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PLANTS Grant recipients and mentors at botany 2014
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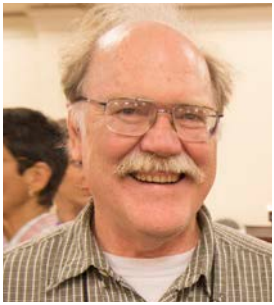

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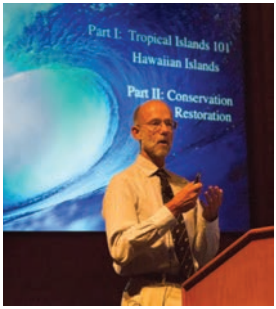

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From the Editor

It's that time of year again: preparing the last issue (number 4) of a volume of *Plant Science Bulletin*. But what to say? It's a special issue for me---my last as editor. First, thank you to Ann Antlfinger, Jenny Archibald, Nina Baghai-Riding, Doug Darnowski, Andy Douglas, Norm Ellstrand, Vicky Funk, Dan Gladish, Root Gorelick, Sam Hammer, Kathryn LeCroy, Chris Martine, Jim Mickle, Mick Richardson, Beth Schussler, Johanne Sharpe, Lindley Tuominen, Carolyn Wetzel, and Andrea Wolfe who served on the *PSB* Editorial Committee during the past 15 years of my editorship. A lot has changed in the *PSB*, and the Society, during that time. Beginning that first year, and with help of Scott Russell, we began to make an HTML version of each *PSB* available online. In the last 2002 issue, *PSB* 48(4), we announced that Bill Dahl was appointed as the first Executive Director of the Society and that he would be organizing the staff at a new office in St. Louis. An early project was to digitize the entire previous run of *PSB* to make it available online. Seven years later, in *PSB* 55(4), we announced that beginning with the first issue of 2010, articles for publication in *PSB* would be peer-reviewed, thus providing a publication outlet for members to publish scholarship not typically supported by the *American Journal of Botany*. This also changed the duties of the Editorial Committee members, who assumed responsibilities as monitoring editors of submitted manuscripts. A less noticeable change in 2010 was a subtle reduction in page size to better fit the format of electronic readers. We instituted several dramatic changes in 2011. The most obvious to the reader was the shift to a full-color cover. More important, however, were production changes with the BSA office staff assuming responsibility for copyediting and layout (what a change in my pre-publication schedule---thank you Rich, Beth, and Johanne!). Despite these changes, the most important thing about *PSB* has remained constant. As I noted in my first editorial, the success of *PSB* "depends almost entirely on your input as [BSA] members and contributors," and it will continue to do so. I intend to be a faithful reader and regular contributor in the future, and I hope you will too.

-Marsh

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Judy Jernstedt Ends Tenure as *AJB* Editor-in-Chief

After serving as the editor-in-chief of the *American Journal of Botany* for 10 years, Dr. Judy Jernstedt has just completed her tenure at the end of 2014.

Jernstedt, Professor of Plant Sciences at the University of California at Davis, oversaw many changes in scientific publishing since 2005—including the evolution and continued development of online publishing and manuscript submission systems, the rise of Open Access and Open Data as issues for exploration, and the importance of helping authors promote their work, through traditional and non-traditional (e.g., social media) outlets. The *AJB* was recognized in 2009 by the Biomedical and Life Sciences Division (DBIO) of the Special Libraries Association as one of the top 10 most influential journals of the past 100 years in the field of biology and medicine, which speaks to the strong efforts of the *AJB*'s authors, reviewers, and editors. Her good work has led to higher impact factors, a greater involvement of the journal's editorial board, increased reader commentaries and author responses within the journal, a number of impressive special issues (including one celebrating Darwin's Bicentennial: "The Abominable Mystery," and others on next-gen sequencing, plant tropisms, global biological change, and "Speaking of Food": the connection between basic and applied plant science), and the successful celebration of the journal's first 100 years (see the *AJB* Centennial Reviews published throughout 2014, and items in the *Plant Science Bulletin*). The 100th anniversary of the BSA and the 150th anniversary of publication of "On the Origin of Species" also occurred during Jernstedt's tenure.

It has been a good run—yet many challenges, and opportunities, exist now and will into the future.

"The biggest challenge has been trying to keep up with the rapidly changing world of scientific publishing and the increasing expectations of authors and readers," Jernstedt said. "It has been a pleasure to work with the great group of thoughtful and extremely diligent Associate Editors on the *AJB* Editorial Board.

"I've been so impressed by *AJB* reviewers—their rigor, constructive approach, and conscientiousness—and the hard-working Editorial Office staff has been a true joy to work with all these years. It was gratifying to see the *AJB* Impact Factor creep slightly above 3 for 2010 (3.052), and I'm confident *AJB* is in good hands to do this again!"

"BSA and the entire global community of botanists has been fortunate indeed to have had our flagship journal led by such an outstanding scholar as Judy Jernstedt," said current BSA President Tom Ranker. "We are all greatly indebted for her dedication and professionalism."

Dr. Pamela Diggle, Professor and Associate Head of the Ecology and Evolutionary Biology Department at the University of Connecticut as well as recent BSA President, will take over as Editor-in-Chief beginning in 2015.

There is no doubt that Jernstedt will remain active in the BSA, after having also served as BSA President in 2001 and Treasurer in 1997, earning the BSA Merit Award in 2010, and serving as a PlantingScience mentor. The BSA thanks Jernstedt for her many years of service and looks forward to her continued work.

Marsh Sundberg with his wife Sara.

Marsh Sundberg Signs Off as *Plant Science Bulletin* Editor

Dr. Marsh Sundberg, as noted in the *PSB* Editorial in this issue, will step down as *PSB* Editor after having served for 15 years. Sundberg has worked diligently to keep the *PSB*---published since January 1955---relevant and interesting to readers looking for information in botany, from BSA news and awards, to peer-reviewed articles that aid in teaching, to helpful book reviews. He also worked to digitize the entire archive of the *PSB*s as well as the transition of the *PSB* from more than just a hard copy and PDF; it is also available in a flipbook format that works seamlessly with e-readers.

Sundberg's passion for botanical education has been prominent throughout his time heading the *PSB*; in fact, readers can look forward to the fourth part in his ongoing series on botanical education in a future issue of the *PSB*. He also co-authored, along with Gordon Uno and Claire Hemingway, the recently released book *Inquiring About Plants: A Practical Guide to Engaging Science Practices*, whose proceeds go to support the PlantingScience online mentoring program. (Copies are available at www.plantingscience.org.)

"We are all grateful for the extreme dedication of Marsh Sundberg in continually producing one of BSA's most valuable resources," said current BSA President Tom Ranker. "Under his editorship, the *PSB* has evolved into an instantly available source of extremely useful information for all interested in botany and education."

Dr. Mackenzie Taylor, Assistant Professor, Plant Reproductive Biology and Development, at Creighton University, will serve as the new *PSB* editor beginning in 2015.

The BSA is honored to have had Sundberg steer the *PSB* over all these years and looks forward to his continuing work within the BSA.

The *American Journal of Botany* Centennial Celebration ends… but its next century begins!

In planning for how to celebrate the journal's centennial celebration in 2014, the *AJB* staff realized that the focus had to remain on the core strengths that have sustained the journal since 1914: its research and its contributing Society members. Throughout the year, the *AJB* has featured a series of *AJB* Centennial Reviews---articles that have looked at key research from the past with a revamped and updated take to find out where the field stands now and going forward. The following *AJB* Centennial Review articles are already available and can be accessed for free:

- "**Neurospora crassa: Looking back and looking forward at a model microbe**" by Christine M. Roche, Jennifer J. Loros, Kevin McCluskey, and N. Louise Glass [101(12):2022, 2014]
- "**Ever since Klekowski: Testing a set of radical hypotheses revives the genetics of ferns and lycophytes**" by Christopher H. Haufler [101(12):2036, 2014]
- "**The plastochron index: Still useful after nearly six decades"** by Roger D. Meicenheimer [101(11):1821, 2014]
- "**The relative and absolute frequencies of angiosperm sexual systems: Dioecy, monoecy, gynodioecy, and an updated online database"** by Susanne S. Renner [100(10):1588, 2014]
- **"The role of homoploid hybridization in evolution: A century of studies synthesizing genetics and ecology"** by Sarah B. Yakimowski and Loren H. Rieseberg [101(8):1247, 2014]
- **"The polyploidy revolution then…and now: Stebbins revisited"** by Douglas E. Soltis, Clayton J. Visger, and Pamela S. Soltis [101(7):1057, 2014]
- **"Plant evolution at the interface of paleontology and developmental biology: An organism-centered paradigm"** by Gar W. Rothwell, Sarah E. Wyatt, and Alexandru M. F. Tomescu [101(6):899, 2014]
- **"Is gene flow the most important evolutionary force in plants?"** by Norman C. Ellstrand [101(5):757, 2014]
- **"Repeated evolution of tricellular (and bicellular) pollen"** by Joseph H. Williams, Mackenzie L. Taylor, and Brian C. O'Meara [101(4):559, 2014]
- **"The voice of American botanists: The founding and establishment of the *American Journal of Botany,* 'American botany,' and the Great War (1906-1935)"** by Vassiliki Betty Smocovitis [101(3):389, 2014]
- **"The nature of serpentine endemism"** by Brian L. Anacker [101(2):219, 2014]
- **"The evolutionary-developmental origins of multicellularity"** by Karl J. Niklas [101(1):6, 2014]
- **"The *American Journal of Botany*: Into the Second Century of Publication"** by Judy Jernstedt [101(1):1, 2014]

To celebrate the contributions of the people behind the science, the *PSB,* throughout 2014, has featured short interviews with some of the *AJB*'s most prolific contributors. This issue wraps up this special feature, but note that many of these authors are still contributing to the journal, well into 2015!

The new year---and new century for the *AJB*---will bring some interesting changes and new features. Incoming Editor-in-Chief Pam Diggle has a number of features in mind for 2015, and the journal will be expanding its reach and exploring a new look. We look forward to the start of the next 100 years!

Carol and Jerry Baskin

Carol and Jerry Baskin both joined the BSA in 1969 and have gone on to serve the Society in a variety of ways, from Jerry's tenure as program director in 1990 to Carol's tenure as president in 1998. Each of them earned the Society's highest honor, the BSA Merit Award, in 2001, and they've contributed 28 articles thus far to the American Journal of Botany *over the course of their careers. They recently reflected on their work in the AJB.*

The first article you published in *AJB* was "Germination Ecology of *Phacelia dubia* Var. *dubia (interior)* in Tennessee Glades" in 1971. Please take us back to that period; what were you studying/most interested in at the time?

In the late 1960s-early 1970s, the main focus of our research was the ecological life histories of herbaceous species. In such studies, timing of events in the life cycle such as flowering and seed germination are investigated in relation to environmental conditions, especially the seasonal changes in temperature and rainfall. The purpose of these studies is to gain a better understanding of how the study species is adapted to its habitat. As we were doing life history studies, we became very interested in the seed dormancy/germination phase of the life cycle and began to design experiments to determine what environmental factors were required for dormancy to be broken and for the nondormant seeds to germinate. Thus, seed germination ecology, or what controls the timing of germination in nature, was becoming a focal point of our research when we published our first paper in the *American Journal of Botany* in 1971.

You have a long history of very productive mutual collaboration. How did this come about? How have you sustained it over the years?

We began to collaborate on research when we were graduate students at Vanderbilt University in the 1960s. We went to the University of Kentucky (UK) in August 1968, where Jerry had a job as an Assistant Professor in the Botany Department. Carol did not have a job, and could not find a teaching job in central Kentucky, so we decided to work together as a research team. In 1999, Carol became a full Professor at UK, with the exact same salary as Jerry – down to the last 12 cents. Jerry retired from UK in June 2011, but he is still very much involved in paper-writing; Carol is still working at UK. Thus, we are still collaborating and working together on manuscripts.

Over the years, we have collaborated with our graduate students, as well as seed biologists from many different countries. Since 2005, we have been to China 12 times and have become heavily involved with seed research there, resulting in many collaborative projects/papers.

Jerry and Carol Baskin, 1979.

