



# PLANT SCIENCE BULLETIN

FALL 2015 VOLUME 61 NUMBER 3



PLANTS GRANT RECIPIENTS AND MENTORS GATHER AT BOTANY 2015!

## IN THIS ISSUE.....



*Student involvement key to success of Botany 2015.... p. 82*



*A Report from Congressional Visits Day.... p. 96*



*BSA member and PlantingScience teacher Kim Parfitt wins Presidential Award.... p. 103*

## FROM THE EDITOR

This issue of *Plant Science Bulletin* has been a very inspiring one to prepare because it is filled with reports, reflections, and photos from Botany 2015. For those of us who could come together at this year's annual society meeting, it was a great time for reconnecting with colleagues and friends, learning exciting new methods, discovering new ideas and, of course, advancing the field of botany.

In the following pages, you will read about the meeting from the perspective of scientists, teachers, and students involved in many different aspects of BSA programming. On page 89, Johanne Stogran, BSA Director of Conferences, reports on the preliminary feedback from meeting attendees and provides some staggering quantitative information about Botany 2015. We also present the winners of several societal and sectional awards, in particular, the 2015 Distinguished Fellow and Emerging Leader Awards (page 92). The *Plant Science Bulletin* extends warmest congratulations to all of this year's award winners.

In this issue, we are also pleased to report on the continued success of BSA programs oriented at education and professional development, including PLANTS and Planting Science. An article on page 96 details the experiences of the 2015 Public Policy Award Winners at Congressional Visit Day. These programs are vital pieces of the society's efforts to fulfill its mission. I hope that you will find these initiatives as exciting to hear about as I do. If you are interested in becoming involved in any of these programs, please contact the BSA office.



*Mackenzie*

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# TABLE OF CONTENTS



## Society News

Survey Says: Botany 2015 in Edmonton was a Huge Success .....	82
Making Success in Botany .....	85
PLANTS Bringing Botany to New Heights .....	89
BSA Award Winners .....	92
BSA Public Policy Award Winners Attend Congressional Visits Day .....	96

BSA Science Education News and Notes.....	102
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## BSA Committees in Action..

## Student Section

The BSA Executive Board Welcomes Becky Povilus .....	106
Students Succeed at Botany 2015.....	108

## Announcements

Bullard Fellowship .....	109
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## Book Reviews

Economic Botany .....	110
Evolution .....	111
History .....	112
Systematics .....	113

# Botany 2016

*Savannah, July 30 -August 3*

*Celebrating our past - Conserving our future!*

International Trade and Convention Center

Savannah, Georgia

[www.botanyconference.org](http://www.botanyconference.org)



## SURVEY SAYS... BOTANY 2015 IN EDMONTON WAS A HUGE SUCCESS!

*By Johanne Stogran, BSA Director of Conferences*

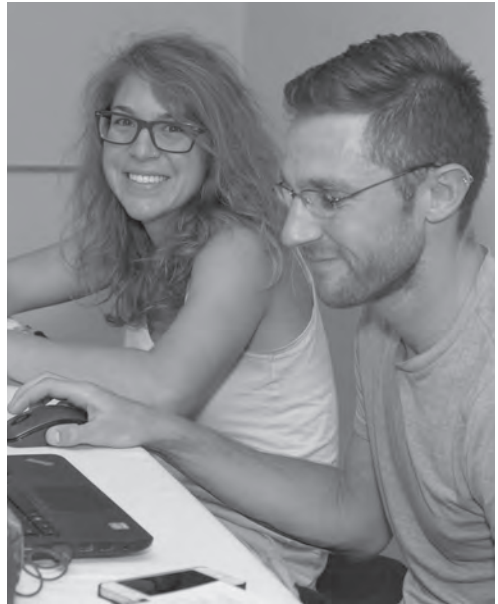
Edmonton truly welcomed us for Botany 2015, with its warm hospitality and excitement to have us in the city! Did you see the welcome decals at the airport? And the big window signs at the Shaw Conference Centre provided a great first impression as we arrived. In addition, we made quite an economic impact on the city to the tune of nearly \$1 million!

This was the biggest Botany conference to date hosted by the BSA. We were invited by the Canadian Societies and had a team of 14 partner societies in this adventure. There was a lot of energy, diversity, and exciting and interesting talks and presentations.

Comments in the survey included the following:

- “I like a conference where many societies and disciplines are brought together.”
- “Botany (conference) was fantastic—even better than I was expecting. Great opportunities to meet new people and hear about fascinating and cutting-edge research.”
- “Positive energy—what I most enjoyed was the diversity of talks/topics and people. I did learn a lot about other research fields and I have met a lot of people from different parts of the world! What also stuck with my mind is the message that we have to tell the world that Botany is cool!”
- “My students enjoy interacting with scientists and learning about other topics.”
- “After attending the conference, my undergraduate researcher is calling herself a botanist!”

The Shaw Convention Centre was the appropriate place to hold a conference of this size; the exhibit hall was large enough for the record number of exhibitors, and it was full of energy during the breaks and receptions. We always make a conscious effort to hold as many events in the hall as possible to give the exhibitors the attention they deserve, which is why all the coffee breaks were in the hall. One of the perks that exhibitors are offered is an e-mail list of all attendees so that they can personally invite you to visit them in their booth during the conference.



There were plenty of breakout rooms of varying sizes, and sessions were assigned to rooms by the projected attendance as noted by the program directors of each session. Symposia organizers are also asked to indicate how many they expect to attend. Unfortunately, the estimates can be a bit off and rooms can be either too big—or worse, too small!

Many thanks to all of you who stayed within our negotiated room blocks at the hotels. Through an agreement with the city of Edmonton, the hotels support the Convention Centre; since we fulfilled our contracts with the hotels, the rental at the Shaw was FREE! This saves the conference a considerable amount of money and lets us keep registration rates as low as we can—much lower than other kinds of professional conferences. Going forward, we hope to always be able to keep costs low to enable more students and young professionals to attend.

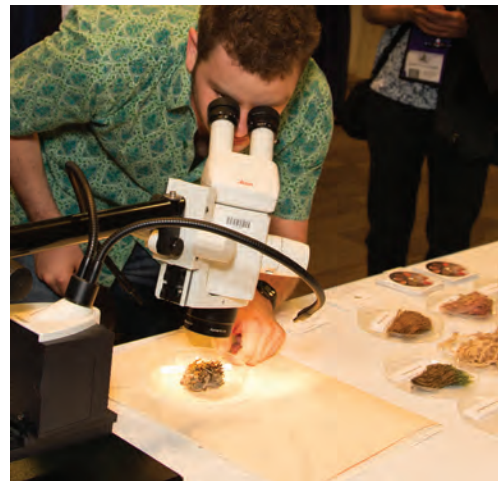
This year we had a record number of posters—almost 500, or twice what we usually have! Rather than limit poster submissions, we chose to accept all and that meant we needed to split them into two locations. Although the official poster session is Monday evening, all the posters do stay up for the entire conference, giving everyone plenty of opportunities to view them. If you miss talking to an author at the poster session time, you can always connect with them via email—or meet over coffee!



Over 80% of you found the conference app to be useful—and many of your comments will be used to upgrade it further for next year. One of the biggest issues is that it currently doesn't sync with the online abstract site, so this is one of the enhancements we will be working on for future versions. The app is the most effective way to stay up to date with any of the on-site changes that occur. The post-conference survey indicated that 43% of attendees use an iPhone 3 years old or newer, but we will also work to ensure older devices can use the app efficiently. In addition, almost 90% of you still like to use the program book! So, yes, we will keep printing it while improving it to make it easier to use.

The majority of you attend the conference to present your research, and for networking opportunities. We promise to keep these as strong incentives to attend while adding new ideas and programs to increase opportunities for both.

And finally, there was an interesting result from the survey: a little more than 50% of you said you heard of the conference by word of mouth! This is fantastic! You are talking about the conference and telling your colleagues and students about your experiences and the many reasons to attend Botany conferences. Keep it up and tell...keep it up and tell them about Botany 2016 in Savannah, Georgia. It is going to be the best one, yet!



# Botany 2015 by the Numbers

One Amazing City  
5 Science-Filled Days



1600  
Attendees



14  
Scientific Societies



52  
Countries



899 Oral Presentations  
including 25  
Symposia & Colloquia



40 Exhibitors



1 Service Project  
23 Field Trips  
17 Workshops



480 Posters



Supported 120 Students and 13  
PLANTS Grant Students  
with FREE registration



Mixers, Receptions,  
Networking Events & Awards



8370 cups of coffee,  
3000 drink tickets &  
1200 cookies!!

*See you in Savannah, July 30 - August 3, 2016*



## MAKING SUCCESS IN BOTANY, WITH A LITTLE HELP FROM YOUR FRIENDS

By Janice Dahl, *Great Story!*

The Botanical Society of America is like family for many of the scientists that make it their professional home.

