SEMs, for example, of pappus hairs, complement light micrographs.

Many photographs are of several seeds to show variable morphology. In addition to the majority black and white photographs, there are several color plates. These depict, for example, the red arils of *Alectron excelsus* (titoki, Sapindaceae) that cap a shiny black

seed and the odd greenish inflorescence of *Korthalsella clavata* (dwarf mistletoe, Viscaceae) with a seed being extruded from a fruit. The text description for the *Korthalsella* is on an adjacent page, but as a very minor quibble, that for the *Alectron* is on a distant page that could have been noted on the color plate. Another set of colored plates shows seeds of *Carmichaelia* species (broom, Fabaceae) in an intriguing array of intra and inter specific color patterns. This genus, depicted on the book's cover has a fruit, that when mature, presents the seed as in a frame that is a persistent, thickened suture. I have many favorite fruits, but those of *Carmichaelia* that I saw near Wellington while on a sabbatical leave, are exceptional. The authors note in the text that *Carmichaelia australis* has distinctive regional forms that have been previously given species status. The colors, patterns, and presentation raise obvious question about evolution and selective forces.

In addition to the usual explanation of terms, the glossary contains a color chart where light buff can be distinguished from medium buff, or light nut brown from nut brown and grey nut brown. Other glossary figures provide illustrations of testa patterns and seed and embryo shapes.

The black and white photographs give the book its substance and will permit seed identification for numerous purposes. Archaeology, paleobotany, and seed bank studies come to mind. It would also allow for comparisons of seeds both within and between geographic areas and taxa. Beyond its uses for plant identification and classification, *Seeds of New Zealand* provides a wealth of information for conservation of biodiversity. The introduction ends on the note that more research is needed to determine ecological function of seeds in terms of dispersal and germination and how variations in form relate to phylogeny. These would be instructive regarding selective pressures and evolutionary pathways. Beyond these, there are interesting facts to discover: The seeds of *Daucus glochidatus* (the native carrot, Apiaceae) are easy to distinguish from the naturalized *Daucus carota* by shorter and more sparsely ciliated mericarps with more simply barbed spines and some, e.g., *Geniostoma repestre* var. *ligustrifolium* (hangehange, Loganiaceae), have coalesced seeds, joined by a persistent placenta. There are, too, the exotic names, at least to the North American of, e.g., *Gingidia* (Apiaceae), *Oreostylidium* (Stylidiaceae), *Centipeda* (Asteraceae), *Alseuosmia* (Alseuosmiaceae), *Corokia* (Escalloniaceae) or *Euchiton* (Asteraceae). (These bring to mind the song about faraway places with strange sounding names).

The groundwork for this book was laid in the 1960's when a seed atlas for identification of New Zealand native plants was undertaken initially by Ruth Mason,

to whom the volume is dedicated. Ruth Mason who was later joined by Margaret Simpson carried out a seed identification service provided by the Botany Division of the New Zealand Department of Scientific and Industrial Research. Colin Webb is a foremost expert on New Zealand seeds. Over the years many people - photographers, taxonomists, writers, and others - helped move the project forward. Sadly, Margaret Simpson died in 1995 before the work was completed

The book is well produced. However, there are some \O soft¹ edges, primarily in some photographs of thick seeds for which depth of field was a problem. I could also quibble with the placement of the voucher list just in front of the index so that it gets in the way of using the index, but it contains the plate number for each species.

Publication of the companion volume on the monocotyledons is anticipated. I hope it is not far off so I can see what seeds of New Zealand Cyperaceae look like. – Mary A. Leck, Biology Department, Rider University, Lawrenceville, NJ.

10th International Exhibition of Botanical Art and Illustration. James J. White and Lugene B. Bruno (eds). 2001. ISBN 0-913196-73-8 (Paper US\$25.00) 183 pp. Hunt Institute for Botanical Documentation, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, PA 15213-3890. White and Bruno present the catalog of botanical artwork displayed at the 2001-2002 exhibition at the Hunt Institute of Carnegie Mellon University. Given the importance of the aesthetic appeal of plants for the promotion of botany, such artwork comes as an important tool for reaching the general public, and this book does a fine job of presenting current botanical art and illustration.

The past few decades have seen an amazing renaissance for botanical art. Botanical art, beginning with early coins and medical works, reached its zenith in the seventeenth and eighteenth centuries with the work of luminaries such as Ehret, Redoute, and the Bauer brothers working mostly in watercolor and gouache on vellum with those works then promulgated via etchings. With the advent of other techniques of illustration, botanical painting waned, especially with the coming of photography and mass color printing. Perhaps the best known publication of botanical art and illustration, *Curtis Botanical Magazine* first appeared during the late eighteenth century. However, even this famous periodical briefly disappeared for a few years in the late twentieth century before its title

was revived.