Your latest article in the *AJB* was "Temperature regulates positively photoblastic seed germination in four Ficus (Moraceae) tree species from contrasting habitats in a seasonal tropical rainforest" in 2013. Please tell us how the thread of your research has changed over time.

Our early studies on seed germination ecology were mostly conducted on herbaceous species that grew in temperate eastern North America, primarily Tennessee and Kentucky. We studied species that grew in a wide variety of habitats, including cedar glades and other rock outcrops, forests, roadsides, fields and pastures. Eventually, we worked in collaboration with people in other parts of the USA and from other countries on species outside our home range.

In the 1980s, while writing our book "Seeds: Ecology, biogeography, and evolution of dormancy and germination," we undertook a survey of the world biogeography of seed dormancy and collected information from all the major vegetation types on earth; we had data for 3580 species. Since publication of our book in 1998, we have continued to collect information on the biogeography of seed dormancy and in collaboration with many colleagues continued studies on seed germination ecology of species growing in various places.

A second edition of our book was published in early in 2014, and it contains information for more than 14,000 species. Information on the world biogeography of seed dormancy has stimulated us to have a deep interest in the evolutionary origins and relationships of the various kinds of seed dormancy (and nondormancy). Recently, in collaboration with people in the National Center for Evolutionary Synthesis (Duke University), our data for about 13,000 species in 281 families have been analyzed from a dormancy transition perspective. Thus, we have expanded our research interests from the timing of germination of seeds in the cedar glades to middle Tennessee to the world biogeography and evolutionary relationships of the different kinds of seed dormancy.

In looking back over the course of your research, what areas have you consistently explored? What areas did you not expect to explore?

We have consistently been interested in seed dormancy/germination ecology. We never expected that our interest in seed germination ecology would lead to a compilation of information on the world biogeography of seed dormancy, and we certainly did not think that the information we acquired could be used to help us better understand the evolutionary origins and relationships of the different kinds of seed dormancy.

In looking back at all of the articles you've published in *AJB*, which one or two stand out above the others and why?

"Germination ecophysiology of herbaceous plant species in a temperate region" from 1988 was an invited "Special Paper," and it was the first summary-type paper that we wrote on seed dormancy and germination. In this paper, we summarized our own data on germination phenology (274 species) and dormancy breaking experiments (179 species), including winter annuals, summer annuals, monocarpic perennials and polycarpic perennials. From the experience of writing this paper, we realized the value of synthesizing information on seed dormancy and germination, and this was part of our inspiration to write a book on seeds.

"Ethylene as a possible cue for seed germination of *Schoenoplectus hallii* (Cyperaceae), a rare summer annual of occasionally flooded sites" from 2003—*Schoenoplectus hallii* is a rare summer annual bulrush of eastern/central USA, and its seeds germinate in depressions (often in cultivated fields) in wet springs. It took 10 years to figure out the seed germination ecology of this species. Freshly matured seeds are dormant and require the cold moist (but not flooded) conditions of winter for dormancy to be broken. In spring, the nondormant seeds will germinate if they are exposed to relatively high temperatures, light, flooding and ethylene (produced in the field when soils are flooded). If any one of these requirements is not met, seeds enter conditional dormancy and must go through another winter before they potentially could germinate. Thus, seeds live in the soil for many years and only germinate when a depression has water in the spring. Although seeds of some species will germinate under the same environmental conditions that break dormancy, those of *S. hallii* require one set of conditions to break dormancy and another set of conditions to promote germination.

Why have you chosen *AJB* as one of the journals in which you've published throughout your career?

We have long been members of the Botanical Society of America and think the *American Journal of Botany* is a very good journal. Thus, when we published a paper in *AJB* we felt that our standing as scientists was increased.

Jerry and Carol Baskin, 2012.

Tod Stuessy

Long-time BSA member Tod Stuessy (for the past 47 years!) has contributed over 30 articles to the AJB *in his career. Stuessy, a BSA Merit Award winner in 1999, shared his thoughts on the research over his career.*

The first article you published in *AJB* was "Chromosome Numbers and Phylogeny in *Melampodium* (Compositae)" in 1971. Take us back to that period; what were you studying/most interested in at the time?

My first article in the *AJB* was part of my Ph.D. thesis at the University of Texas at Austin. I continued working on aspects of the genus when arriving at Ohio State in 1968, and in fact, we are now still working on the group using molecular methods. I remember very well the thrill of having this paper published in *AJB*. It was sole authored, as many papers were then, and I felt really proud to have it in one of the mainstream botanical journals.

Your latest article in the *AJB* was "Genetic variation (AFLPs and nuclear microsatellites) in two anagenetically derived endemic species of *Myrceugenia* (Myrtaceae) on the Juan Fernández Islands, Chile" in 2013. How has the thread of your research changed over time?

For the past 30 years we have been working on the evolution and biogeography of the endemic plants of the Juan Fernández (Robinson Crusoe) Islands, off the coast of Chile. My interest in island biology came from reading the book "Island Life" by Sherwin Carlquist. It seemed to me then, and still seems to me now, that these isolated land masses would be great places to investigate the process of evolution. Furthermore, there is a bit of adventure working in isolated places, and the Juan Fernández Islands are certainly that!

In looking back over the course of your research, what areas have you consistently explored? What areas did you not expect to explore?

I have maintained an interest in the classification and evolution of Compositae, and I have chosen to work mainly in groups of the family in Latin America, beginning in Mexico, then into Central America, and finally in southern South America into Argentina and Chile. Then there is my interest in island biology already mentioned. I have also maintained a strong interest in the principles and methods of biological classification and continue to publish on this topic.

In looking back at all of the articles you've published in *AJB*, which one or two stand out above the others and why?

Quite frankly, I don't feel that any one of the articles I published in the *AJB* is more significant than the others. I think that this is because I remember the persons and places that accompanied these papers, and these are personal recollections and have little to do with the science in the papers themselves. I suppose that the paper most cited is the one on Paeonies with Tao Sang and Dan Crawford ("Chloroplast DNA phylogeny, reticulate evolution, and biogeography of Paeonia (Paeoniaceae)" from 1997).

Why have you chosen *AJB* as one of the journals in which you've published throughout your career?

As a botanist, I value my membership in the Botanical Society of America. Hence, I also value publishing in this journal, which has always maintained a high (but not unrealistic) level of quality.

Dr. Tod Stuessy collecting plant specimens at Laguna Laja, Chile, in 1988.

Ruth Stockey

Oregon State University

Ruth Stockey has been a member of the BSA for over 40 years and was presented with the BSA Merit Award in 2006. She has just published her 32nd AJB article, and she shared her thoughts on her research over the years.

The first article you published in *AJB* was "Seeds and Embryos of Araucaria mirabilis" in 1975. What were you studying/most interested in during that period?

I wrote this article as a part of my Master's thesis. At that time, I was studying araucarian conifers from the Cerro Cuadrado Petrified Forest of Patagonia and collecting living araucarian specimens in Australia and New Caledonia. My detailed anatomical work on permineralized fossil plants started during the 1970s, a theme that I have continued in many of my papers since. Ironically, in 2012 I published a paper ("Seed cone anatomy of Cheirolepidiaceae (Coniferales): Reinterpreting Pararaucaria patagonica Wieland") with Ignacio Escapa and Gar Rothwell on fossils from this same site where we reinterpreted the material described my third paper ("Reproductive biology of the Cerro Cuadrado (Jurassic) fossil conifers: Pararaucaria patagonica" in 1977). With the discovery of new and better preserved fossils, we were able to demonstrate that Pararaucaria was a member of the extinct conifer family Cheirolepidiaceae and provided the first anatomical description of cones from this family that has been known mostly from compression fossils lacking anatomical detail.

Your latest article in the *AJB* was "*Hughmillerites vancouverensis* sp. nov. and the Cretaceous diversification of Cupressaceae" in 2014. Tell us how the thread of your research has changed over time.

My areas of research have changed considerably over the past 35 years. I started with conifer reproductive biology. Research on coal balls in the early days changed to include compression/impression fossils and permineralized cherts from Alberta and British Columbia when I moved to Canada. Fossil plants from the Jurassic, Carboniferous, Cretaceous, Paleocene, Eocene and Pliocene have been investigated. Upland conifer fossils gave way to aquatic flowering plants including Lythraceae, Araceae, Saururaceae, Nymphaeaceae, and Limnocharitaceae, and finally research on fossil ferns, bryophytes and fungi.

In looking back over the course of your research, what areas have you consistently explored? What areas did you not expect to explore?

I expected to explore conifer research, which evolved from studies of Araucariaceae to Pinaceae, Podocarpaceae, Cheirolepidiaceae and Cupressaceae. I never expected to study fossil fungi, which turned out to be some of the best preserved material in the Middle Eocene Princeton Chert from British Columbia and our newer site at Apple Bay.

In looking back at all of the articles you've published in *AJB*, which one or two stand out above the others and why?

A couple of papers stand out in my mind because of the interest they aroused, including "The role of Hydropteris pinnata in reconstructing cladistics of heterosporous ferns" in 1994 with Gar Rothwell in which we demonstrated the monophylesis of heterosporous aquatic ferns and the parent plant for dispersed Parazolla spores. The plants were rooted aquatic ferns with pinnate fronds that bore spores inside bisexual sporocarps like Marsileaceae, with spores like those of Salviniaceae.

Secondly would be the papers in the 2009 Darwin Bicentennial Special Issue that I co-edited with Sean Graham and Peter Crane. For me, "Distinguishing angiophytesfrom angiosperms: a Lower Cretaceous (Valanginian-Hauterivian) fruit-like reproductive structure" is a significant study that will become more important when we describe the entire structure (now found since the paper was published). The seed containing structures ("cupules") are now known to be attached to axes in compound cone-like structures with short shoots in the axils of bracts. In turn, these short shoots bear two leaves that wrap around single tetrahedral seeds. The seeds were pollinated using a pollination droplet and bisaccate pollen. Doylea tetrahedrasperma will soon be placed into a new order of gymnosperms.

Why have you chosen *AJB* as one of the journals in which you've published throughout your career?

The journal has always been very highly regarded in our field and now with "impact factors," this still remains true and can be quantified. I always liked the quality of the illustrations, which in paleobotany are extremely important. In addition, time to publication has always been good.

Jack B. Fisher

University of British Columbia

Dr. Jack Fisher has been a BSA member for nearly 50 years and earned the BSA Merit Award in 2003. He has published in the AJB *for the past 44 years, and he spoke about his research and publications in that time.*

The first article you published in AJB was "Development of the Intercalary Meristem of *Cyperus alternifolius*" in 1970. Take us back to that period; what were you studying/most interested in at the time?

This was part of my PhD thesis, carried out in the lab of Prof. Elizabeth Cutter, who was a pioneer in the field of morphogenesis. It was the hot topic in plant development at that time. I was interested in the effects of plant growth regulators on monocots and enjoyed experimental plant anatomy.

Your latest article in the *AJB* was "Gelatinous fibers and variant secondary growth related to stem undulation and contraction in a monkey ladder vine, Bauhinia glabra (Fabaceae)" in 2014. How has the thread of your research changed over time?

Most of my career was spent as a researcher at Fairchild Tropical Botanical Garden, with

its excellent collection of tropical plant life. My continuing interest was in plant development and structure but emphasized topics of interest to the Garden or in collaboration with other botanists---ranging from tree architecture, liana xylem anatomy and hydraulics, to descriptive palm anatomy. I always felt very lucky to be working in a garden surrounded by fascinating plants and by people who appreciated them.

In looking back over the course of your research, what areas have you consistently explored? What areas did you not expect to explore?

In most of my studies, I've been drawn to understanding how a structure develops into its shape and what its function might be. Also, I have a general love of microscopes and the beauty of plant tissues. Perhaps my most unexpected area of botanical study was tree architecture and computer simulations of tree forms. This occurred only because of a chance contact and later collaboration with Hisao Honda, a Japanese biophysicist. We complemented each other with a mix of botanical and computer strengths.

Of all the articles you've published in AJB, which one stands out above the others and why?