They were introduced to the Society as students, were entrenched in good science, met leading scientists, and continue to embrace the community as their own.

Dr. Allison Miller is a perfect case in point. The newest member of the BSA Board as Director-At-Large for Education, a mentor with the PLANTS Program, and past Chair of the Economic Botany Section, it's clear that the Associate Professor of Biology St. Louis University and Research Associate for the Missouri Botanical Garden has a passion for giving back to botany.

"I have been the beneficiary of the actions of the Botanical Society since I was an undergrad," she says. "I have a sense of wanting to give back so others can enjoy what I have."

Miller is excited to join the Board of Directors for the BSA to lead the Education area. "It is a great opportunity to work with people with similar goals," she says. She'll be working on the PlantingScience



program, a program she's passionate about because of its ability to reach young minds with science.

"At the Botany conference, we are building relationships and science," Miller says. "We are trying ideas and abandoning some. We are finding collaborators."

"It is an exciting time for us in the Society and in science," Miller says. "We are dealing with challenges and opportunities in food and environment—global challenges that can be answered with our help. There is a need for people who understand plants to answer those questions. We're on a great trajectory and I am interested to see how, moving forward, we identify and seize the opportunities we have."



Dr. Chris Martine is the David Burpee Professor of Plant Genetics and Research Curator, Manning Herbarium, Biology Department at Bucknell University. He consistently focuses on bringing as many students as possible to the Botany conference every year.

“This is a kind and supportive environment for students to present their research,” Martine says. “Even if they are challenged, it will be supportive and it will help them grow as scientists. There are a lot of undergrads living in research,” says Martine. “Part of being in science is being engaged in science, and that means seeing and being engaged in this conference. That would be botany.”

“The connections I made here became my community. The Society encourages and supports members willing to support science. That’s the way it works. That encourages me to do good things, and I have that same hope for my students.”

Martine recently became a Lifetime Member of BSA, the youngest member to do so. The decision, he says, was both logical and emotional. “I’ve got a lot of years left, so the numbers just made sense,” he said with a smile. “I also believe so strongly in what BSA does for the botany community, what it does for me, and what it does for my students, that it was a way for me, in some small way, to show a level of support.”

“I’m the one that got a tattoo of my plant at the Boise Botany conference,” says Dr. Ranessa Cooper

of Hillsdale College, Hillsdale, MI, with a huge smile and a glint of mischief as she shows it off.

“I started coming to these conferences as an undergrad in 1995 with Jeff Osborn and I’ve only missed three in 20 years. This is my meeting,” she stresses. “There is no better meeting to adopt. I love to come because of the people; it’s like a family reunion. And BSA is just a great group of people. You are literally choosing your future professor and preparing for your future jobs here.”

At the Edmonton Botany conference, Cooper was truly multi-tasking by co-organizing a colloquium, roasting a colleague at the Paleobotany banquet, mentoring a student through the PLANTS program, co-hosting the Michigan banquet, and helping her own students with presentations. “It’s a very full and fulfilling meeting,” Cooper says, talking about the effect that BSA’s outreach and networking has had on her own career and can have for the students who come into the programs now.

She calls the “breadth of science” at the conference “inspiring” and draws on much of the research to show her students how exciting the science is and the scope of ongoing research. “I’ve been inspired here, and I hope I help someone else with my data when I present,” she said.

“Botany meetings are the best thing since sliced bread,” says Dr. Chelsea Specht of the University of California, Berkeley, and Curator of Monocots at the University and Jepson Herbaria. “You know





everybody and it feels like you just saw them. The Society catches people early in their careers and keeps them all the way through. They engage you in education and outreach,” Specht says.

The end result? “You can fit in, give and receive, and you don’t have to wait for age or buy-in to benefit from the Society.”

The relationships built through BSA and the Botany conferences are “like being part of a club,” Specht explains. “When you go for tenure, you have to have letters from 15 people. Those people cannot be mentors or collaborators. I easily had those supporting letters because of this community of people who had seen my research here at this meeting. They knew me and they knew my work. And they knew me well. That is super important in our community.”

Specht remembers her first presentation at a Botany conference in 1997 as a grad student and having senior scientist James Seago listening, commenting, and complimenting her work. “Today, our society is so negative in most ways. To publish or get a grant, so much of the feedback is negative,” she says. “But this meeting is positive. They know you and your work. You become part of something, nationally and internationally too.”

Specht wanted the chance to give back, so she signed on to the PLANTS Program as a mentor. “I like the cascading structure where the students are assigned both student and faculty mentors,” she said.



As a mentor, both in the PLANTS program and in her university role, Specht says she loves the opportunity to open doors for students. “As a mentor, I have students work on a variety of things. I make sure they have a variety of materials and experiences. In the end, the right choice for them might not be botany, but sometimes it is.”

Dr. Selena Smith at the University of Michigan—and winner of the Emerging Leader Award—grew up on acreage and fell in love with plants and dinosaurs as a child. She knew early that science was her destiny, but it wasn’t until late high school that a lucky half-term in botany grabbed both her imagination and her intellect.

Now, as an Assistant Professor of Earth & Environmental Sciences and Program in the Environment in the Department of Earth & Environmental Sciences at the University of Michigan, she looks back with a smile at those early studies that took her to the life she loves today.

“I want to continue the legacy,” Dr. Smith says. “I have a high school student in my lab now...I’ve been in the field for a long time, I’ve been in research for a long time, I’ve mentored and been mentored, I’ve been Associate Editor for the *American Journal of Botany*, and I’ve organized symposia. I’m engaged. That’s part of it. Research is fun and it’s one part of it. But if we are the only ones with a clue, it’s not enough. For paleobotany, we have to engage people’s imagination and show them how things



have changed. Evolution, ecology and climate change—it's all relevant, current, and important.”

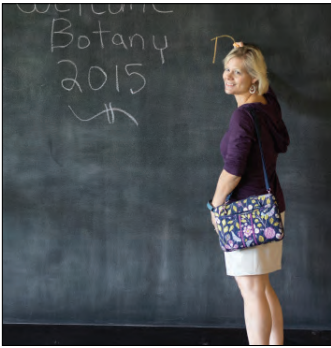
Smith says, “If we don't tell people how important plants are, they'll never appreciate them. Even if just a few of the students we mentor go on in botany, we have still helped more people appreciate plants.”

For young people thinking about a career, Smith has some advice. “Figure out what you enjoy doing and be sure what you like.” She talks about the “circuitous” route she took to find exactly the right spot. “You have to be patient and creative, and be open to ideas and networking,” she says.

“Paleobotany is like one big family, very supportive of one another—a community,” Smith says.

During her first trip to the Botany conference in 1999, she felt the sense of community and was amazed at the good science—“science from good scientists,” she calls it. And the kicker was the integration of the disciplines that she believes “you wouldn't find anywhere else.”

Winning the Emerging Leader Award is a bit surreal for Smith, who still remembers coming to that first Botany conference as a freshman undergrad with a poster presentation. Now, she is working with her own graduate student, watching her blossom and become more engaged and loving botany. That, she says, is the ultimate reward.



## PLANTS PROGRAM BRINGS BOTANY TO NEW HEIGHTS

By Janice Dahl, from *Great Story!*

The PLANTS program (Preparing Leaders and Nurturing Tomorrow's Scientists: Increasing the diversity of plant scientists) has been bringing talented and diverse undergraduate students to the Botany conference for the past five years. This program, funded by the National Science Foundation and the Botanical Society of America, brought 13 students to Botany 2015, where they received mentoring from graduate students, postdocs, and faculty, and participated in networking events, including the Diversity Luncheon and career-oriented activities. The program covers the normal costs of travel, registration, food, and accommodation at the meeting.

In August, the BSA received confirmation that it is receiving another NSF grant to continue the PLANTS program, with some enhancements, for the next five years. This is fantastic news, especially since botanists are saying that the PLANTS program, quite literally, changed the course of their lives.

"The PLANTS grant was the only way I could have come to the Botany conference," says Dori Contreras, a fourth-year Ph.D. student in paleobotany at the University of California, Berkeley. That was the first year of the PLANTS program—in 2010—and Contreras said she had no idea she wanted to be a botanist.

Paired with mentor Brian Atkinson, she learned about the possibilities of networking. "The connections I have made here have made a big difference," she says. "I am the poster child for networking at these conferences," where you meet people she calls "science famous."

Contreras grew up in a family with five children, with her mom graduating from college after 10 years of taking one class after another. Contreras supported herself from the age of 17 and worked 40 to 60 hours a week through most of her college career, with a strong aversion to loans.

"I worked retail, sold trucks, and worked in auto finance. I was doing well for myself in business, but it wasn't satisfying. It was boring," she says. "I wanted something more. I didn't know graduate school was an option for me," Contreras says flatly.