Many extremely talented new artists from societies such as the American Society of Botanical Artists, the Society of Botanical Artists, and the Guild of Natural Science Illustrators are now producing works that rival the best botanical art of the late eighteenth and early nineteenth centuries. In this revival, a key role belongs to the Hunt Institute of Carnegie Mellon University. That Institute is one of the finest existing repositories of botanical art and illustration and of information on that field and its history. The Hunt Institute has conducted regular exhibitions of twentieth century botanical artists from the mid-1960's onward at approximately three-year intervals, with over 850 artists now exhibited in these programs.

The catalog of the 2001-2002 exhibition is printed on heavy weight archival paper with a matte surface, though colored areas do show some gloss—i.e. it is easily viewed in almost any lighting. Colors are strong and accurate as expected from such a high-quality work, which introduces or shows the latest work of artists from ten countries and on six continents. Artist's biographies are listed in the second part of the catalog, after the works themselves are presented.

This breadth of submissions seen in this work is one of the most heartening aspects of the recent renaissance in botanical art, guaranteeing a very wide coverage of the world's plants in fine art. Most works are done in watercolor, though a few others range from gouache to pen and ink to graphite. Most works are realistic, though some are more stylized. All are accurate depictions at the scientific level—readers from just about anywhere will recognize familiar species from gardens and the wild.

10th International Exhibition of Botanical Art and Illustration belongs in every college and university library both for its value to botanists and for the connection that it provides to the world of art. Anyone teaching an introductory course, especially one containing sizeable numbers of non-science majors, would do well to use a copy in teaching since extension of scientific topics into the humanities can be such a help in creating and maintaining student interest. It is a delight for both the mind and the eyes. – Douglas Darnowski, Washington College, Chestertown, MD 21620



Perception of the Visual Environment. Boothe, R.G. 2002. ISBN 0-387-98790-8 (hardcover, US \$90). 407 pp. Springer-Verlag, New York, NY. - I was asked to review this book because my research group focuses on the public's biological understanding of plants within the visual environment. Our research findings have led us to propose and introduce a number of visual perception and visual cognition-based concepts to improve botany education (e.g., *plant blindness*, *botanical sense of place*, *marquee plants*, and the *LimitingCases™ teaching strategy*). So, the contents of this book were of obvious interest to me and my 30 Ph.D. students, past and present. However, in wearing my botanist's hat, I had to ask myself: "Of what value might such a book be to the broad spectrum of botanists represented by the BSA as its members conduct their research investigations and teach their students about plants?"

The book's author is a professor of psychology at Emory University and he teaches a course with the same title as this book. His research laboratory at Yerkes Primate Center conducts NIH-supported neurophysiological studies of normal and abnormal development of vision in monkeys. He tells us that the book's "... primary audience consists of juniors and seniors majoring in psychology, *biology* [emphasis added], or neuroscience.... Graduate students and postgraduates in related fields...form a secondary audience." Given the fact that future biologists are part of the book's target audience, I then asked: "What are some examples of how *botanists* might benefit from the knowledge this book contains?" To answer that question, first, a general overview of its contents may prove helpful.

To read this book, no specialized background knowledge of visual perception, beyond basic concepts one learns in introductory college biology and psychology, is assumed. Throughout the book, the author compares and contrasts what it means to perceive the world visually—from a human's, a monkey's, and a computer's standpoint. Each chapter is supported by a carefully selected reading list, comprised of approximately 20 accessible sources, drawn from the vast literature base of visual neuroscience. "The primary purpose of the book is pedagogical" (p. vii). In keeping with the book's title, 472 illustrations provide visual representations of key ideas—in the form of maps, graphs, charts, diagrams, and images. Two other features that promote learning are found on the opening pages of all 12 chapters: (a) a detailed chapter outline, and (b) a short list of questions that the reader should be able to answer after having read the chapter.

Here are some representative, verbatim, chapter pre-questions (one from each of the 12 chapters, in sequence) that might interest botanists and capture

the *flavor* of this textbook:

1. Percepts convey to observers “knowledge about what,” “knowledge about how,” and “subjective perceptual experience.” Use the example of the phenomenon of *binocular rivalry* to illustrate what is meant by these three distinct aspects of percepts.
2. Distinguish between *empirical knowledge* and *perceptual knowledge*.
3. What are some differences between *natural* and *artificial environments*, and what implications do these differences have on perception?
4. What is the function of *perceptual filtering*?
5. Illustrate with some examples how the visual system is organized into functional streams [M-, P-, and K-streams] of processing.
6. Elaborate what it means to conceptualize perceptual processing as being essentially a statistical procedure.
7. What are *hue*, *saturation*, and *brightness* [with respect to color]?
8. What kinds of strategies can be employed to try to infer properties of surfaces from pieces of contour?
9. Describe what it means to assert that stereovision cannot be based exclusively on either space or time, but must be based on space-time.
10. Summarize the neural streams of processing that are particularly concerned with temporal change and motion.
11. What are the Hebbian rules, and how can they explain some of the effects of environmental influences on perceptual development?
12. Give some examples of perceptual qualities that are likely to be derived primarily from the observer instead of the stimulus.