I value the paper on comparing the xylem of vine and tree forms of *Gnetum* done in collaboration with Frank Ewers ("Vessel Dimensions in Liana and Tree Species of Gnetum [Gnetales]" in 1995) because it was recognized with the BSA's Michael Cichan Award.

Why have you chosen *AJB* as one of the journals in which you've published throughout your career?

First, to support the Botanical Society of America as my professional society. But equally, to have my work seen by colleagues throughout the world who respect the journal. The fine quality of the printing lets me present my photomicrographs to their best quality.

Peter Raven

Peter Raven needs very little introduction! As President Emeritus of the Missouri Botanical Garden and a noted "Hero for the Planet" by Time *magazine, Dr. Raven has contributed nearly 30 articles to the* AJB *throughout his career. Dr. Raven has been a BSA member for 55 years, served as BSA President in 1975, and earned the BSA Merit Award in 1977. He spoke recently about his research in the journal.*

The first article you published in *AJB* was "Chromosome numbers in Compositae I. Astereae" in 1960. Take us back to that period; where were you, what were you doing, and what were you studying/most interested in at the time?

When I was a graduate student at UCLA, I was studying the Onagraceae, plants now referred to the genus Chylismia, with Harlan Lewis; Mildred Mathias, Daniel I. Axelrod, and Henry J. Thompson were among the members of my committee. I was busy with the group on which I was writing my dissertation, but starting to branch out into broader aspects of evolution in the family. M. Kurabayashi visited Harlan's laboratory in 1959-60, my last year there, and we worked on the morphology of the chromosomes in the family, publishing an article describing how their morphology changed during the course of meiosis and revealing patterns that seemed to be correlated with the complex structural heterozygosity in the family but which have not yet been explained satisfactorily at a molecular or structural level. At the same time, we graduate students were counting chromosomes in the family Asteraceae (Compositae) and finding interesting

Dr. Peter Raven while teaching at Stanford University in the 1960s.

Dr. Peter Raven.

patterns in number and morphology. I collected all the species I could get my hands on, and with the collaboration of Don Kyhos eventually published a long series of articles including hundreds of new chromosome counts.

Your most recent article in the *AJB* was the introduction to the Special Issue on Biodiversity in 2011. How has the thread of your research changed over time?

What we used to call biosystematics, in which the role of chromosome number and morphology was of central importance, has become less fashionable and fewer people know how to count chromosomes or bother to do so---a pity. Now nucleic acid analyses of sequences or even whole genomes are stressed, to learn more much more efficiently. The chromosome work is still valid, as is artificial hybridization, which tells so much about the nature of species in various groups of plants. Along the way I collaborated a lot with Hiroshi Tobe, recently retired as Chairman at the Botany Department, Kyoto University, and one of the runs of papers in *AJB* reflects that collaboration.

Since I moved from Stanford to the Missouri Botanical Garden in 1971, I have focused more on floristics, producing work not suitable for publication in *AJB*, since floristics could be carried out efficiently with the major herbarium and library at MBG, and especially on conservation worldwide. When I published my first paper in the journal, it was not obvious that special efforts were needed for conservation, whereas now it is completely obvious.

In looking back over the course of your research, what areas have you consistently explored? What areas did you not expect to explore?

Plant systematics and evolution were my major focus from the mid-1950s to about 1980, and then I turned almost exclusively to floristics and conservation, and finding support for others. I had no idea until the mid-1960s that conservation would become such an important part of my career, and neither did anyone else, for the most part.

In looking back at all of the articles you've published in *AJB*, which one stands out above the others and why?

The joint article with Lewis and Kurabayashi on mitotic chromosomes in Onagraceae ("A Comparative Study of Mitosis in the Onagraceae" from 1962) seems to me to have been the most important in that it began to solve a problem of general importance. Others in *AJB* have mostly been parts of large fields of knowledge.

Why have you chosen *AJB* as one of the journals in which you've published throughout your career?

Excellent circulation, reputation, and format, one of relatively few options when I began my career, and now better than ever.

BSA Science Education News and Notes

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

21st Century Challenge: Opening Student's Eyes to Plants in Their World

—Dr. Catrina Adams, Acting Education Director, BSA

It is a warm fall day and I'm standing behind a booth at the Missouri Botanical Garden's popular "Prairie Day" event running a classic outreach activity: guess the natural object based on touch alone. A 9-year-old gets a quizzical look on her face as she reaches into the "mystery box." She takes the egg-shaped object in her hand, and runs her fingers over the papery scales. "Oh!" she says, "It's an acorn!" Pulling the pinecone out of the box, she confirms her guess with a smile, "Definitely an acorn." Now I'm the one perplexed—this is the third child today making the same misidentification.

Perhaps you have noticed students arriving in your botany classes with very little background knowledge about plants. As Lena Struwe put it in an interview for a recent article on Plant Blindness in the *Philadelphia Inquirer*, "Many times I have to start from scratch. This is a petal. This is a leaf. This is a branch."

The September issue of *CBE Life Sciences Education* has a special focus on plant science teaching and learning and is well worth a read. In the article "Attention 'Blinks' Differently for Plants and Animals," authors Benjamin Balas and Jennifer Momsen apply the "attentional blink," an established paradigm in visual cognition, to investigate differences in visual perception of plants and animals. They find that plants do not capture our attention in the same way as animals; it's harder to notice plants. The authors offer three ways instructors can help students overcome perceptual biases against plants:

1. Directly address plant blindness in instruction.

2. Increase opportunities for students to actively attend to plants in their environment.

3. Present plant images simultaneously with text or narration.

It's not just students who are inattentive to plants. Part of the problem is that many K-12 teachers do not feel as prepared to teach about plants to their students, and favor using animal examples to address core concepts in biology. When surveyed through Horizon Research's National Survey of Science and Mathematics Education about how well qualified they felt to teach five fundamental topics, high school biology teachers reported being least confident about plant biology. Only 59% of biology teachers report ever having had a course in botany.

As botanists, we can make a difference by building bridges between levels of education, and by reaching out to younger audiences and their teachers to share our passion for plants. What can you do to help others pay attention to, appreciate, and become curious about the plants that they currently pass obliviously every day?

Could you share learning activities you've developed with a broader audience through the PlantED Digital Library?

Could you spare a few hours to communicate with middle- and high-school student teams through PlantingScience? Mentoring with PlantingScience requires a small time commitment (about an hour a week for 2-8 weeks when teams are active), with a flexible schedule. The best part is that you don't need to leave your office to make a difference in the lives of students and teachers from around the world. We're recruiting mentors for the upcoming spring session until January 31. To register as a new mentor, go to http://www.plantingscience.org.

Perhaps you are already doing outreach, having broad impacts with your research, or volunteering your time to local efforts. If so, please let us know about your efforts so we can inspire other members at cadams@botany.org!

We all know how critical plants will be to facing this century's global challenges. Let's ground our future leaders, professionals, and citizens with a greener vision of the world around them and help open their eyes to plants.

Youngest Gardeners Learn to Love Plants

Joan Hudson is passionate about bringing plant awareness and appreciation to the youngest audiences, volunteering her time to design and deliver garden programs for pre-K 4- and 5-year-olds at the Gibbs Pre-K Center of the Huntsville Independent School District in Huntsville, TX. She and the other garden volunteers there involve the young students in experiencing the garden using all five senses.

"I just love going to the preK and working with the many students each week. They all have a smile when they come to the garden… It is very rewarding – they are the next generation."

Members Share Their Passion for Science and Plants by Mentoring

"I am a very scientific-minded guy with new ideas everyday. I'm always interested in how things work and how things are put together. I am not a very plant oriented student and I never thought about planting anything in my life. ***I rest the future of plants in your hands****." – Quote from Planting-Science student to scientist mentor*

Middle- and high-school years are an important time to capture students' interest in science and in plants, which unfortunately are underrepresented in many K-12 classrooms. During these years students are doing a lot of self-identification, finding their interests and beginning to think of themselves as "good at science" or "not good at science." It's a critical time to influence students and break through negative stereotypes about what science is and who scientists are, and give them a taste of what it is like to practice authentic science, including the creative thinking required to troubleshoot experimental designs and make sense of data.

This past summer we had the opportunity to talk with several PlantingScience mentors, and asked: "Why spend your time mentoring middle- and high-school students online?"

Dr. Rupesh Kariyat of the University of Wyoming was a mentor with Planting Science in the beginning years and was excited with the opportunities it offered not only the students, but also the science community. He believes the program has the ability to encourage students to study science. "I never had such an opportunity to interact with a scientist," he said, "and to design and execute an experiment."

"We get the cool science," Kariyat said. "No other science gets this opportunity."

Klara Scharnagl, a mycologist with Michigan State University, has been a scientist with Planting Science for 2½ years, and enjoys infusing an enthusiasm for plant science in the next generation.

She gets excited about engaging people in the discussion of what they grow and eat. In the context that people "generally don't know the plants in their own backyard," Scharnagl says the important discussion of loss of diversity is a long way off, but botanists have a good place to start when they can educate young people on the basics of plant production.

One thing PlantingScience is particularly good at, most of the mentors agree, is showing students that scientists are real people.

"Children picture a scientist," Scharnagl said, "or some version of a scientist." That image may be Albert Einstein or any number of caricatures of scientists shown in the media. Then the student meets the botanist in PlantingScience via the mentor's online profile and conversation or Skype and the image becomes more real.

"It changes what people think scientists are, and we become real people with families, pets and hobbies." And, students get a real look at what botany looks like as a career. That, say the scientists, may have a real impact on whether students start thinking about science as a future career choice.

Dr. Emily Sessa of the University of Florida is enthusiastic about science outreach into all levels, including elementary education. "It teaches important skills, including critical thinking," she says. "If you give a little kid a microscope, it opens up a whole new world. It might change their life. It is really powerful if you introduce a child to science at a young age."

St. Louis University's Dr. Allison Miller is also convinced that plants can be a hugely important vehicle for thinking about science, but even more important, for how we think about life on the planet. The connections among plants, conservation, food, and society, she explains, have created a perfect storm of information need that botanists can fill.

Active young scientists like Angela Rein McDonnell, the new student representative on BSA's Board, have stepped up to work on PlantingScience. "I am interested in being a better communicator and learning to explain complicated things," she said of the program.

Talking to the middle- and high-school students is fun for her. "They are excited to hear what I think, and that makes me excited."

The program "grows an awareness of plants and their value to the world," explained McDonnell, who herself was inspired by her father who grew a large garden throughout her youth.

The chance to change science literacy in the next generation is a bright beacon for botanists. Andrew Schnabel of Indiana University South Bend says he got involved in the PlantingScience program at its inception, believing that "participation is important for botany."

"Most students coming into the university have little background in plants. It will help if we can get some younger children educated." Part of that education, Schnabel said, is showing them the plethora of jobs that exist in botany. "There are thousands of jobs for plant biologists."

It's just a matter of taking the opportunity to open the discussion with the upcoming generations, say these scientists.

(Thanks to Janice Dahl, Great Story!, for her help with this segment.)

PLANTED DIGITAL LIBRARY: WE NEED YOUR BEST RESOURCES

Many of you are already engaging your own students with plants and have phenomenal education resources that you've seen impact the students in your classes. Why not spend an afternoon polishing these stellar resources and share them with a broader audience online? The PlantED digital library is accepting submissions.

Share your best lessons with teachers and professors around the world and get the satisfaction of knowing you are impacting many more students than you can reach through your own classes. PlantED is a peer-reviewed library of teaching resources. The peer-review process helps you refine your resource with feedback from reviewers and you will have a citable teaching resource when the materials are published online. To contribute, visit planted.botany.org.

CHECK OUT THESE RECENTLY PUBLISHED RESOURCES FROM THE LIBRARY:

Chemical Competition in Peatlands

Jon Swanson, Edwin O. Smith High School
Jessica Budke and Bernard Goffinet, University of Connecticut

These lab exercises were designed to enhance students' understanding of the concept of chemical competition in ecology. They use the moss Sphagnum to illustrate the concept, which shows students that competition occurs between plants.

Phylogenetic Approach to Teaching Plant Diversity

Phil Gibson and Joshua Cooper, University of Oklahoma

Educators can use this resource as an opportunity for students to collect structural data that can be used to construct phylogenies, combine structural and molecular data to construct phylogenies, gain experience in phylogeny construction, and provide a meaningful framework to learn the characteristics of major terrestrial plant groups.