But that tiny piece of knowledge from Atkinson changed everything. She needed more education. She applied for an NSF Fellowship and was funded for a trip to the lowland rainforest in Costa Rica, and the light of her dream grew brighter.

"Kids in the country or even in the inner city just don't think this level of education is possible," Contreras said, explaining the importance of diversity programs like BSA's PLANTS program, where she mentors and serves on her own university's Diversity Committee.

"We have to encourage science, reach out too, if we want to impact passion for science to students. We have to fish for interest and foster that interest if it's there."

Brian Atkinson, Contreras's mentor, is a fourth-year Ph.D. student in Oregon State's Botany and Plant Pathology Department who started out at a PLANTS grant recipient, coming to the conference as a fine arts student and finding his way slowly to paleobotany. Today, he credits that transformation in large part to the contacts and relationships built through the BSA and the Botany conference.

"When they called for mentors, for me it was really about giving that same experience that I had to people from underrepresented groups. Since plants are so important to me, the PLANTS grant is there for people like me to get access to the Botany conference and understand how the meeting works."

Atkinson has mentored three people, all of whom were very different in terms of personality, course of study, and expectations from the conference. In large part, the mentorship is about “developing relationships and offering conference guidance that is beneficial” to the individual student, he says.

James McDaniel of the University of Wisconsin-Madison, started coming to the Botany conference in 2011 as an undergrad. “I knew a little about plants, but I wanted to know more,” he said. He was paired with a peer mentor and a professor mentor, both of whom taught him the ropes about the conference and the expectations for him as a recipient of a PLANTS grant. “The most exciting thing was the networking,” he says now, “meeting all these people you would potentially be working with in the future. These people,” he says with a look across the sweeping floor of the conference center, “are the key to your success.”

Now, as a fourth-year Ph.D. student at the University of Wisconsin-Madison, McDaniel believes strongly in the power of the relationships he has built through the PLANTS program, BSA, and the Botany conference. It’s a long way from the future he once imagined as a high-school or middle-school teacher, and he says his passion for plants came from all the scientists he met along the way.

“I love research and I love passing on that knowledge,” McDaniel says. So when he looks at the PLANTS Program now, he sees a way to pass along some of the benefits he received. “I like passing on some of the information about getting into grad school, getting funding for school and research, and fellowships—things I didn’t know

**“When they called for mentors, for me it was really about giving that same experience that I had to people from underrepresented groups. Since plants are so important to me, the PLANTS grant is there for people like me to get access to the Botany conference and understand how the meeting works.”**

existed,” McDaniel says. “The mentees are getting the kind of friends they need and deserve through this program.

“It’s a great experience to be able to pass that knowledge on to another person, the knowledge that my mentor passed on to me.”

McDaniel says, “Diversity is a huge issue for science. This conference is getting more minorities and diverse groups into the sciences all the time, but it’s our job as scientists to get out there and interest people in science.”

Dr. David L. Gorchov of the Department of Biology at Miami University, Oxford, in Ohio is a long-time mentor with the PLANTS program. He says, “It’s part of being a professor to train the next generation. The Botany conferences can be intimidating, but the programs are well organized and it’s our jobs as mentors to be helpful so the students don’t have to figure it out by themselves.”

“It’s easy to be a mentor,” says the 25-year BSA member. “It has a positive effect on me and on the next generation.”

Dr. Gorchov talks about one “very artsy, creative student” he mentored in the beginning years of the PLANTS program, and his smile broadens. “The student would consistently miss our meetings, despite my reminders. I thought the whole thing was very unsatisfactory in my eyes. But a few years later I learned that the student’s overall performance had improved because of the feedback I gave.”

Conversely, Dr. Gorchov said, “My student this year is well prepared, asking all the right questions, and might actually not grow as much from the mentoring. You just don’t know.”



Dr. Chelsea Specht of the University of California, Berkeley, and Curator of Monocots for the University and Jepson Herbaria, said she wanted the chance to give back, so she signed on to the PLANTS program as a mentor. “I like the cascading structure where the students are assigned both student and faculty mentors,” she said.

As a mentor, both in the PLANTS program and in her university role, Specht said she loves the opportunity to open doors for students. “As a mentor, I have students work on a variety of things. I make sure they have a variety of materials and experiences. In the end, the right choice for them might not be botany, but sometimes it is.”

That’s really what happened with her, Specht says, recalling her pre-med background and the explorations that led her into evolutionary biology, ethno-pharmacology, and eventually to plant molecular genetics and systematics. She simply loved the exploration and the science, and in turn, loves showing others that same exploratory process that turned her on to botany.

“BSA is uniquely good at bringing in people at an early age and keeping them engaged,” Specht said. “Young people have energy and ideas, and being involved is helpful to your career, too. It’s good for the members and the Society.”



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## BSA AWARD WINNERS

THE BOTANICAL SOCIETY OF  
AMERICA'S 2015 DISTINGUISHED  
FELLOW AWARD WINNERS

The Botanical Society of America Distinguished Fellow Award (formerly known as the Merit Award) is the highest honor our Society bestows. Each year, the Merit Award Committee solicits nominations, evaluates candidates, and selects those to receive an award. Awardees are chosen based on their outstanding contributions to the mission of our scientific Society. The committee identifies recipients who have demonstrated excellence in basic research, education, and public policy, or who have provided exceptional service to the professional botanical community, or who may have made contributions to a combination of these categories. Based on these stringent criteria, the 2015 BSA Distinguished Fellow Award recipients are Margaret E. Collinson, Donald Levin, and Jonathan F. Wendel.

## PROFESSOR MARGARET E. COLLINSON

**Professor Margaret Collinson** is an internationally known and respected plant paleobiologist. She has been elected as a Foreign Member of the Royal Netherlands Academy of Arts and Sciences, and serves as a corresponding Member of the Senckenberg Gesellschaft für Naturforschung (Germany) and Honorary Research Fellow of the Natural History Museum (London). Her work is broad and multidisciplinary, covering paleobotany, plant systematics, paleoecology, plant-animal interactions in the past, and plant biochemistry. Particularly noteworthy contributions include early Cenozoic vegetation history, the fossil record of ferns, and highlighting the importance of fire in paleoecosystems. Because of these diverse interests, in many ways Collinson is an ambassador of botany by continuously showing its relevance to other disciplines such as Earth sciences and paleontology, while also making novel contributions to traditional botanical sciences. In addition to her scholarly work, Collinson is a tireless and dedicated teacher, and a mentor and supporter of paleobotany. She has been recognized with undergraduate teaching awards, mentored numerous young scientists, and does not distinguish between those who are

her own students and those who are not. The 13 PhD students she has graduated to date have all remained involved in science or education, several of them becoming accomplished scientists in their own right. Collinson served as the President of the International Organization of Paleobotany as well as taking on leadership roles in other organizations. To quote one letter, “Her creativity, incredible productivity and warm collegiality together conspire to make her an excellent example of those who would be recipients of this award.”



DONALD LEVIN

**Professor Don Levin** has been enormously productive and influential in diverse areas of research at the interface of population genetics, hybridization, breeding system biology, defense mechanisms, and polyploidy. He has an exceptional record of achievement in research that is recognized both nationally and internationally; this impressive record has stretched for half a century and continues today. Levin is a world leader in research and one of the leading botanical figures of our time. Some of the most influential papers and books in plant evolutionary biology over the past several decades were written by Levin. There are few researchers possessing such diverse expertise who do so many things so well and have made such major contributions in so many areas of plant biology.



JONATHAN F. WENDEL

**Jonathan F. Wendel** is one of the world's leading researchers studying the genetics and genomics of plant polyploidy, particularly in cotton and other species of the genus *Gossypium*, which has been the focus of much of his work. His nearly 250 papers span a staggeringly broad range of topics, not only on polyploidy but on phylogenetics, systematic theory, maize genetics, crop evolution, and taxonomy, to name only a few. His work has always been at the leading edge of his fields of interest, beginning with isozymes and moving seamlessly into the DNA era from its beginnings with restriction enzymes, through manual sequencing, and on into the current "next-generation" high-throughput phase of comparative genomics. Wendel has been noted throughout his career for sharing his technical and theoretical insights in incisive and lucid review papers. He is an excellent colleague and valued collaborator, generously giving of his time and boundless energy to further the work and careers of others, and serving as an organizer of important conferences and symposia. Wendel is also an engaged mentor of graduate and undergraduate students and visiting scientists. He is a distinguished lecturer and educator, and someone who has contributed tremendous service to his institution, having served as chair of Iowa State University's Department of Ecology, Evolution, and Organismal Biology since 2003. To quote from three of his supporting letters, Wendel is "one of the very elite plant evolutionary biologists in the world", whose work "has spanned decades and has resulted in a new synthesis of views on the genetic and genomic consequences of polyploidy"; "He is a leading light in plant genome evolution."