In short, this book is designed to move from questions of what it means to *perceive visually*; to scientific ways of determining what is perceived; to what is out there to be perceived; to how we transduce, sample, and image what is out there; to the biological hardware and software we use to do this; to how we perceive color, form, 3-D, and motion; to perceptual system development; to how low-level signals take on high-level qualities; to the subjective aspects of seeing. It does this with sufficient scientific rigor for an introductory work, while explaining the subject in a manner comprehensible to non-specialists.

There is no botanical knowledge in this book. A botanist who reads it needs to consider whether or not its contents lead to a better understanding of plants. So, how might *perception of the visual environment* intersect with the work that today's botanists do? Plants are a key component of the visual landscape. Botanical *fieldwork* takes place in a visual environment that consists of visible (and invisible) electromagnetic radiation, the earth's atmosphere, and the surfaces of water, vegetation, fauna,

anthropogenic artifacts and structures, plus other physical features. Each visual environmental element has the potential to confound the botanist's observations and records. An awareness of the characteristics, strengths, biases, and weaknesses of our visual observation systems can only serve to enhance the quality of our research—whether we are taking field notes by ourselves or bidding satellites to do our remote sensing. Conversely, botanical *laboratory work* frequently involves interpretation of microscopy-based images. Once again, visual perception enters the picture—from the origin of the image itself to our making sense of it.

Consider another example. Some of us may study plant-insect interactions. In many bee-pollinated flowers, a region of low ultraviolet (uv) reflectance is found near the center of each petal. This pattern is invisible to us, because human vision does not extend into the ultraviolet region of the electromagnetic spectrum. Bees, although blind to red light, can easily detect ultraviolet light. The contrasting ultraviolet pattern they see (called a nectar guide) helps a bee to quickly locate the flower's center. This adaptation leads to *visual cueing* that may benefit both the flower (enabling more efficient pollination) and the pollinator (aiding the bee's rapid collection of nectar).

When I ask students how we could see these nectar guides for ourselves on living flowers, they often say: “Take a uv light source outdoors at night and shine it on various flowers to see which species look different from their daylight appearance and may possess nectar guides.” They mistakenly apply their “black light-fluorescent poster” schema to this research problem! By failing to understand that sunlight already *has* a uv component and yet we don't see nectar guides during the day (because the eye simply cannot detect reflected uv light), students are unable to design an appropriate experiment. Once he understood more about visual perception, one student took identical shots of black-eyed Susan flowers, *Rudbeckia hirta*, on B&W film using a 35mm camera—one shot with, and one shot without, an ultraviolet filter attached. The resulting paired photographs simulated the differences between what humans see and what bees see on the same flower. Some students might say he should have used color film, but knowledge of visual perception tells us **there cannot possibly be any “true” color rendition of reflected radiation that falls outside the spectral band visible to our eyes. It is also interesting to note that most digital still cameras and digital video cameras contain CCDs that are just as sensitive to uv light as silver halide film is, and can even yield immediate floral images under uv illumination.**

Another botanical application: Some of us use Munsell's Color Charts for Plant Tissues to separate and

categorize plants in our research studies by leaf, flower, or fruit on the basis of differences in hue, value, and chroma. The accompanying directions state: "Sometimes the color of plant tissues reveals the genetic origin of plants, effects of toxic substances, or the actions of parasitic organisms," as well as helps in solving problems of plant physiology and nutrition." Boothe's book helps the botanist understand the basis of such visual distinctions as chroma, hue, and value—whether the researcher is using such direct-comparison color charts, a hand-held colorimeter, or plant image files to be analyzed with a software-based color-area meter.

At this point, the *PSB* reader will have to decide if the content of this book might help to inform his or her own work— be it research or teaching. If visual perception concepts, principles, or judgments are involved in that work, then, in the opinion of this reviewer, this book is well worth reading. It stands up well in comparison to similar scholarly titles which appear in print today. Marcel Proust once wrote: "The real voyage of discovery consists not of seeking new landscapes but in having new eyes." In effect, that's what this book offers an observant reader. —James H. Wandersee, Louisiana State University, 15th Laboratory, Room 223-F Peabody Hall, Baton Rouge, LA 70803.

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