TOOLS FOR 21ST CENTURY BIOLOGY TEACHING

What is 21st Century Biology?

The Keynote Panel at the recent Life Discovery Conference aimed to answer that question and to challenge us meet 21st century biology teaching challenges. You can view a pdf of the presentation here: http://www.esa.org/ldc/wp-content/uploads/2014/10/2014-LDC-Keynote.pdf

Panelists Janet Carlson and Susan Singer brought together biology education reform efforts from K-12 and higher education to show the common themes. As they demonstrate, "weaving meaningful connections across STEM learning is beginning to echo across all levels of education." The panelists challenged us to see STEM focus not as content-specific, but rather as epistemic – "the sources, strategies, or practices from which science knowledge comes and, in turn, is shared." In other words, we should be focused on communicating the "how" of biology, not the "what."

The Keynote ended with a call to action. You can be an agent of change by:

1. Crossing boundaries between K-12 and institutions of higher education, talking with each other and respecting each other's strengths.

2. Being ready for students coming from a Next-Generation Science Standards background who are primed to understand cross-cutting themes and the practices of science.

3. Thinking differently about undergraduate biology: revisit core ideas in increasing depth, build connections between ideas and disciplines, carefully construct a storyline and help learners construct and build explanations using evidence.

A Pedagogical Framework for Screencasting

Some of you may have participated in the Coursera MOOC "An Introduction to Evidence-Based Undergraduate STEM Teaching," a seven-week course this fall that explored effective teaching strategies for college STEM classrooms. If you missed the course, this video series by Robert Talbert of Grand Valley State University, developed as a part of the course, describes the pedagogical framework for screencasting as part of a flipped-instruction model. If you've considered presenting lectures outside of your classroom for any reason, you may find this video a helpful resource: http://tinyurl.com/k3efayr.

Inquiring About Plants

Don't miss Uno, Sundberg and Hemingway's "Inquiring About Plants: A Practical Guide to Engaging Science Practices," which offers classroom-tested "tricks of the trade" for drawing students into the practice of science. All proceeds from the sale of the $10.95 e-book will benefit the PlantingScience program. Print copies are available with a donation. For details or to get your copy, see http://www.plantingscience.org.

What Does Online Mentorship of Secondary Science Students Look Like?

By Adams, Catrina T. and Claire A. Hemingway. 2014. *BioScience* 64(11): 1042-1051.

Abstract: Mentorship by scientists can enrich learning opportunities for secondary science students, but how scientists perform these roles is poorly documented. We examine a partnership in which plant scientists served as online mentors to teams conducting plant investigations. In our content analysis of 170 conversations, the mentors employed an array of scaffolding techniques (encouraging; helping clarify goals, ideas, and procedures; and supporting reflection), with social discourse centrally embedded and fundamental to the mentoring relationship. The interplay of techniques illustrates that scientist mentors harmonize multiple dimensions of learning and model the integration of science content and practice. The mentors fulfilled self-identified motivation to promote their students' interest and to enculturate students to the science community through online discourse. The patterns of this discourse varied with the mentors' gender, career stage, and team–mentor engagement. These findings address research gaps about the roles, functions, and conceptions of scientists as online mentors; they can be used to guide program facilitation and new research directions.

Personalia
In *Memorium*

William A. Jensen
1927-2014

Dr. William August "Bill" Jensen, Ph.D., 87, passed away quietly on September 9, 2014 at the Sanctuary Facility in Dublin, Ohio after a long illness.

Bill led a very distinguished and full professional life. He received his Ph.B. (1948), M.S. (1950) and Ph.D. (1953) all from the University of Chicago. During his Ph.D. he held Atomic Energy and Public Health predoctoral fellowships at the University of Chicago and Carlsberg Laboratory in Copenhagen, Denmark.

Just before he began his undergraduate program at the University of Chicago, Bill was drafted into the service at the end of the World War II. He never saw active duty but worked in an army hospital lab. He continued in the reserves during his schooling and returned to Europe to the Carlsberg Lab (with Prof. Heinz Holter) in Copenhagen where he completed his Ph.D. research. During his graduate work he married his first wife Joan Sell and they explored Europe and this set the stage for his future love for travelling to many places in the world.

Upon returning from Europe, he carried out postdoctoral work at the California Institute of Technology (with Profs. Arthur Galston and James Bonner) (1953-55) and in the laboratory of Prof. Jean Brachet in Brussels, Belgium (1955-56). He then accepted an Assistant Professorship at the University of Virginia (1956-57) and then the same at the University of California, Berkeley (1957) where he quickly rose through the ranks to Professor of Botany. During his tenure at UC-Berkeley, he held positions of Chairman of the Department of Botany and also of Instruction in Biology, as well as Assistant and Associate Dean of the College of Letters and Science. In 1973-74, he was Program Director of Developmental Biology at the National Science Foundation. Bill was invited to move to Ohio State University, Columbus in 1984 where he became Dean of Biological Sciences (1984-1999) and Professor of Plant Biology until his retirement in 2009.

Bill was a man of many talents and interests. His early professional interests were in the areas of cell differentiation associated with plant embryos and embryo sac development which led him to combine techniques of histochemistry and electron microscopy, pioneering approaches at that time. From this work he became a sole author of the still popular book *Botanical Histochemistry* (1962). He mentored numerous graduate students and postdoctoral fellows who hold and have held major teaching and research positions at institutions of higher learning in the United States, Canada and Europe. His research has been published in over 100 articles in a variety of excellent journals, including 14 articles in the *American Journal of Botany*.

Throughout his career, he developed a passion for teaching at both the graduate and undergraduate levels and received several important awards for these efforts from the University of California and the Ohio State University and the Charles E. Bessey Award from the Botanical Society of America. At the Ohio State University in his later years he taught very popular large classes to non-science majors that enjoyed his portrayals of famous scientists and his multimedia presentations. His authoring

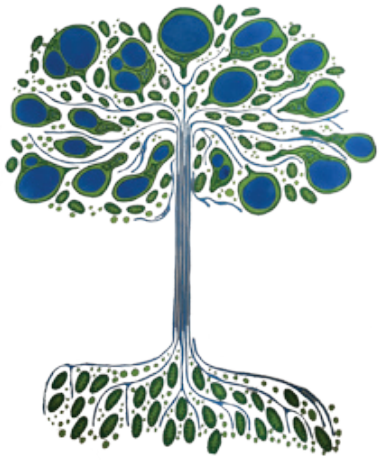
of entry-level texts in General Botany and General Biology supported this love for making botany and biology fun and understandable.

Bill gave generously to professional societies such as AAAS, the Botanical Society of America, and the American Institute of Biological Sciences. He was a Fellow of AAAS and the California Academy of Sciences, and received the Merit Award (Distinguished Fellow) from the Botanical Society of America where he served in a variety of capacities including its President in 1978.

From an early age when he joined the high school science club because of his interests in biology, botany and microscopes, as well as playing the clarinet, to his adult life where biology, botany and microscopes continued to be focal points, Bill was always enthusiastic, curious, questioning, and pushing-the-envelope kind of person who loved challenges and always expected the best from himself and others. His insatiable curiosity and talent for creating beautiful, abstract, color pen drawings of images he had studied with his electron microscope became his passion in later years. He loved doing them, displayed them at art shows, sold them and sometimes gave them away as gifts. Prof. Jensen, 'Bill', you lived a full life, trained, mentored and taught countless young people to love botany and biology.

You did this with dignity, humor, humbly and with a deep-seated love for humankind. Such a legacy will live on through your dear wife Beverly, your family, friends and colleagues for many years to come. We will miss you.

---Dr. Jack Horner



Dr. and Mrs. Jensen exhibiting his artwork at Botany 2013 in New Orleans.

Redesigned Hunt Institute Website at New URL

PITTSBURGH, PA—All things must come to an end. Although huntbot.andrew.cmu.edu has served the Hunt Institute well since 1997, it is time for a change. With our redesigned and reorganized website, we are migrating to a new URL (www.huntbotanical.org).

We conducted a site-wide content review and reorganization and turned to Mizrahi, Inc. (www.mizrahionline.com) of Pittsburgh for a new look and a better way to maintain and update the site. Most of the content from our old site has been incorporated into the new one. The reorganization and new design just make it more accessible. Also, we have augmented the new site with exciting, additional content. All issues of *Huntia*, our journal of botanical history, and the *Bulletin*, our newsletter, are now available online as PDFs. Other relevant, out-of-print publications will be added soon. Descriptions are available for every exhibition since our first public one in 1963. Publicity images and checklists will be added to these Past Exhibitions pages in the coming months. We added *Virtues and Pleasures of Herbs through History* to the Exhibitions Online section and revamped *Botanists' Art. Order from Chaos* will be undergoing a content review and redesign in the future. Our existing databases have been upgraded. We are pleased to announce the launch of the long-awaited Archives' database, Register of Botanical Biography and Iconography. We continue to add thumbnail images to the Catalogue of the Botanical Art Collection at the Hunt Institute database. The public domain images will soon be available in a separate database to speed downloading. Our marketing information has been collected in an aptly named section where we invite everyone to "Get Involved" with the Institute.

About the Institute

The Hunt Institute for Botanical Documentation, a research division of Carnegie Mellon University, specializes in the history of botany and all aspects of plant science and serves the international scientific community through research and documentation. To this end, the Institute acquires and maintains authoritative collections of books, plant images, manuscripts, portraits and data files, and provides publications and other modes of information service. The Institute meets the reference needs of botanists, biologists, historians, conservationists, librarians, bibliographers and the public at large, especially those concerned with any aspect of the North American flora.

Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library. The current collections include approximately 24,000+ portraits; 200+ archival collections; 29,504 watercolors, drawings and prints; 243,000+ data files; and 30,429 book and serial titles. The Archives specializes in biographical information about, and portraits of, scientists, illustrators and all others in the plant sciences and houses over 200 collections of correspondence, field notes, manuscripts and other writings. Including artworks dating from the Renaissance, the Art Department's collection now focuses on contemporary botanical art and illustration, where the coverage is unmatched. The Art Department organizes and stages exhibitions, including the triennial *International Exhibition of Botanical Art & Illustration*. The Bibliography Department maintains comprehensive data files on the history and bibliography of botanical literature. Known for its collection of historical works on botany dating from the late 1400s to the present, the Library's collection focuses on the development of botany as a science and also includes herbals (eight are incunabula), gardening manuals and florilegia, many of them pre-Linnaean. Modern taxonomic monographs, floristic works and serials as well as selected works in medical botany, economic botany, landscape architecture and a number of other plant-related topics are also represented.

WARF Innovation Award Winners Harness A Busy Virus, Help Crops Bask In The Shade

Plant research reigns at the annual prize ceremony

MADISON, Wis. – A discovery that could transform drug production and a fresh strategy for feeding a hungry world have claimed top honors from the Wisconsin Alumni Research Foundation (WARF). The winning teams are led by professors Aurelie Rakotondrafara and Richard Vierstra.

"We give these awards to recognize the creativity and dedication that spark breakthroughs on campus," says Carl Gulbrandsen, managing director of WARF.

This year's prizewinners included a special genetic sequence that could enable researchers to produce multiple proteins from a single strand of mRNA. The sequence, a type of internal ribosome entry site (IRES), was discovered in a wheat virus by UW–Madison plant pathologist Rakotondrafara and collaborator Jincan Zhang.

"The new IRES is the first of its kind that can be exploited in plant systems, with far-reaching implications," says Rakotondrafara. "The power to express multiple genes at once could lead to better biofuel crops and new drugs."

The researchers found the special sequence in the Triticum mosaic virus, which can express its protein at a higher efficiency from its single mRNA strand. Their discovery could change how biopharmaceuticals are made, like the antibody cocktail produced in tobacco plants currently being used to treat Ebola victims.

A team led by genetics professor Vierstra also received accolades for its work on light-sensing plant proteins called phytochromes. These photoreceptors play a key role in how plants respond to shade, triggering developments such as lanky stalks and immature fruit.