DR. SELENA Y. SMITH RECEIVES  
EMERGING LEADER AWARD



**Selena Smith** has only recently become an Assistant Professor of Earth & Environmental Sciences and Program in the Environment (and Museum of Paleontology) at the University of Michigan. Nevertheless, she already has established an exemplary record of innovative scientific research, professional leadership, and student mentorship. Selena initiated her program of paleobotanical research as a high school honor student, conducting, completing, and publishing her first scientific paper before entering the University of Alberta, where she completed an additional nine papers while completing her B.S. and Ph.D. degrees in 2002 and 2007, respectively. In 2005 she received the first NSERC André Hamer Doctoral Postgraduate prize, awarded to the single most outstanding doctoral student in Canada. Smith already has published more than 30 refereed papers (since the year 2000). The superior quality of her studies has been appreciated since her first presentations, earning her numerous awards, including the Isabel Cookson Award (for best research student presentation in paleobotany at the annual Botany conferences), and prestigious competitive pre-doctoral and post-doctoral fellowships in Canada and the United Kingdom. She has achieved continuous National Science Foundation funding through multiple awards from 2010 through at least 2018. Smith's studies go well beyond the narrow systematic breadth, stratigraphic ranges, or preservational modes that characterize the work of less creative scientists, and she has been at the forefront of developing and employing new methods and technologies such as X-ray

tomography, which uses synchrotron technology to develop non-invasive 3-D images of fossil plants that may still be imbedded in rock matrix. Her work also spans a wide range of foci, including structure and development, reproductive biology, paleoecology and paleophytogeography, and systematics and evolution of ferns, gymnosperms, flowering plants, and fungi.

### MARGARET MENZEL AWARD (GENETICS SECTION)

*The Margaret Menzel Award is presented by the Genetics Section for the outstanding paper presented in the contributed papers sessions of the annual meetings.*

**Dr. Joshua Puzzy**, College of William and Mary, “*Nuclear phylogenomics of the seed plants*” Co-authors: Shing Hei Zhan, Tao Chen, Michael Deyholos, James Leebens-Mack, Dennis Stevenson, Philip Thomas, Gane Ka-Shu Wong, Sean W. Graham and Sarah Mathews.

### A. J. SHARP AWARD (BRYOLOGICAL AND LICHENOLOGICAL SECTION)

*The A.J. Sharp Award is presented each year by the American Bryological and Lichenological Society and the Bryological and Lichenological Section for the best student presentation. The award, named in honor of the late Jack Sharp, encourages student research on bryophytes and lichens.*

**Manuela Dal Forno**, George Mason University, “*Mycobiont cladogenesis triggered by photobiont speciation: A case study of the Rhizonema-Cora lichen symbiosis.*” Co-authors: James D. Lawrey and LRobert Lucking

### EDGAR T. WHERRY AWARD (PTERIDOLOGICAL SECTION AND THE AMERICAN FERN SOCIETY)

*The Edgar T. Wherry Award is given for the best paper presented during the contributed papers session of the Pteridological Section. This award is in honor of Dr. Wherry’s many contributions to the floristics and patterns of evolution in ferns.*

**Dr. Emily Butler Sessa**, University of Florida, “*Exploring potential asymmetric hybridization in a Mediterranean fern complex: the Asplenium*

*obovatum group.*” Co-authors: Maria Vicent and José María Gabriel y Galán

### ISABEL COOKSON AWARD (PALEOBOTANICAL SECTION)

*Established in 1976, the Isabel Cookson Award recognizes the best student paper presented in the Paleobotanical Section.*

**Carla Harper**, University of Kansas, “*Biomarkers in paleomycology – A case study using fungus-infected Permian woods from Antarctica.*” Co-authors: Alison Olcott Marshall, Craig P. Marshall, Thomas N. Taylor, Michael Krings and Edith L. Taylor.

### KATHERINE ESAU AWARD (DEVELOPMENTAL AND STRUCTURAL SECTION)

*This award was established in 1985 with a gift from Dr. Esau and is augmented by ongoing contributions from Section members. It is given to the graduate student who presents the outstanding paper in developmental and structural botany at the annual meeting.*

**Kelsey Galimba**, University of Washington, “*Duplication and divergence of the floral organ identity genes.*” Co-authors: Jesús Martínez-Gomez and Veronica Di Stilio.

### MAYNARD MOSELEY AWARD (DEVELOPMENTAL & STRUCTURAL AND PALEOBOTANICAL SECTIONS)

*The Maynard F. Moseley Award was established in 1995 to honor a career of dedicated teaching, scholarship, and service to the furtherance of the botanical sciences. The award is given to the best student paper, presented in either the Paleobotanical or Developmental and Structural sessions, that advances our understanding of plant structure in an evolutionary context.*

**Stephanie Conway**, University of Melbourne, Australia, “*Surface analysis of cell division in the shoot apical meristem of gymnosperms.*” Co-author: Andrew Drinnan.



GENETICS SECTION STUDENT  
RESEARCH AWARDS

*Genetics Section Student Research Awards provide \$500 for research funding and an additional \$500 for attendance at a future BSA meeting.*

**Carlos I. Arbizu-Berrocal**, University of Wisconsin-Madison, Graduate Student Award (Advisors: Drs. David Spooner and Philipp Simon), for the proposal “*Molecular and morphological studies of wild and cultivated carrot from Turkey, the genus Daucus.*”

**Beck Powers**, University of Vermont, Masters Student Award (Advisor: Dr. Jill Preston), for the proposal “*Genetic building blocks in the evolution of sympetaly: a candidate gene approach.*”

ECOLOGY SECTION  
STUDENT PRESENTATION AWARDS

**Emily Rollinson** (Graduate Student), Stony Brook University, for the paper “*Functional diversity and the assembly of riparian plant communities*” Co-author: Jessica Gurevitch

**Tammy Elliot** (Graduate Student), McGill University, for the paper “*Understanding shifting plant boundary distributions using phylogenetic methods*” Co-author: T. Jonathan Davies

**Hanna Dorman**, Mississippi State University, for the best Graduate Student poster “*Genetic structure of Rhizobia associated with Chamaecrista fasciculata*” Co-author: Lisa Wallace

**Mae Lacey**, for the best Undergraduate Student poster “*Exploring the potential for Solanum fruit ingestion and seed dispersal by rock-dwelling mammals in the Australian monsoon tropics*” Co-authors: Elizabeth Capaldi, Ingrid Jordon-Thaden and Chris Martine

PHYSIOLOGICAL SECTION  
STUDENT PRESENTATION AWARDS

**Vi Bui**, University of Western Ontario, for the paper “*Wood anatomy of Norway spruce and Scots pine under warming and elevated CO<sub>2</sub>*” Co-authors: Zsofia Stangl, Vaughan Hurry, Norman Huner and Danielle Way

**Erika Bucior**, Ithaca College, for the poster “*The physiological responses of Brassica rapa (Fast Plants) to nutrient and drought stress*” Co-author: Peter Melcher

PHYSIOLOGICAL SECTION  
LI-COR PRIZE - PAPER

**Kerri Mocko**, University of Connecticut, for the paper “*Stomatal behavior and integration of functional traits are consistent with climate of origin for co-occurring congeners*” Co-author: Cynthia Jones

PHYSIOLOGICAL SECTION  
LI-COR PRIZE - POSTER

**John A. Huber**, Brigham Young University, for the poster “*Exploring the possibility of photosynthetic plasticity in Agave sensu lato*” Co-author: J. Ryan Stewart

DEVELOPMENTAL & STRUCTURAL  
SECTION STUDENT TRAVEL AWARDS

**Riva Bruen**, University of California at Berkeley (Advisor, Chelsea Specht)

**Kelsey Galimba**, University of Washington (Advisor, Veronica Di Stilio)

ECOLOGY SECTION  
STUDENT TRAVEL AWARDS

**Laura Bogar**, Stanford University (Advisor, Dr. Kabir G. Peay)

**Eric Limbird**, Middle Tennessee State University (Advisor, Dr. Jeffrey Walck)

GENETICS SECTION  
STUDENT TRAVEL AWARDS

**Hanna Dorman**, Mississippi State University (Advisor, Dr. Lisa Wallace)

**Jacob Landis**, University of Florida (Advisor, Dr. Pamela Soltis)

**Brandon Sinn**, Ohio State University (Advisor, Dr. John V. Freudenstein)

PTERIDOLOGICAL SECTION  
& AMERICAN FERN SOCIETY  
STUDENT TRAVEL AWARDS

**Kelsey Cook**

**Benjamin Dauphin**

**Joel Nitta**

## BSA PUBLIC POLICY AWARD WINNERS ATTEND CONGRESSIONAL VISITS DAY

*By Morgan Gostel, Marian Chau, Andrew Pais, and Ingrid Jordon-Thaden*

This year, several BSA members traveled to Washington, DC to speak with elected members of Congress about the importance of federal funding for basic research. The BSA has been participating in the Congressional Visits Day (CVD) since 2012. This event is sponsored by the Biological and Ecological Sciences Coalition (BESC) and held annually in Washington, DC.

Since becoming involved with this event, the BSA's Public Policy Committee has grown, become more active, and expanded its national policy involvement and visibility. Beginning in 2013, the Board of the BSA voted unanimously to sponsor an annual Public Policy Award for students and early career scientists to support travel to and participation in the CVD. This year the Public Policy Award was awarded to one student and one postdoc: Andrew Pais (North Carolina State University) and Dr. Ingrid Jordon-Thaden (Bucknell University), respectively. These awardees have shared their experience, as follows.

We need to engage policymakers more frequently in conversations about the value of federal funding for science, share our work, and communicate its significance regularly. One way to stay informed about science policy is to sign up for bimonthly policy alerts at <http://policy.aibs.org/aibs>, prepared by the American Institute of Biological Science's (AIBS) Public Policy team.

### ANDREW'S EXPERIENCE

When I applied for the BSA Public Policy Award, my hope was to better understand how scientists were participating in the realm of public policy. I was pleased to meet with other scientists who had embedded themselves in various agencies or had joined the ranks amongst political appointees. As part of the first morning's events, I attended a panel hosted by the Ecological Society of America (ESA) and heard from several government employees who started their careers in science and transitioned into public policy. The panel discussion included: Laura Petes, Assistant Director for Climate Adaptation and Ecosystems at the White House

Office of Science and Technology Policy (OSTP); Richard Pouyat, National Program Leader for Air and Soil Quality Research at the U.S. Forest Service; Alexis Erwin, Environmental Sustainability Advisor Bureau for Africa at the United States Agency for International Development (USAID); and Alan Thornhill, Director for Office of Science Quality and Integrity at the U.S. Geological Survey (USGS). Among many other topics, we discussed the importance of embedding ecologists and other non-medical life scientists in all aspects of government—emphasizing the need to put scientists at the table where they haven't normally been expected to participate. I took this point to heart as we trained how to effectively advocate federal scientific policies to our representatives and senators in Congress.

The remainder of the day was spent reviewing aspects of the proposed budget for the National Science Foundation (NSF) in fiscal year 2016. Kei Koizumi, Assistant Director for Federal Research and Development in the White House OSTP, summarized the \$7.7 billion NSF budget proposed to Congress, and CVD participants were also informed about H.R. 1806, a re-authorization bill going through the House of Representatives that would put constraints on how the NSF allocated its funds to certain scientific disciplines not deemed to be “in the national interest.” With the objectives given to CVD participants (to encourage support



*BSA Public Policy Awardee Andrew Pais.*

for the proposed \$7.7 billion for the NSF and not support H.R. 1806), participants divided into teams by state of residence and prepared talking points to deliver to their congresspersons. Besides me, the team representing North Carolina included Kevin Kloeppe, Associate Graduate School Dean and Associate Professor in Western Carolina University; Christine Muth, Biology Instructor at the North Carolina School of Science and Math; and Robert Gropp, AIBS Director of Public Policy and Co-Executive Director. Together we made up an effective team that could communicate how the NSF was vital from an administrator's, teacher's, and student's perspective.

The next day, we first delivered our message to the offices of two Republican senators from North Carolina; we met with legislative assistants in both Senator Burr and Senator Tillis' offices. The staffers were very friendly and receptive to our points. My argument for sustaining a trained workforce in science and technology resonated well with the Senate offices since training and retaining skilled scientists in the Research Triangle Park (RTP) would continue to attract businesses and bring jobs to North Carolina. In particular, I thought my meeting with Senator Tillis' office was very productive. I look forward to meeting with Senator Tillis' legislative assistant again since he is an alum from my home university and will return to North Carolina for the August recess. We may even have the opportunity to schedule Senator Tillis to meet with us and participate in a photo-op at my university.

After our visits with Senate offices, we sat in on an appropriation subcommittee meeting, and then we met with House offices representing North Carolina. Although Republican and Democrat representatives sitting on the subcommittee did not come to a final agreement at the time that we sat in on their meeting over commerce appropriations, the atmosphere in the room seemed very cordial and not at all polarizing as I would have expected. Indeed, every representative office we met greeted us with a respectful and welcoming tone. Of the House of Representative offices we met from North Carolina [Rep. Butterfield (D), Rep. Meadows (R), and Rep. Price (D)], all three responded positively to our message. Although Rep. Meadows did vote in support of H.R. 1806, I still appreciated the courtesy of his office to consider the concerns we had over the reauthorization bill. Not every politician is going to agree with the policies that

**Not every politician is going to agree with the policies that the scientific community largely endorses, but we are better off engaging with everyone so that our message is at least at the table when decisions have to be made.**

the scientific community largely endorses, but we are better off engaging with everyone so that our message is at least at the table when decisions have to be made.

In summary, while many of the policy decisions made in Congress may appear to be predictable along party lines at first glance, I honestly believe there is room for persuasion when making the case for federal funding of pure scientific research. I have personally communicated with my Senator and Representatives on how federal funds have advanced my research and how such research has benefitted North Carolina. I would encourage botanists and all life scientists to contact their elected officials. Many Congressional staffers are well educated and eager to learn more about how your work can benefit their state. However, many of our policy makers are not experts in science, and they are relying on your expertise to guide their decisions. Of everything I observed from this trip, I would just like to reiterate how easy it is to schedule a meeting with your Congressperson. Don't just vote—get your foot in the door at a House or Senate office next time you're near D.C. or your local state capitol. Most political offices regularly host constituent visits, and scientific societies such as the AIBS are glad to coordinate a visit for you. Although travelling to Washington D.C. can be expensive, many scientific societies are now recognizing the importance of connecting scientists with government offices and providing travel awards. I am grateful that the BSA supported my visit to D.C., and I hope others may use this award for future visits with Congress.

### INGRID'S EXPERIENCE

As an Environmental and Public Policy Committee (EPPC) member for American Society of Plant Taxonomists (ASPT), I was asked to

participate in the annual Biological and Ecological Sciences Coalition (BESC) Congressional Visits Day (CVD) in May 2015. (Watch out, I think I am on the road to becoming a political lobbyist considering the number of acronyms in this synopsis!) While still holding onto my lab coat and plant labels, part of my own personal growth is to explore the facets of how I as a scientist can contribute to the decisions being made in the big white, marble buildings of State and Federal offices.

Each year, CVD organizers prepare messages and materials the week before the event. Things change so fast in Washington, D.C., that an agenda for discussion may need to be altered the night before. In total, 29 participants held 54 appointments with Congressional offices from 15 states to advocate for increased federal investments in scientific research. This year we asked members of Congress to support the President's Fiscal Year 2016 Budget Proposal, including \$7.7 billion for the National Science Foundation (NSF)—a \$500 million increase from the 2015 budget and a 3% increase in the Biology Directive.

My team consisted of five CVD participants from Maryland (Charles Fenster from the University of Maryland, College Park), Pennsylvania (myself, Bucknell University), and Virginia (Megan Paustian and Tammy Wilbert from the Smithsonian Institution and Morgan Gestel from George Mason

University). Our morning meetings were kept to the Senate side, bouncing from meetings with Senator Cardin (MD), who met with us briefly while waiting to speak with his legislative assistant, Senator Mikulski (MD), Senator Toomey (PA), and Senators Kaine and Warner (VA). During our afternoon meetings, we met with offices from the House of Representatives, including Congressman Steny Hoyer (MD-5), Congressman Tom Marino (PA-10), and Congressmen Connelly (VA-11) and Beyer (VA-8). During part of the afternoon, our team was divided due to scheduling conflicts. Megan, Morgan, and Tammy met with Representatives from Virginia, while Charlie and I met with Representatives Hoyer and Marino.

Although our meeting with Senator Toomey's office was cut short, due to what seemed to be another urgent appointment, our meeting with Representative Marino, who spoke to us directly between votes, was very engaging. His aide kept him on a minute-by-minute schedule, while I introduced our team, explained briefly why we were there, and thanked him for seeing us personally. Representative Marino got straight to the point, asking each of us, one at a time, to explain why our research is important to voters and why he should be interested in it. I responded with an explanation about a planned field trip to the Appalachian



*BSA Public Policy Team posing with Senator Cardin (MD). L-R: Dr. Ingrid Jordon-Thaden, Morgan Gestel, Dr. Charles Fenster, Senator Cardin, Dr. Megan Paustian, and Dr. Tammy Wilbert.*

mountains of West Virginia to hunt for rare and endemic perennial mustard, *Draba ramosissima*. I explained that, similar to the presence of dragonflies to indicate water quality, certain plant species are sensitive to a declining habitat. If indicator species, such as dragonflies and sensitive mustards, are missing from a habitat, we know that the overall biodiversity of that habitat is low. Low biodiversity leads to a domino effect to other problems in maintaining an ecosystem, including erosion control and water quality. He literally exclaimed “SOLD!” and that he would like to fund this research! I asked him if I could hold him to that and we shared a brief laugh. Representative Marino was excited to hear what we had to say and agreed with most of our points. It was invigorating to have direct communication with Representative Marino, whose vote has direct implications for funding basic research.