But phytochrome mutations created by Vierstra, Ernest Burgie, Adam Bussell and Joseph Walker may alter how plants react to their environment. That could mean smaller crops capable of flourishing in dense, low-light conditions, or making plants flower and produce fruits and seeds at times of the year when the weather might be better.

"To feed a surging world population, we'll have to rethink how we grow food," says Vierstra. "This research could be a major boon to agricultural productivity."

An independent panel of judges selected the winners from a field of six finalists. These finalists were drawn from among more than 400 invention disclosures submitted to WARF over the past 12 months. The winning inventions each receive an

JOB OPENING ASSISTANT PROFESSOR: BOTANY

Nine-month, tenure-track position, Department of Biological Sciences, Emporia State University, Emporia, KS. Ph.D. required by time of hire. Teach plant taxonomy and lab, general biology, and specialty courses that complement our existing offerings at the undergraduate and graduate level. Successful applicants will have experience in plant systematics, plant community ecology, or biogeography. Teaching experience desirable; post-doctoral research experience desirable but not required. Development of active research program involving undergraduates and master's-level graduate students expected. Faculty typically teach 12 contact hours (or equivalent).

Starting date August 2015; Salary range: $50,000-$53,000. Screening will begin January 13, 2015, and continue until position is filled.

Send letter of application with separate statements of teaching philosophy and research interests, CV, unofficial transcripts, and four references including address, telephone number, and e-mail address to: Dr. Brenda Koerner, Search Committee Chair, Department of Biological Sciences, Campus Box 4050, Emporia State University, Emporia, KS 66801-5415. Telephone: 620-341-5606; FAX: 620-341-5607; e-mail: bkoerner@emporia.edu; website: http://biology.emporia.edu.

An Affirmative Action/Equal Opportunity Employer Institution, Emporia State University encourages minorities and women to apply.

BSA Membership: There's No Place Like Home

There's no place like home if you're a botanist. And if you're a botanist, there's no place quite as comfortable as the Botanical Society of America—at least that's what the scientists at Botany 2014 in Boise, Idaho, had to say.

"I love BSA and the Botany Conference. It really feels like family," said Klara Scharnagl, a mycologist from Michigan State University. "It is friendly, open and people are willing to talk about ideas." She talked about the interesting mix of relaxed professionalism, and the focus of BSA on building up young scientists.

Dr. Marian Chau of the University of Hawai'i at Manoa Lyon Arboretum first got involved as a student and said the welcoming atmosphere hooked her. "You can walk up to anyone, even the big names, and they will talk to you about their research and yours," she said. That genuine interest in all kinds of botanical science and in scientists at all career levels are things many BSA members believe is unique about the Society.

"Plants are my life," said Dr. Uromi Goodale of Xishuangbanna Tropical Botanic Garden, Chinese Academy of Sciences. "I couldn't think of a better conference to attend." She's been a member of BSA and attending the conferences throughout her career, focusing on development, networking and training.

"I think it's my responsibility, not only as a scientist, but as a human being to mentor young people willing to conserve and preserve what I call 'green gold,' the plants and water," she says. Like so many of her fellow scientists in BSA, she takes that feeling to heart, spending every moment of the Botany Conference talking and mentoring, hoping to help take science to the next level through the emotional connections made with people.

Dr. Kyra Krakos, Maryville University, sees BSA as a way to turn science up a notch, from the student right on up. She brings her own students to the conferences to "introduce them to a broader world of science without terrifying them. Attending (the conference)," she says, "is when students decide whether to go on into science or not." Or even, she explains, exactly where in science they might want to go.

Krakos talks passionately about the effect BSA has on its young people. "They speak science better" after they come to a meeting. "They make connections and contacts, and they make decisions about their careers and course of study."

BSA member Kyra Krakos, University of Maryville-St. Louis (top row, second from left) enjoying time with some of her undergraduate students at Botany 2014: Adam Hoeft, Audra DeMariano, Adam Rork, Ryan Hulsey, and Rebecca Girresch.

For Dr. Emily Sessa of the University of Florida, BSA is a fantastic place to find plant scientists with different backgrounds and fields of scientific study. "From the moment I leave one Botany Conference, I am counting down the minutes to the next Botany meeting," she said with a laugh. "It's a contagious sort of environment."

Why contagious? It's a combination, she says, of taking into account the education and camaraderie. Sessa first came to BSA on a research award as a graduate student, and talks about all the opportunities that exist at all levels for scientists.

Dr. Allison Miller of St. Louis University's Biology Department echoes that sentiment, coming to BSA as the winner of the Young Botanist award as an undergraduate. Today, she has a network built of friends from those first years, with new friends added each and every year. "It is a friendly, supportive and honest environment, not competitive," she said. "It becomes a place of support, not only professionally, but personally. "

Miller, like others, talked about the culture of support and mentoring in the Society. "We all have a huge responsibility to encourage a support people through the rocky times and all the way through their careers," she said. "I have scientists here I seek out even now. It is my responsibility to mentor young scientists and my desire to seek out mentors."

Networking is one way to start finding the people who will impact your career, said Dr. Stacey Smith of the University of Colorado, Boulder. "I always tell my students, 'The interview starts now.' And it does. As soon as you start connecting, all the foundations you need through your career are right here at the meeting," she said.

"This is the group of people I am most comfortable with," Smith says. It has put her in contact with some of the leading botanical scientists. As a result, she has plotted her own career track to mirror theirs and inspire high achievement for herself. "You have to have a goal to aim for. All these people had something they started with and made some unique contributions… I can see how that path could go.

"Having that community is hugely important," Smith says. "I encourage my students to go out into that community and I can be confident they will be well-received." The community is broad-based, including other students and scientists at every stage of their careers.

Morgan Gostel, the past student representative on the BSA Board from George Mason University, also talked about the important role the community plays. "There are other professionals I can network with to share, collaborate and learn from. That provides me an outlet for presenting and sharing my research." As a young scientist, that has meant the ability to be part of a professional network, and feeling tied-in to something important."

If you have a colleague who isn't a BSA member at this point, direct him or her to http://botany.org/membership/ or simply e-mail Heather Cacanindin, Membership & Subscriptions Director, at hcacanindin@botany.org.

—By Janice Dahl, Great Story!

Membership to the Society and attendance at annual Botany conferences---like this gathering at the final night of Botany 2014 in Boise---open doors to future collaborations and even enduring friendships.

Evolution and extinction on a volcanic hotspot: Science, conservation, and restoration in the endangered species capital of the world

Address of the BSA President
From Botany 2014
Tom A. Ranker
University of Hawai'i

The theme chosen for the 2014 International Day for Biological Diversity, sponsored by the Convention on Biological Diversity (CBD), was *Island Biodiversity*, which coincided with the designation by the United Nations General Assembly of 2014 as the International Year of Small Island Developing Nations. The CBD website provides a succinct summary of the importance of biodiversity on islands: "Islands and their surrounding near-shore marine areas constitute unique ecosystems often comprising many plant and animal species that are endemic—found nowhere else on Earth. The legacy of a unique evolutionary history these ecosystems are irreplaceable treasures" (http://www.cbd.int/idb/2014/). Not only do islands present "irreplaceable treasures" of diversity, unfortunately, they also present dramatic examples of our current human-caused extinction crisis with many islands experiencing some of the highest rates of the loss of species due to direct or indirect human activity. Fortunately, however, there is an increasing awareness of the need for conservation and restoration efforts on oceanic islands globally.

I have been conducting research on the flora of the Hawaiian Islands for over 25 years. In this presentation, I will summarize the primary attributes of this archipelago that have both led to the evolution and diversification of its unique biota and to its massive loss of native ecosystems and native species of plants and animals. The examples provided by the Hawaiian Islands are reflective of similar patterns and processes that have occurred on many oceanic islands worldwide.

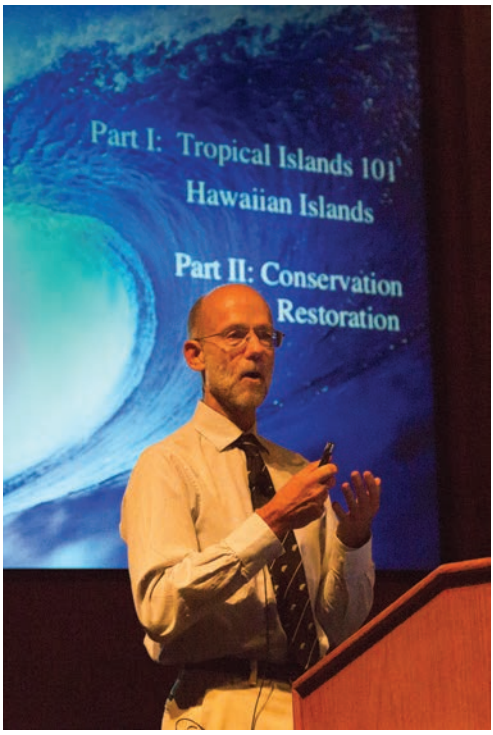
Lastly, I will highlight several examples of conservation and restoration efforts and programs present in the Hawaiian Islands to give a hint of what can be done here and on other islands to, hopefully, reverse habitat loss and stop the further extinction of species.

Origins of the Hawaiian Islands and their unique biota

The Hawaiian Islands are the most isolated, large group of islands on Earth. North America is the closest continent at about 4,000 km away. The Marquesas Islands are the closest large group of islands at a distance of about 3500 km from Hawai'i. The Hawaiian Islands are produced by a nearly stationary volcanic hotspot that subtends the Pacific tectonic plate and that is currently adding fresh lava to the Island of Hawai'i (aka: the Big Island). As the Pacific plate moves to the northwest at ca. 9 cm/year, the formation of each island ceases and it slowly erodes into the sea over the course of millennia. This hotspot has been active for at least 80 million years and has produced what we recognize today as the main Hawaiian Islands (i.e., from youngest to oldest: Hawai'i, Kaho'olawe, Maui, Lana'i, Moloka'i, O'ahu, Ni'ihau, and Kaua'i; 0 to ca. 5 million years old), the northwestern Hawaiian Islands, and the Emperor Chain. The latter two chains of islands represent former high islands that are currently either just above sea level or below sea level.

The interplay of two critical, environmental factors has facilitated the evolution and diversification of the Hawaiian biota: (1) Most of the main islands reach elevations of at least 1000 m and as high is 4200 m, and (2) at 19 to 20 degrees North latitude, these high islands are within the northern trade winds belt. This combination of nearly constant easterly/northeasterly tropical winds with middle to high elevations creates dramatic rainfall gradients on both sides of mountains, including drastic rain shadows, that present opportunities for ecological and biotic evolution and diversification.

The known or estimated numbers of native terrestrial species of all groups of organisms on the Hawaiian Islands are low compared to similarly sized regions in comparable habitats in mainland tropical regions. The known number of flowering plants is nearly 1100 species (W. L. Wagner, pers. comm.), ferns and lycophytes 159 species (Vernon & Ranker, 2013), and mosses 159 species (Staples et al. 2004). By contrast, for example, the Mexican state of Chiapas is about 1.7 times larger than the



Dr. Thomas Ranker delivers his address at Botany 2014 in Boise.

entirety of the Hawaiian Islands (simple.wikipedia.org/wiki/List_of_countries_by_area) with a broadly similar range of habitats but possesses about 8000 species of vascular plants alone (Smith, 1981).

Certainly one of the most spectacular attributes of the native Hawaiian biota is the high level of species endemism. Here are some endemism values: angiosperms, 89%; ferns and lycophytes, 74%; mosses, 51%; liverworts, 74%; arthropods, 99%; mollusks, 99%; birds, 81%. These are the highest or among the highest of any place on the planet. In addition, the Hawaiian Islands are home to some of our most striking cases of adaptive radiations. Among plants, the most species-rich radiations from single colonizing ancestors include the Silversword alliance (30 species, 3 endemic genera; Asteraceae), the lobelioids (ca. 130 species, 6 endemic genera; Campanulaceae), and the mallows (20 endemic species, 2 endemic genera; Malvaceae) with each clade showing species with a diversity of life forms and habits (e.g., see Wagner et al., 1999).

Environmental destruction and species extinctions

Humans first arrived in the Hawaiian Islands approximately 1500 years ago. Since human settlement, about 90% of the native dry forest has been lost, 60% of mesic forest, and 40% of wet forest. Before European contact (1778), 35 bird species had been driven to extinction (e.g., see Armstrong, 1983) and the continued loss and degradation of natural landscapes has led to numerous extinctions in most groups of organisms with many additional species currently on the brink of extinction. Over half of vascular plant taxa are considered at risk (Palmer, 2003; Sakai et al., 2002; Vernon & Ranker, 2013; Wagner et al., 1999), 10% of the native flora has gone extinct since human arrival (Wagner et al., 1999), and over 30% is federally listed as threatened or endangered (www.fws.org). Over 40% of the plant species listed as threatened or endangered in the United States are native to the Hawaiian Islands (www.fws.gov), which comprise only 0.2% of the country's land surface area.

Other than direct landscape modification by human activity, the introduction of alien organisms (accidentally or on purpose) has caused massive changes to native ecosystems and has introduced major threats to native species. More than 5000 introduced species have become established in the Hawaiian Islands, many of them aggressive. For example, 46% of vascular plants now common on Hawaiian landscapes are introduced aliens; 43% of other terrestrial plant groups; 20–25% of arthropods; 48% of other invertebrates; 27% of birds; 95% of mammals; and, 100% of reptiles and amphibians (i.e., Hawai'i has no native reptiles or amphibians but now has 33 species naturalized) (see Juvik & Juvik, 1998).

Conservation and restoration

Numerous individuals, organizations, and governmental agencies are engaged in conservation and restoration efforts in the Hawaiian Islands at both the level of individual species and at landscape/ecosystem levels. Here I will highlight a few examples.

Auwahi Dryland Forest Restoration on Mau'i. Tropical dry forests in the Hawaiian Islands and other oceanic islands worldwide have been disproportionately impacted by human activity and are among the world's most threatened ecosystems (see Medeiros et al., 2014, and references therein). In the Hawaiian Islands, less than 10%

of the pre-Polynesian contact area of dry forests remains. The original dry forests of east Mauʻi were destroyed by over-grazing and burning and have mostly been replaced by large stands of an aggressive invasive shrub *Ageratina adenophora* (Spreng.) Kind & Robinson (Asteraceae), along with a massive population of the invasive grass *Cenchrus clandestinus* (Hochst. ex Chiov.) Morrone ("kikuyu grass"; Poaceae). The spread of these and other invasive species, along with the activities of domestic cattle and feral ungulates, has caused massive declines in populations of native species. In 1997 a long-term restoration project of dry forest was initiated on the western slope of Haleakala on east Mauʻi in an area called Auwahi. The work has been conducted by a partnership between the U.S. Geological Survey (USGS)/Biological Resources Division (BRD)/Pacific Island Ecosystems Research Center (PIERC) and the Leeward Haleakala Watershed Restoration Partnership (see: http://www.hear.org/usgs-brd-pierc-hfs/; http://www.lhwrp.org/). Details of this project and initial results as of 2012 can be found in Medeiros et al. (2014). Broadly speaking, the project involved delineating a 4 ha ungulate-proof exclosure, suppressing kikuyu grass with an herbicide, and planting seedlings of the formerly common native shrub *Dodonaea viscosa* Jacq. (Sapindaceae). By 2012, native shrub cover had increased from 3.1% to 81.9% and cover of nonnative grasses had declined from 75.4% to 3.3%. In addition, nonplanted seedlings of 14 native tree species and six native shrub species were observed in the restoration area. Stem counts of native woody plants increased from 12.4 to 135.0/100 m^2 and native species diversity increased from 2.4 to 6.6/100 m^2. New exclosures are being constructed nearby to expand this restoration effort.

Restoration of Kaʻena Point Natural Area Reserve, Oʻahu. The Natural Area Reserve (NAR) system of the State of Hawaiʻi consists of 20 reserves on five islands and encompasses 50,000 ha of the State's most unique ecosystems (http://dlnr.hawaii.gov/ecosystems/nars/). The Kaʻena Point area on westernmost Oʻahu is a remnant dune system and was established as a NAR in 1983. The area harbors one of the largest seabird colonies in the main Hawaiian Islands, is home to populations of three endangered species of flowering plants, and is an important pupping ground for the endangered Hawaiian monk seal. The primary nesting seabirds include the Wedge-tailed Shearwater and the Laysan Albatross. For decades prior to the initiation of protection, the ecosystem was severely damaged by off-road vehicle activity. Vehicles were prohibited shortly after the NAR was established and the vegetation began to recover, but the ground-nesting seabird populations were still severely impacted by invasive mammals including rats, mice, dogs, cats, and mongoose. In addition, endangered plants were unable to reproduce due to seed predation (see Young et al. 2012 and references therein; see link to download a PDF of this report in the Literature Cited section).

A large-scale restoration effort of the Kaʻena Point NAR was begun in 2010 with the construction of a 2-m tall predator-proof fence, blocking off 20 ha, and the removal of all predators via trapping. The fence was completed in 2011. Details of the project and a report of the initial impact of the project on native species can be found in Young et al. (2012). Surveys indicate that seabird populations are recovering quickly; e.g., the average number of Wedge-tailed Shearwater chicks observed per year have increased from about 614 to 2359 and the average number of pairs of adults attempting to nest has increased from an average of 3265 to 4726. Laysan Albatrosses are showing similar signs of recovery. Ongoing surveys will assess the impact of restoration on the endangered plant populations.

Examples of conservation and restoration programs

There are numerous programs and initiatives in the State of Hawaiʻi that focus on various aspects of biological conservation and restoration. These include private foundations, private companies, botanical gardens, museums, and local, state, and federal agencies. I will provide two examples here.

Hawaiian Rare Plant Program (HRPP) at Harold L. Lyon Arboretum at the University of Hawaiʻi at Mānoa. The goals of the HRPP are (1) prevent further extinction of native Hawaiian plant species and Polynesian introduced crop plants, (2) propagate plants for approved restoration projects and garden use, and (3) initiate and maintain an in vitro and seed germplasm collection of critically endangered plants. The program consists of two units. The Micropropagation Laboratory conducts research on the best ways to propagate the species of concern via micropagation (aka: tissue culture) and to produce large numbers of plants for ecological restoration projects. The lab is currently growing about 17,500 individual plants from 228 plant taxa, 141 of which are listed as threatened or endangered. The Seed Conservation Laboratory

conducts research on the best ways to achieve long-term storage of seeds of both common and rare, threatened, or endangered native Hawaiian plant taxa. The lab has about 4.6 million seeds and ca. 200,000 spores of ferns from about 475 native Hawaiian plant species, 168 of which are listed as threatened or endangered. More information about the HRPP can be found on their website: http://manoa.hawaii.edu/lyonarboretum/conservation/hrpp/.

Oʻahu Army Natural Resources Program (OANRP). The OANRP was established about 15 years ago and currently has a staff of over 60. It implements conservation actions for the stabilization of 51 federally listed threatened or endangered plant species that occur on U.S. Army lands and surrounding areas on the Island of Oʻahu. The general goals of OANRP are to establish and maintain stable populations of the 51 species, manage threats (i.e., weed control, predator control), and to collect germplasm for storage of genetic materials and for ex situ propagation for restoration projects. More information about OANRP can be found on their website: http://www.garrison.hawaii.army.mil/sustainability/NaturalResources.aspx.

There are numerous useful online resources that will provide valuable gateways to conservation and restoration activities in the Hawaiian Islands, for example:

http://www.hawaiiconservation.org/

http://www.conservehi.org/

http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/hawaii/

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Book Reviews

Bryological and Lichenological

A Field Guide to California Lichens

Stephen Sharnoff
2014. ISBN-13: 978-0-300-19500-2
Flexibound, US$32.50. 405 pp.
Yale University Press, New Haven, Connecticut, USA

The eagerly awaited new guide to California lichens is now available. The author, Stephen Sharnoff, was a co-author with Dr. Irwin M. Brodo on the monumental *Lichens of North America*, a more definitive volume with an abundance of color photographs, but not a field guide. This compact new book (9.25 × 5.5 inches) is a handy size to take in the field. It describes 707 of the 1500-plus species of lichens reported in California, with about 500 color illustrations.

The foreword by Peter Raven provides an excellent introduction to lichenology and to the wide range of habitats found in the state. He also points out the threats to survival of many lichen species, one of many reasons to collect and study these organisms.

An introductory chapter by the author describes the complexity of habitats in the state, their symbiotic physiology, asexual reproduction, internal structure including sexual reproduction, terminology, and collecting methods.

The guide organizes lichens by form in three groups: foliose, fruticose, and crustose genera, and alphabetically within each group. Under each genus, the more common species are described and pictured. Spores, chemistry, substrates, frequency, and geographic distribution in California are given, where relevant, for each species. Comparisons are made with similar-appearing lichens. Common names are given, as in *Lichens of North America*; these names are not "common" among collectors in my experience, but they often add a visual clue to particular lichens, such as "firedot lichens" for species of the brilliant orange *Caloplaca* species.

The California lichen flora deserves its own book, because the state is so ecologically diverse, its lichen flora is huge (over 1500 species), and because it includes many unique lichens restricted to the Pacific coast, Baja California, and the California Channel Islands. Habitats include ocean cliffs, mountains, alpine environments, deserts, chaparral, hardwood forests, conifer forests, and sand dunes. The California Channel Islands offer an almost pristine array of lichens that once occupied the adjacent mainland but are now mostly extirpated by urbanization, farming, ranching, and fire. Genera in this group include *Dendrographa*, *Dirina*, *Lecanographa*, *Niebla*, *Phyllopsora*, *Roccella*, *Schizopelte*, and *Thelomma*. Desert genera, found in California but rare elsewhere, include *Heppia*, *Lichinella* and other Lichinaceae, *Peltula*, and *Texosporium*.

Sharnoff tackles some difficult genera such as *Caloplaca* (35 species), *Lecanora* (28 pictured), and *Usnea* (22 species). Color photographs are often the easiest way to tentatively identify some crustose forms. Inclusion of common but difficult crustose genera on rock will be especially helpful; examples are six species of *Acarospora*, seven of *Aspicilia*,

seven of *Buellia*, and eight of *Ochrolechia*. All are very common genera, but species identification requires specialized keys and diligence.

Sharnoff clearly is aware of the current status of various lichens, and the names given are all up to date. The book includes first reports of several species for California: *Caloplaca arizonica*, *Enterographa oregonensis*, *Roccella gracilis*, *Sphaerellothecium subtile* (a lichenicole on *Seirophora*), and for the basidiolichen *Multiclavula corynoides*; the latter is also pictured for the first time. An intriguing pair of photographs (p. 174) compares *Dendrographa leucophaea*, a coastal fruticose lichen, in the unparasitized form with the same species parasitized by a third fungus or lichenicole, *Trimmatothele dendrographae*, which changes its morphology dramatically.

Two appendices discuss chemical spot tests and recent name changes. The latter is a constant problem in lichenology, because numerous generic names have been changed in the past 20 years or so. Hence referring to older books, articles, or species lists can be confusing. A glossary, bibliography, and index complete the book.

Drawbacks are minimal: scale bars are missing on the photographs, but accompanying descriptions usually give dimensions. No authorities are given for the scientific names. One factual error is on p. 300; *Lecidea brodoana* is not endemic to California as it also occurs in Arizona and Mexico. There are a few misspellings: I noticed "asahinea" (p. 162), "Hafelia" (p. 373), "shizidia" (p. 402), and "walrothii" (p. 403).

No key is included; the author states that he preferred to include more species, rather than devote space to keys. The author also notes that when the reader finds a lichen not included in this book, other lichen books with keys can be consulted. Other important sources with keys and a wider coverage of species include *Lichens of North America* and the three volumes of the *Lichen Flora of the Greater Sonoran Desert Region* edited by T. H. Nash and colleagues. Another lapse is the failure to include the old synonyms from Appendix 2 in the index. If one knows a lichen as *Fuscopannaria leucophaea*, there is nothing in the index to help one know it is now called *Vahliella leucophaea*.