Our take-home message resonated well during the CVD meetings. Simply put, the NSF Biology Directorate funds nearly 66% of all basic biology research in the United States, and its importance cannot be understated. The second most critical part of our meetings was to stress the importance of voting “No” to House Resolution 1806 (the America COMPETES Reauthorization Act). This legislation, while reauthorizing the NSF,

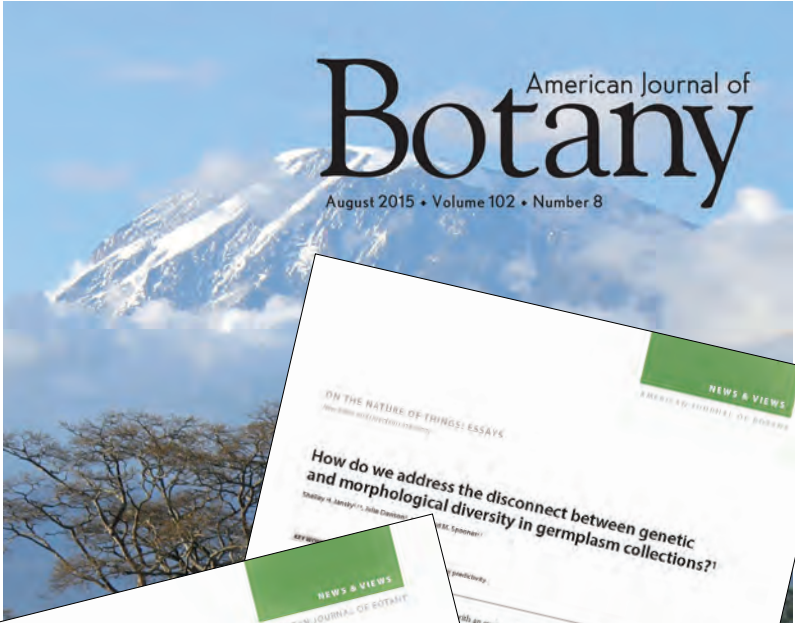
also implements burdensome oversight on the management of NSF funds. An AIBS response letter can be found at [http://www.aibs.org/position-statements/20150421\\_competes\\_reauth.html](http://www.aibs.org/position-statements/20150421_competes_reauth.html). Unfortunately, the House passed HR 1806 the week after our visit on May 20, 2015. Among the Representatives whose offices we met with, only one voted “Aye”—Representative Marino—despite his supportive proclamations during our meeting. We will monitor activity related to similar legislation in the Senate, and we anticipate that the AIBS will update us with Action Alerts to contact Senators regarding America COMPETES in the future.

Congressional politics remain fraught with partisanship and although basic research, by its very essence, is nonpartisan, challenges lie ahead for scientific funding if scientist voices are not heard. If we, as botanists, do not remain informed and aware of the policy that affects our work, we can be assured of only one thing: that we are not a part of legislative conversation. The ASPT EPPC and BSA PPC look forward to continued interaction to best communicate and pursue science policy priorities for our membership. We will be presenting the results of our 2014/2015 public policy surveys, with big announcements regarding their implications for shaping the future of public policy in ASPT and BSA soon!



*BSA Public Policy Team in front of the U.S. Capitol. L-R: Dr. Megan Paustian, Dr. Charles Fenster, Dr. Tammy Wilbert, and Dr. Ingrid Jordon-Thaden.*

# American Journal of Botany Showcases New Features...



# American Journal of Botany

August 2015 • Volume 102 • Number 8

## Highlights

A quick glance at noteworthy articles in this month's issue

### PHYSIOLOGICAL RESPONSES TO ENVIRONMENTAL STRESS: IMPLICATIONS FOR SELF-FERTILIZATION

Under stressful environmental conditions, such as predictable seasonal drought, natural selection may favor plants that can complete their life cycle rapidly. Self-fertilization may be advantageous in these environments since autogamous flowers pollinate have shorter lifespans and set seed more rapidly than their outcrossing relatives. Tucker et al. (p. 962) use two key underlying assumptions of the drought escape hypothesis in Clark: a group with strict task separation in different habitats with divergent mating systems. By characterizing the physiological responses of *C. australis* to seasonal drought in multiple wild populations, the authors found a link between environmental conditions and changes in fitness-related plant physiological performance. This study provides insights into the evolution of selfing in species in habitats where compressed life cycles are advantageous.

Am. J. Bot. 102(8):962-2015 doi:10.3733/ajb.140657

### MULTIPLE ORIGINS OF THE AUTOPOLYPOID GALAXYRIZOCLATA

Autopolyploidy (whole genome duplication within a species) had been considered as a rare and an unimportant evolutionary process. Today, however, researchers recognize its prevalence and that it can serve as an important mode of speciation. *Galaxia* (Dipentelaceae) is one of the earliest recognized autopolyploid taxa with both diploid and polyploid lineages that are morphologically indistinguishable, yet little is known about its polyploid origin. Using flow cytometry and ten microsatellite markers, Servais et al. (p. 973) document the existence of the autopolyploid lineage in the southern USA. This work reveals the independent origins over documented in a polyploid system and provides compelling evidence that autopolyploids can be genetically diverse and therefore play an important role in plant evolution. (Galaxia image by James H. Miller & Ted Fisher, Southern Botanical Society, Bagwood.org)

Am. J. Bot. 102(8):973-2015 doi:10.3733/ajb.140954

### WHAT ARE THE LONG-TERM EFFECTS OF NONNATIVE INVASIVES?

Nonnative plant invasions are a primary ecological threat. While numerous studies have examined the immediate effects of plant invasions, far fewer focus on the longer-term effects. Fry and D'Amatteo (p. 817) argue there is a pressing need for additional longitudinal studies on the effects of plant invasions—understanding how interactions between native and nonnative species may change over time, for example, could be crucial for management strategies in invasion impacts, and suggest research strategies for improving our understanding of long-term invader effects change over time. (Photo shows long-term invasion experiment at Indiana University Research and Teaching Preserve, Bloomington, IN. Photo credit: S.L. Fry)

Am. J. Bot. 102(8):817-2015 doi:10.3733/ajb.150105

## ON THE NATURE OF THINGS: ESSAY

### How do we address the disconnect between genetic and morphological diversity in germplasm collections?

Debbie A. Lambert, Cole Christensen, & J. S. Spehn

NEWS & VIEWS  
AMERICAN JOURNAL OF BOTANY

(Thibaut and McCauley, 1997). Conceptually, neutral molecular markers have become popular because they are thought to more accurately reflect genetic relationships in germplasm collections (Lambert et al., 2008). The genetic relationships in germplasm collections may not provide an accurate picture of their evolutionary history. The number of alleles variation in a species may vary different for neutral markers compared with more informative markers (Hollander et al., 2008). Lambert et al. (p. 962) used two key underlying assumptions of the drought escape hypothesis in Clark: a group with strict task separation in different habitats with divergent mating systems. By characterizing the physiological responses of *C. australis* to seasonal drought in multiple wild populations, the authors found a link between environmental conditions and changes in fitness-related plant physiological performance. This study provides insights into the evolution of selfing in species in habitats where compressed life cycles are advantageous.

Am. J. Bot. 102(8):962-2015 doi:10.3733/ajb.140657

American Journal of Botany 102(8): 815-816, 2015. http://www.aob.org/ © 2015 Botanical Society of America 815

## .....and a New Look!

# Botany

American Journal of

During the celebrations last year for the *American Journal of Botany's* 100th year in publication—which not only featured *AJB* Centennial Reviews in the journal itself, but interviews in the *Plant Science Bulletin* of the *AJB's* most prominent contributors—a question was being raised beyond acknowledging the centennial.

## Where does the journal go from here?

So far in 2015, the answers are evident. With the introduction of Editor-in-Chief Pam Diggle, the *AJB* has added a few new elements to signify that the journal is pushing forward: a new essay feature, a new Highlights section, and a revamped look to the journal itself.

The new essay feature—“On the Nature of Things,” named after the first-century BCE poem “De Rerum Natura” by Titus Lucretius Carus—is the chief component of the *AJB's* revitalized News and Views section. These essays provide succinct and timely insights into multiple aspects of plant science; thus far, topics have included species distributions, parasitism disruption, ecological restoration, plant invasions, conservation genetics, and more. Stay tuned for these articles each month, and feel free to make suggestions to Dr. Diggle at [pamela.diggle@uconn.edu](mailto:pamela.diggle@uconn.edu).

At the same time the essay feature was introduced, the *AJB* began featuring certain articles with its new Highlights feature. This gives readers a way to quickly scan articles of special note in the issue as well as articles that show the breadth of coverage in the journal.