I recommend this lichen guide, with its stunning photographs and modest price, to all field biologists, amateur or professional, in California. It would be excellent for an introductory lichen course, particularly one aimed at field identification. It requires only a hand lens, and does not depend on use of a compound microscope, for most of the species included. The book will be essential to amateurs wanting to learn the common lichens in the state, and will also introduce them to many rare or unusual lichens, as well as some essentials on lichen biology.

–Shirley C. Tucker, Research Botanist, Santa Barbara Botanic Garden, and Lichen Curator, Cheadle Center for Biodiversity and Ecological Restoration, University of California, Santa Barbara, California, USA. tucker@liifesci.ucsb.edu

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ECONOMIC BOTANY

The World as a Garden: The Life and Writings of David Fairchild

David W. Lee, editor
2013. ISBN-13: 978-1-4937-6523-2
Paperback, US$12.68. xvi + 335 pp.
Createspace, West Charleston, South Carolina, USA

David Fairchild (1869–1954) had a great impact on American agriculture and horticulture in the first half of the twentieth century. During those years, he published five popular books (now long out of print) on plant exploration and travels in tropical lands and on insects under the microscope. At the very end of the nineteenth century, he started and directed the Section of Seed and Plant Introduction (S.P.I.) of the U.S. Department of Agriculture, which eventually expanded into the present-day Agricultural Research Service. Thus, he initiated the government-supported exploration and collection of new foreign crops and ornamental plants in a systematic way. In his later years, David Fairchild championed tropical fruits and palms for Florida, where he was directly involved in the creation of four present-day botanical institutions: USDA Subtropical Horticultural Station, Fairchild Tropical Botanic Garden, The Kampong of the National Tropical Garden, and Montgomery Botanical Center. With his name associated with these centers of gardening, botanical research, and education, Fairchild is still recognized and appreciated in South Florida, but he is less known elsewhere in America. We can now be reacquainted with his enthusiasm and love of plants and with his influence on the variety of plants growing in our farms and gardens.

David Lee has collected an anthology of Fairchild's writings that are selected from chapters of his books, published essays, articles from *National Geographic* and professional journals, and unpublished letters. These excepts follow Fairchild's life from his birth at the new Michigan State University, where his father was a professor, to his childhood on the new campus of Kansas State University, to his final years in Miami. Taken as a whole, the writings give a fascinating picture of Fairchild's life and accomplishments. They paint a portrait of a humble man who loved plants, travel, and the company of fellow plant enthusiasts and his extended family.

The introductory commentaries by David Lee are in italic font and are clearly distinguished from Fairchild's own words, which are printed without italics. Lee has also selected many black-and-white photographs, dating from the 1870s to the 1950s, of Fairchild's family, botanical friends, and locales throughout his life that parallel the text. Many of the photos are printed here for the first time from archival material. Lee's commentaries place the excerpts in context with the events of the times and with Fairchild's life. Often, Lee discusses Fairchild's actions and opinions in terms of the understanding at the time compared to what we know today about the ecology of weeds and invasive plants, or about genetics and eugenics.

I recommend this book for any botanist who enjoys reading about plant exploration in "the old days," for horticulturists keen to learn more about how the diversity of garden plants were introduced to this country, and for biologists curious to know what it was like to be a young American biologist studying at the great German universities under famous professors of the nineteenth century. Read how the Japanese cherry trees in Washington, D.C., were originally burned on arrival due to contamination and had to be reshipped with better quarantine controls. Fairchild writes about his father-in-law, Alexander Graham Bell, and his association with other botanical personalities of the twentieth century, including L. H. Bailey, W. Swingle, and E. D. Merrill. He describes the rugged adventures of Frank Meyers and Joseph Rock, who he employed as field collectors. History buffs will find the first-person accounts of Fairchild's involvement with so many aspects of American agriculture and horticulture fascinating. He writes about the need to establish an Everglades National Park and to develop new crops, especially tropical fruits, in Florida. I read the book at intervals without losing my place in Fairchild's life story or losing interest in the fascinating life of a true plant lover. For a very modest price, I got hours of reading enjoyment and experienced some of the thrill of plant exploration.

–Jack B. Fisher, Department of Botany, University of British Columbia, Vancouver, British Columbia, Canada

Plant Biographies (or Plant's Eye View of the Planet and Man)

Sue Eland
2014. ISBN-13: 978-0-9576539-0-0
CD-ROM £59.99, US$100.00
http://www.plantlives.com

Complete *Plant Biographies* is a CD that contains a 5506-page PDF file. A "Plant Biography" is a compendium of published information about a particular species or variety. The goal is to provide 'an entertaining and fascinating insight into the plant world's participation in the life of the planet…" The author's introduction emphasizes her enthusiasm for reconnecting people to plants. She clearly has a solid grasp on what is being called "plant blindness."

The CD begins with a variety of introductory material, including a statement of the philosophy underlying making a huge database about plants for a popular audience. However, the closest the CD comes to delimiting the project is a rather vague statement that it "already embraces some of the most obvious plants met with in day-to-day life…" and that "… it [will] never be possible to include every species…" A more specific overview of which plants are currently included and which have not yet been added would make it easier to use the CD. What does an omission mean, if anything? What groups are well covered, and what groups await future work? Despite organizing the plants by genus, the list does not indicate how many species are in a genus or what portion are described at this time. Since it is written for a popular audience, I think that is important. In my experience people tend to underestimate botanical diversity and think that if a reference lists only one species, say, of *Cleome hassleriana*, then if the plant they are looking at is a *Cleome*, it must be *Cleome hassleriana*.

The main work is an immense file containing the "Biographies." I estimate that there are 10,465 Biographies. A few ferns and fungi (truffles) are included. Even so, since the author has gone to great lengths to get names in many languages, alternate English common names, and botanical synonyms, most lines in the Biographies are cross-references, such as:

> Cubeno physic see *Veronicastrum virginicum*
> Cubeun's root see *Veronicastrum virginicum*
> Cubibe see *Piper cubeba*

The Plant Biographies range from a paragraph to several pages in length. Entries begin with the genus, then give selected species. Synonyms are listed, then one common name is chosen and put in bold capitals. The plant is very briefly described: "SAFFRON is a bulbous perennial. Native to Asia Minor and southern Europe, it has crocus-like blue, lilac or white flowers with protruding, orange-red 'stamen-like spikes.'"

Although dozens of common names are given in the Biography, one is chosen and then used throughout the Biography (above, saffron). It is not clear how the chosen common names were selected. Some are British---reedmace for cattails (*Typha latifolia*). Of course there is no easy answer in choosing common names, but it will help users around the world if the author explains her reasoning.

Following the brief description is a list of common names, which may include dozens of languages. This section often ends with "in flower language it is said to symbolize…." Next the entry explains the species epithet "*Sativus* means 'cultivated'" and the (chosen) common name: "The common name Saffron comes from an Arabic word for 'yellow' *assfar.*…" A generally historically arranged discussion of the plant's uses follows, full of interesting facts about its relation to humans, including literary quotes. Often information on commercial uses, current sources, and medicinal uses in several cultures are included. Also included for saffron is that "it is the birthday flower of April 16th."

Overall the nomenclature is excellent. Apocynaceae replaces Asclepiadaceae, *Morus tinctoria* sends you to *Maclura tinctoria* and *Mahonia aquifolium* is referred to *Berberis aquifolium*. Some changes are not recognized in the list: acacias are still one huge genus, and the chrysanthemums listed are two European species while garden Asian chrysanthemums, for which there are no biographies, are given as the genus *Dendranthema*.

There are a number of botanical errors. The discussion of bracken explains that "the seeds of some [ferns] cannot be seen with the naked eye." Plant family names are italicized. Asteraceae is described as a "previous family name" for Compositae. Capitalization is somewhat inconsistent but common names are capitalized most of the time.

Seriously lacking are references within the entries. With medicinal and culinary uses taking up much of the entry, it is important to be able to determine who is being quoted and seek further information.

The bibliography includes 791 entries, almost entirely books; the journals included are *The Herbal Review* and *Economic Botany*, and the websites are *The Plant List, Tropicos* and *Multilingual Multiscript Plant Name Database*. The publication date is 2013 but there are no references after 2010, except the websites. The majority of the references were published 1970-1994 (495, 61%), only 3.5% (37) since 2000. Rydberg's *Flora of the Prairies and Plains* (1971) is in the bibliography but not the *Flora of North America* (1993+). Also not in the bibliography or the entries are references to German Commission E's work on herbal medicine or *The Physician's Desk Reference for Herbal Medicine*, sources that I use to check information on medicinal plants. The result is that I do not know whether I can trust the information presented. Old isn't necessarily inaccurate, but the lack of recent information is worrisome. Without citations within the entries and 741 references, the source of the information cannot be readily identified.

This is an amazing piece of work, compiling an enormous array of popular facts about important plants. There are wonderful pieces of information included and the entries often give a good review of the plant's role in human history. However, with old references and no internal citations, the quality of particular facts is impossible to evaluate. *Plant Biographies* is described as the first edition of an ongoing project, so perhaps these problems will be remedied in future editions.

---Kathy Keeler, A Wandering Botanist (http://awanderingbotanist.com)

Education

Dispelling the Darkness: Voyage in the Malay Archipelago and the Discovery of Evolution by Wallace and Darwin

John van Wyhe
2013. ISBN-13: 978-981-4458-79-5
Cloth, US$75.00. 405 pp.
World Scientific Publishing Co. Ltd., Singapore.

Alfred Russel (yes, one "l") Wallace has variously been described as forgotten, neglected, obscure, brilliant, "the greatest field biologist of the nineteenth century," co-discoverer with Darwin of evolution, the first to write down the theory of evolution, famous for being forgotten, as being robbed by Darwin and Victorian society of his priority of discovery, as having forced Darwin to publish his theory when he did, an outsider, "more myth than man" (p. 3), and in many additional terms. Some have even gone so far as to suggest that Darwin received Wallace's essay on evolution (the one read together with two essays by Darwin at the Linnean Society of London meeting on 1 July 1858) weeks or even months before admitting that he had and either borrowed from it or plagiarized it. A few have described Wallace as a hanger-on and others have described him as the man who discovered evolution. Many books and essays have been written on the subject, and together they have created or, as this book states, helped "to reinforce the image of a legendary Wallace who is very different from the historical Wallace" (p. 5).

This books aims to set the record straight, and few historians of biology are better equipped and more qualified to write such a tome than John van Wyhe, founder and editor of Darwin Online (http://darwin-online.org.uk/) and Wallace Online (http://wallace-online.org/) as well as editor or author of a number of other books on Darwin (full disclosure: I know van Wyhe; we lectured in the same symposium on Darwin and Orchids in Singapore in 2011).

The first chapter sets the scene of the times and provides brief outlines of Darwin's and Wallace's backgrounds and some of the people and writings that may have influenced them (e.g., Malthus, Lamarck, Ida Laura Pfeiffer, Charles Lyell). It makes clear that Wallace came from a middle-class English

family. His father was a solicitor who inherited property that could generate a good income, but lost it in bad investments and subsequently moved from London to the Welsh border. Thus, reports that Wallace came from a working-class Welsh family are incorrect. In those days this made a difference. At present, rising from poverty would make Wallace look good. The Darwins were made wealthier due to intermarriage with the Wedgwoods (dinnerware china fame). That is why "Darwin never had a job, unlike Wallace who would have so many" (p. 11).

Chapters 3–9 deal in great detail with Wallace's travels, the ships he sailed on, the locales he visited, collecting methods, dwellings in the places he visited, illnesses, individuals he employed, his notes and notebooks, the start of his writings, and even durians—the fruit famed for an odor offensive to westerners and a taste that led Wallace to describe it as the "king of fruits" and "a food of the most exquisite flavor" (p. 91), and certainly a fruit I greatly enjoy and eagerly seek out when in Southeast Asia. What I find very impressive in these chapters is the careful dating of events, references to port records regarding the movement of ships, and great attention to details. These chapters convert Wallace from a myth to a man and explain how a surveyor became a great naturalist.

Chapter 10 is a detective story. Did he (Darwin) or didn't he? Did Darwin delay publication of his theory of evolution after formulating in ca. 1838 and if he did, why? The chapter addresses the questions methodically and concludes that there was... Well, those interested in the answer should read the book. All I can say here is that van Wyhe is convincing.