And finally, the journal has a revamped look to match not only the new features, but also the ongoing progressive content of the research articles. The updated fonts and layout give the *AJB* a modern look while retaining the strong elements that have served the *AJB* well over its existence.

Make sure to check out  
the entire breadth of the journal  
at [www.amjbot.org](http://www.amjbot.org)!



# BSA SCIENCE EDUCATION NEWS AND NOTES



By *Catrina Adams,*  
*Education Director*

*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, Education Director, at CAdams@botany.org.*

## PLANTINGSCIENCE KICKS OFF SECOND DECADE WITH LARGEST FALL SESSION EVER

I'm happy to report that PlantingScience, the Botanical Society of America's online mentoring community, is growing by leaps and bounds, thanks to support from BSA members and volunteer scientist mentors, and through joint efforts with our partnering plant societies. We are anticipating our largest session ever for this fall, and expect over 2000 students will participate from over 40 schools in the USA and Canada.

The ideas that were so radical in 2005 when Bruce Alberts issued his challenge for scientific societies like ours to help bring real science and scientists into K-12 classrooms are now starting to get real traction. Teachers around the world are looking for ways for their students to explore their own questions, gain critical thinking and quantitative literacy skills, and break down negative stereotypes of scientists to learn what scientists and science are really like. New assessment tools are being built to evaluate students' ability to combine science practice and content together as scientists do, and standards are shifting to emphasize big ideas and skills (doing science) over terminology and facts (learning about science).

We're entering a new decade with PlantingScience, and it dovetails with this new era in science education. We have a decade head-start

in honing our program to best help teachers bring real plant science to their students, and our ability to take advantage of the current opportunities stems from our outstanding community of teachers and scientist volunteers who have grown the PlantingScience program into what it is today.

## WELCOME TO THIS YEAR'S MASTER PLANT SCIENCE TEAM MEMBERS!

MPST members are sponsored by the PlantingScience partner societies. They commit to extra mentoring and professional development and work more closely with teachers. We are glad to announce that the following BSA-sponsored graduate students and postdocs will be a part of this year's cohort:

Kara Barron, Katie Becklin, Lee Beers, John Bennett, Riva Bruenn, Steven Callen, Keri Caudle, Julia Chapman, Kyle Christie, Taylor Crow, Will Drews, Chloe Pak Drummond, Kate Eisen, Susan Fawcett, Michelle Garcia, Katherine Goodall, Laura Hancock, Claire T. Hann, Julie Herman, Irene Liao, Gwynne Lim, Pamela Millan, Juliet Oshiro, Rhiannon Peery, Megan Philpott, Susan Pruitt, Junoo K. Tuladhar, Kirsten Verster, Evelyn Williams, and Brett Steven Younginger.

## NEW PLANTINGSCIENCE "AGRONOMY FEEDS THE WORLD" THEME UNDER DEVELOPMENT

Starting this fall, PlantingScience will be partnering with the American Society of Agronomy to develop a new, joint investigation module with the theme "Agronomy Feeds the World." We anticipate that the new theme will be ready for testing next fall and ready for teachers to choose the following spring. The new module will help capture a rising demand for real science experiences within high school agriculture classes, and provide a link with food and sustainability and exposure to a broader range of plant science careers for middle and high school science and biology classrooms. If you already volunteer with PlantingScience, this will be an opportunity to help students with something new, and if you are not currently volunteering a mentor, perhaps this new theme will excite you to give it a try.



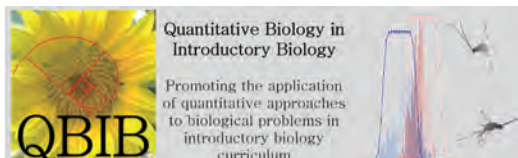


## PLANTINGSCIENCE TEACHER KIM PARFITT RECEIVES PRESIDENTIAL AWARD FOR EXCELLENCE IN MATHEMATICS AND SCIENCE TEACHING

Congratulations to BSA member and Cheyenne Central High School teacher Kim Parfitt, who recently received the prestigious Presidential Award for Excellence in Mathematics and Science Teaching (PAEMST). The annual award is made to outstanding K-12 science teachers from across the country. Kim is a longtime PlantingScience teacher leader, and her video submission for the PAEMST award featured her students participating in PlantingScience's C-Fern investigation, explaining to her all about gametophytes and archegonia. Well deserved, Kim!

## WE'RE LOOKING FOR NEW PLANTINGSCIENCE MENTORS FOR THE UPCOMING SPRING SESSION

As we expand and grow, we are looking for more scientists willing to volunteer as mentors. The time commitment is small, and you can mentor online without leaving your office. Consider joining us for the upcoming spring session (mid-February through mid-April). You can apply at [www.PlantingScience.org/NewMentor](http://www.PlantingScience.org/NewMentor)



## UPCOMING EVENTS

The QUBES (Quantitative Undergraduate Biology Education and Synthesis) group is up and running with a fantastic website featuring many resources you may find helpful for your biology classes, including the ability to run mathematical and statistical software on the QUBES site without local installation. You can find these resources at [qubeshub.org](http://qubeshub.org).

QUBES is also hosting a number of faculty mentoring networks, including one that will launch at November's National Association of Biology Teachers meeting in Providence, RI. If you are planning to attend, please consider applying for the network and representing plant biology.





3<sup>rd</sup> Life Discovery – Doing Science Education Conference has a October 2 deadline for Hands-on Workshop and Short Presentation proposals. The theme is “Creating Connections – Biology in Action,” which focuses on stimulating approaches to Life Science instruction that:

- Connect learning to life science careers in research and practice: What is it like to be a Biologist?
- Connect learning to current events: What is the relevance of Biology?
- Connect learning across institutions and settings: How do we build bridges across education settings?

Hope to see some of you in Baltimore this spring!

PULSE has been working on a certification of undergraduate biology education for the twenty-first century. The group has recently announced a series of “progression levels” for certification. The PULSE certification is intended to motivate important changes in life sciences education across the country. The “progression levels” are intended to be similar to the U.S. Green Building Council’s LEED certification, where organizations can be recognized for certain thresholds of achievement. Eight schools participated in a pilot assessment, and all have made strides towards Vision and Change recommendations in comparison with a traditional biology curriculum, achieving ranks of “PULSE Progression Level I: Beginning” through “PULSE Progression Level III: Accomplished.”

You can learn more about the PULSE certification efforts here:

<http://www.pulsecommunity.org/page/pulse-progression-levels-announced>.

### FROM THE *PSB* ARCHIVES

**60 years ago:** “A new journal, *Virology*, is being published by Academic Press Inc., 125 East 23rd St., New York 10, N. Y. Editors are George K. Hirst (Public Health Res. Institute of New York), Lindsay M. Black (Univ. of Illinois), and S. E. Luria (Univ. of Illinois). Subscription price is \$9.00 per year. “ *PSB* 1(3)

**50 years ago:** Irving W. Knobloch of Michigan State University reported on the Fifth Summer Institute for College Teachers of Botany, held in the summer of 1965. “One hundred and forty-six applied, and 27 were accepted plus two sent to us by the NSF on their foreign-participant program. These participants came from 17 states of the Union and from three foreign countries. Twenty of the 29 had Ph.D. degrees, and the remaining nine had masters’ degrees. The intelligence of the group varied about an unknown, and hence undisclosed, mean, but none of them could be considered subaverage. All were fine, earnest people, anxious for knowledge about the latest advances in the various aspects of botany.” *PSB* 11(3)



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## A WORD FROM THE STUDENT REPRESENTATIVES



*By Jon Giddens, Angela McDonnell,  
and Becky Povilus Student Representatives*

## THE BSA EXECUTIVE BOARD WELCOMES BECKY POVILUS AS THE NEW STUDENT REPRESENTATIVE

The Executive Board of the Botanical Society of America includes two student representatives who are elected by the student membership. Each of the two student representatives serve a two-year term, with a new representative elected each year. The student representative position was first created in 2006 as a way to engage student members of the BSA in the governance of the society. Since 2006, student membership of the society has been represented by nine student members.

This year, we say thank you to Jon Giddens, who rotates off the executive board, and welcome our 10th elected representative, Ms. Becky Povilus of Harvard University. We sat down to talk about her research how she came to be on the executive board.

### **When did you join BSA and what motivated you to do so?**

I joined my first year of grad school, when I started working on my Ph.D. I remember that my advisor (Dr. Ned Friedman) was specifically promoting his own aspiration of a “perfect attendance” record at the annual BSA conference.

### **What motivated you to run for the position of Student Representative to the Board of Directors?**

I hadn’t really thought about running for the position until I started working as part of the team that helps run microMORPH, a research

coordination network that organizes workshops, summer courses, and travel grants to promote research in plant evolution and development. As I got a handle on that, a mentor suggested that I think about being a BSA student rep. Learning how to make an organization work or how to organize a conference/meeting/workshop takes a lot of time, but I think it’s a very useful skill set both in and outside of academia.