Then there is the question of when did Darwin receive Wallace's essay. Was it on 18 June 1858 or much earlier? Van Wyhe suggests that it was received on 18 June 1858 on the basis of careful reconstruction of Wallace's movements, places and dates of posting of mail, arrivals and departures of five ships, and overland travel from Suez to Alexandria (p. 225). His argument is constructed very well and leaves no place for the suggestion that Darwin plagiarized Wallace and/or robbed him of fame.

Van Wyhe's style is clear and easy to read. His facts are carefully substantiated. He approaches all issues even handedly. The book is well illustrated even if the printing of a few illustrations leaves something to be desired (but some of this was improved and illustrations were added to a paperback also published in 2013; see Literature Cited). This may not be the last book those interested in Wallace may read, but my view is that it will be one the best.

And, an explanation: My interest in Wallace was generated by his essay and comments (Wallace, 1867a, 1867b) in support of Darwin's suggestion (Darwin, 1862a, 1862b) that *Angraecum sesquipedale* is pollinated by a moth that has a very long proboscis (Arditti et al., 2012).

–Joseph Arditti, University of California, Irvine, California, USA

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Systematics

Trees of Western North America

Richard Spellenberg, Christopher J. Earle, and Gil Nelson
2014. ISBN-13: 978-0-691-14580-8
Flexibound, US$29.95. 560 pp.
Princeton University Press, Princeton, New Jersey, USA

This is a companion volume to *Trees of Eastern North America* by the same authors (in a different order of priority). The dividing line is the 100th meridian, deviating slightly in southeastern Texas; if you are working in the tier of states from North Dakota to Texas, you'll need to buy both volumes.

If one searches for *Trees of North America* at amazon.com, there are 4501 titles returned. A great many of these are not tree books at all; nonetheless, there are dozens, if not hundreds, of such titles in print. This volume stands out because its coverage includes not only the native species, both common and rare, but also a goodly number of cultivated species. In this latter category are *Ginkgo* and several species of *Araucaria*, none of which escape cultivation but which attract attention wherever they are planted.

The authors well recognize there is no firm line between a tree and a shrub, and therefore are generous in their choices of what to include. There are no dichotomous keys. The general-interest person has somehow to intuit Celastraceae versus Anacardiaceae; by the same token, it is my experience that non-botanists have little patience with keys—"Just tell me what the name is."

The nomenclature follows the current *Flora of North America* (FNA), to the extent available. The binomials are given with scientific authorities, which lends a greater degree of precision; however, the names of the authorities are often abbreviated, a practice that FNA eschews. As is always true, the authors of this book had to make choices: for example, in the treatment of the Chinese tallow tree, *Sapium sebiferum* is adopted here, with *Triadica sebifera* cited at the end of the text segment. It appears that FNA volume 12, to include the Euphorbiaceae, will adopt *Triadica*. Fortunately, the thorough index at the back of the volume includes entries for both the common name (as "Tallow Tree, Chinese") and the two binomials by which this weedy adventive is known.

The colorful illustrations by David More are an important feature of this book. Bark, flowers, fruits, leaves—whatever bears on identification—are illustrated. The illustrations (and the range maps) are identified by the common name of the plant concerned, which makes for a bit of glancing back and forth to the accompanying text.

There is no Literature Cited, nor is there a suggested list of further reading or selected websites. Perhaps it is intended that the book will be a stand-alone reference and guide; one can only wish the authors and their readers every success.

–Neil A. Harriman, Biology Department, University of Wisconsin-Oshkosh, Oshkosh, Wisconsin, USA; harriman@uwosh.edu

Field Guide to Wisconsin Grasses

Emmet J. Judziewicz, Robert W. Freckmann, Lynn G. Clark, and Merel R. Black
2014. ISBN-13: 978-0-299-30134-7
Paperback, US$30. ix + 346 pp.
University of Wisconsin Press, Madison, Wisconsin, USA

The authors have impressive credentials in agrostology: Judziewicz is author of the Poaceae treatment in *Flora of the Guianas*, of *American Bamboos* (with Lynn Clark and others), and of dozens of papers in the refereed literature. In addition to *American Bamboos*, Professor Clark has published widely on grass phylogeny and allied subjects. Retired Professor Freckmann authored the treatment of *Dichanthelium* for *Flora of North America*, along with numerous other papers on grasses. Ms. Black is a computer expert, responsible for the herbarium websites maintained by University of Wisconsin–Stevens Point and UW–Madison.

The color frontispiece opposite the title page is Zizania aquatica, southern wild rice; the photograph is repeated (and labeled) on pp. 21 and 319.

The first chapter, on morphology, is a first-rate primer on the terminology of grasses, including how to distinguish them from sedges and rushes. The pages are adorned with excellent color photographs, with everything cleanly labeled. The subject of modern classification of the Poaceae is treated but briefly—as is appropriate in a field manual, the genera and species are arranged alphabetically.

The history of agrostology in Wisconsin is a welcome chapter on local botanical history. The subject has little to do with field identification of grasses, but it does put the whole enterprise into perspective.

The keys to genera work. I tested with several specimens. The decision was taken (wisely, I think) to include all grasses ever collected outside of cultivation in Wisconsin. A goodly number of these are waifs that have not become established as part of the Wisconsin flora; but if they showed up once, they will probably show up again, and the book will be of maximum usefulness if they are all there. The authors included a segment on cultivated grasses, which have become popular in horticulture; they are not included in the keys.

There are no descriptions of the species, but the drawings and photographs are very well done. The generic names *and* the specific epithets are all translated or explained. This is an unusual feature in a field guide, but most welcome. It does much to demystify the whole subject, for the beginner. Where an accepted name differs from a common reference, such as *Flora of North America* (2003 and 2007) or Fassett's *Grasses of Wisconsin* (1951), it is indicated. However, another major source of Wisconsin information is the online herbarium of UW–Madison, where some problems arise: for example, buffalo grass (*Buchloe dactyloides*) is now treated as a species of *Bouteloua*, but there is no hint of that at the Madison website. This kind of disconnect in the information stream is unavoidable; it is not mentioned in the book, because the "problem" might well disappear minutes from now with a few keystrokes.

The glossary is a model of clarity and plain English. The concluding index is labeled as "Taxonomic Index," which is entirely appropriate, because it includes only Latin and common names of grasses. If you want to re-read the history of Wisconsin agrostology, you will have to find it by other means (pp. 26–29).

University presses typically keep their books in print for decades. Fassett's *Grasses of Wisconsin* is still in print; the present field guide certainly merits a similar record for longevity.

–Neil A. Harriman, Biology Department, University of Wisconsin–Oshkosh, Oshkosh, Wisconsin, USA. harriman@uwosh.edu

Field Guide to the Wild Flowers of the Algarve.

Chris Thorogood and Simon Hiscock.
2014. ISBN 978-184246-497-7
Cloth US$60.00, 272 pp.
Royal Botanic Gardens, Kew, Richmond, Surrey, United Kingdom, distributed in US by University of Chicago Press, Chicago, Illinois, USA.

Field Guide to the Wild Flowers of the Algarve is a delightful addition to the library of field botanists, ecologists, conservationists, nature enthusiasts and hikers. Several features make this book exceptional for those interested in the natural world: beautiful photography, excellent notes on identification and natural history, and a focus on a distinctive geographical and diverse floristic domain that stretches across the southernmost region of mainland Portugal, and its least developed region---the western Algarve where there are nationally protected nature reserves.

A most noteworthy aspect of this new guide is that it is among the first on any Mediterranean flora based on the relatively new APG phylogenetic arrangement. Another valuable quality is that each family named opens with a brief description of its unique characteristics.

The book is the result of 10 years of effort by Chris Thorogood, a field botanist who has documented the flora of the region and who has a particular interest in parasitic plant speciation, and Simon Hiscock, Professor of Botany in the Biological Sciences Department, University of Bristol and Director of the University Botanic Garden, who has lead botanical field courses in the Algarve since 2002. Prior to that, Peter Placito and David Mabberley established a field course which for a number of years brought students to the Algarve to learn about the region's rich biodiversity and traditional agricultural practices, and who also had established a field course for students from Oxford which ran from 1987 to 1997. The authors brought students from Bristol University for an annual field botany trip to the west coast of Portugal. These study trips, and the students involved, have contributed to the enormous amount of work and research required to produce this invaluable resource dedicated to the wildflowers of this region.

Of particular interest to author Thorogood are

the parasitic plants that the Algarve holds, such as the spectacular halophytic *Cistanche phelypaea* which inhabits salt marshes around Faro, Lagos and Alvor, and the distinctive halophytic fungus *Cynomorium coccineum*, which grows on just a few sea cliffs in the region. A section on endemic plants also highlights the extremely rare perennial *Silene rothmaleri*, previously believed to be extinct but observed by the authors on a few remote shale slopes of Cape St. Vincent, as well as the endemic spurge *Euphorbia monchiquensis* and rock rose *Cistus palhinae*. From the 50 species of endemic plants of the entire Iberian Peninsula, 12 are found only in the Algarve.

The guide introduces readers to three broad geographical regions of Algarve: *litoral* [coastal], *barrocal* [rolling limestone hills, Cretaceous and Jurassic] and *serra* [mountainous, mainly Carboniferous rock]. Plants of particular interest to the authors were parasites, carnivorous plants, orchids, and Arum. The habitats as defined feature halophytes, xerophytes, salt marsh plants, and matos, i.e., sclerophyllous plants.

Hardbound and well-bound, as one would wish for a serviceable field guide, the photographs and illustrations that delineate how to differentiate taxa are of excellent quality. The guide concludes with a 5-page glossary, an 8-page index of English names, and a 14-page index of scientific names, with the page indicated with bold font if it contains a photograph (an error is observed for *Silene rothmaleri*, pg. 9 in the index). Containing over 1000 species descriptions, the book is profusely illustrated on every page with over 650 stunning color photographs, and 780 line drawings and distribution maps.

-Dorothea Bedigian, Missouri Botanical Garden, St. Louis, MO

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Plant Science Bulletin Featured Image

PLANTS Grants—Applications Accepted Beginning January 15

Program helps increase number of undergraduates from underrepresented groups to attend BOTANY meetings

For the past five years, the Botanical Society of America, with funding assistance from the National Science Foundation, has offered the PLANTS program and awards (Preparing Leaders and Nurturing Tomorrow's Scientists: Increasing the diversity of plant scientists). Over 55 talented and enthusiastic undergrads have participated in this program. The goal of the PLANTS program is to increase the number of undergraduates from underrepresented groups who attend the BOTANY meetings, and to increase their level of academic excellence and motivation to pursue advanced degrees in the plant sciences. PLANTS alumni leave the program better prepared for a future career in the plant sciences. The majority of alumni are pursuing careers in academia. Others have begun careers in government, industry and non-profit work related to botany.

Science will not thrive unless it is equally accessible to students from all backgrounds, including those from groups that are currently underrepresented. Therefore, the Society encourages you to consider contacting talented and diverse undergraduates who may be eligible for this award. This is truly an amazing opportunity for students!

The PLANTS program will fund up to 12 undergraduates from throughout the U.S. to attend the BOTANY 2015 meeting on July 25-29, 2015 in Edmonton, Alberta, Canada. At the meeting, the students will receive mentoring from graduate students, postdocs and faculty, and participate in networking events including the Diversity Luncheon and career-oriented activities. The program covers the normal costs of travel, registration, and food and accommodation at the meeting. An overview of the scientific conference will be available January 1 at www.botanyconference.org.

Applications are accepted beginning January 15 and due by March 2, 2015 and include completion of an online form providing a statement of interest, a letter of recommendation, and unofficial transcripts. Applications are welcome from all undergraduates who have interest in plant science; the admissions goal is to create a diverse pool of students. The application form will be located online at www.botany.org under the AWARDS tab. Any questions should be sent directly to BSA Membership and Marketing Director Heather Cacanindin at hcacanindin@botany.org.

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Jonathan Silvertown

Professor of Evolutionary Ecology
University of Edinburgh
Sunday July 26, 2014 - 7:30 PM