### **What is your favorite thing about BSA so far?**

BSA does a really good job of encouraging student participation, especially at conferences. There are a lot of awards you can apply for, to help with travel costs, and everyone is very supportive.

### **What is your research about?**

Broadly, the evolution of seed development in flowering plants. I like thinking about how the developmental processes that take a fertilized ovule and turn it into a functional seed have evolved as a defining part of angiosperm reproduction. As such, my research centers on how endosperm develops and what it is actually doing in a seed. One thing in particular that I am interested in is imprinting and parent-of-origin effects on endosperm development—this is something that has been investigated at the molecular level in only a couple of model angiosperm systems. As part of my dissertation, I’m looking into how imprinting has evolved as an important regulator of endosperm



*Becky Povilus, new BSA Student Representative.*

and seed development in flowering plants.

I'm doing much of this research with the waterlily *Nymphaea thermarum*, which is a really special species. It is a member of one of the earliest diverging angiosperm lineages, is annual, is small, and is relatively easy to grow in a greenhouse (all rare traits among early diverging angiosperms). There are a bunch of other features that make it a good system to work with, but it also has an interesting history: shortly after being described in the late 1980s, it was declared to be extinct in the wild (populations were maintained thanks to people working at Botanischen Gärten der Universität Bonn and Kew). Altogether, it's a great example of why exploring and preserving biodiversity is essential for basic scientific research.

**What sorts of experiences have you had that helped to guide you to the path of your current research interests?**

Other projects not working out have certainly been a big factor. Probably one of the most important moments, however, was Googling “annual miniature waterlily” while looking for an amenable experimental system to work on and learning about *Nymphaea thermarum*. I'm really grateful for the work that people at Kew and Bonn have done to figure out how to grow the *N. thermarum*, and that they made all that information readily available.

**What has been the most challenging part of your research?**

Learning when enough is enough, and figuring out how to design a project so that you can have other people to work on it, too.

**What has been the most rewarding part of your research?**

For day-to-day thrills, nothing is better than getting a sample to look gorgeous under a microscope. And this is going to sound really corny, but no matter how many slides I look at, looking at a new slide for the first time is still like opening a present: you don't know what's there and it might be something really exciting (or it could be that your tissue got destroyed during processing and looks terrible, but that just makes the good samples all the more special, right?).

**Is there anything you know now about being a graduate student that you wish you would have known as an undergraduate student?**

Learn some programming languages! I'm starting to get a handle on some basics for statistical analysis and bioinformatics, but I'm pretty sure that a lot of the more I could do to streamline my data collection/processing.

**What sorts of hobbies do you have?**

I'm not sure if this counts as a hobby, but I spend quite a bit of time trying to figure out how to fit one more plant on my windowsills at home and by my desk. I am also lucky to be based at the Arnold Arboretum in Boston; not only is the lab building on arboretum grounds, but my commute takes me through the collections every day. It's hard to not get distracted by all of the plants and what they are doing throughout the year—I definitely get into lab later when I have a camera with me.

## CONNECT WITH THE BSA

If you are interested in nominating a student to become the next student representative, or if you're a student interested in serving on the board, be sure to look out for the call for nominations in your email from BSA each spring. It's a great opportunity to learn about the Society and to gain a variety of experiences. Duties for the position typically include organizing a couple of events at the annual meeting, writing four newsletters to students, writing several articles for the *Plant Science Bulletin*, and attending two yearly board meetings, one of which happens at the annual meeting. If you have any questions about the position, feel free to contact the student representatives (Angela McDonnell at [angela.mcdonnell@okstate.edu](mailto:angela.mcdonnell@okstate.edu) or Becky Povilus at [rpovilus@fas.harvard.edu](mailto:rpovilus@fas.harvard.edu)) any time. We're always open to hearing your ideas or answering questions! Alternatively, you can connect with us on our Facebook group page by searching for Students of the Botanical Society of America.

## STUDENTS SUCCEED AT BOTANY 2015

We would like to extend a huge “thanks!” to everyone who attended the annual Botany 2015 meeting in Edmonton, Alberta. It was an excellent meeting filled with workshops that enabled attendees to learn about new techniques, including botanical illustration, next generation sequencing techniques, and niche modeling methods. There were also numerous opportunities for networking with our peers at the coffee breaks, banquets, and mixers. Above all, there were many great talks regarding current research, over given by students! A list of award-winning talks and posters can be found in this issue of *Plant Science Bulletin*. Students comprised about a third of attendees and many attended our annual luncheon Monday afternoon and the social and networking event Monday night. Stay tuned for links on the [www.botany.org](http://www.botany.org) website for a link to the presentation given by Dr. Kate Hertweck (University of Texas at Tyler) at the luncheon! We look forward to the next Botany meeting in Savannah, Georgia, July 30-August 3, 2016.





# ANNOUNCEMENTS



## HARVARD UNIVERSITY OFFERING BULLARD FELLOWSHIPS IN FOREST RESEARCH

Annually, Harvard University awards a limited number of Bullard Fellowships to individuals in biological, social, physical, and political sciences and the arts to promote advanced study or the integration of subjects pertaining to forested ecosystems. The program seeks to allow mid-career individuals to develop their own scientific and professional growth by using the resources and interacting with personnel in any department within Harvard University. In recent years Bullard Fellows have been associated with the Harvard Forest, Department of Organismic and Evolutionary Biology, and the J. F. Kennedy School of Government, and they have worked in areas of ecology, forest management, policy, and conservation. Stipends of up to \$60,000 are available for periods ranging from six months to one year and are not intended for travel, graduate students, or recent post-doctoral candidates. Applications from international scientists, women, and minorities are encouraged.

Additional information is available on the Harvard Forest web site (<http://harvardforest.fas.harvard.edu>). Annual deadline for applications is February 1.



# BOOK REVIEWS



## Economic Botany

Midwest Maize: How Corn Shaped the U.S. Heartland..... 110

## Evolution

How the Earth Turned Green: A 3.8-Billion-Year History of Plants..... 111

## History

Fathers of Botany: The Discovery of Chinese Plants by European Missionaries..... 112

## Systematics

A Californian's Guide to the Trees Among Us..... 113

### ECONOMIC BOTANY

#### **Midwest Maize: How Corn Shaped the U.S. Heartland**

Cynthia Clampitt

2015. ISBN-13: 978-0-252-08057-9

Paperback, US\$19.95. 296 pp.

University of Illinois Press, Champaign, Illinois, USA.

As one who has studied the evolution of maize for most of his career, I thoroughly enjoyed this ethno/economical history of the impact of maize cultivation on the “corn belt.” Where others have focused on maize in its heartland (Staller et al., 2006) or maize as a food crop (Fussell, 1992), Clampitt presents an environmental history of corn’s role in the development of the Midwest. The text is well documented with copious endnotes to support additional reading. It is also filled with interesting factoids that will be useful when I next teach economic botany—or introductory botany for that matter.

The first two chapters cover European discovery and the diversification of corn. For instance, it is well documented that maize was part of the original Columbian exchange. I did not know Magellan carried seeds with him on his circumnavigation and introduced maize to the Philippines. I also did not know that the Venetians shipped corn across the Mediterranean to the Middle East from whence it was re-traded to northern Europe as “Turkish wheat.” Both of these events led to early confusion about the center of origin of maize being in Asia.

So where is the “midwest” of the title? This is explained in the next two chapters on settling the Midwest. I was surprised to find that the term

“middle west” was first applied to Kansas and Nebraska shortly after the American Civil War and would only spread to “the great interior region, bounded east by the Alleghenies, north by the British dominions, west by the Rocky Mountains, and south by the line along which the culture of corn and cotton meets” (Lincoln, 1862). (As a native Minnesotan, I always thought of Kansas as being “the west”!) *Midwest* is frequently used as a synonym for the somewhat older term “corn belt.” According to Clampitt, Chicago became the capital of this region by the mid-1850s in large part because of the huge grain elevators built there and the establishment of the Chicago Board of Trade. Corn was now a commodity that helped to feed the northern armies. The Chicago Union Stockyard, home of hogs and corn-fed beef, was established in 1865 as the war ended. The rail center of the country had grain elevators and animal pens dotting its rail lines in all directions.

The development of farming and milling technology is the focus of the next two chapters. Most of the early technological changes involving farm machinery used in other crops were applied equally well to maize. A major difference was harvesting. Even in the 1940s much corn was still being picked by hand. It wasn’t until 1954 that a reliable “corn head” could be attached to a combine that could pick, husk, and shell corn automatically. Food processing consisted only of what home gardeners do today, although done on a much larger scale.

With the exception of a short chapter on popcorn, the next four chapters read like the background to the indie documentary *King Corn*. In today’s food world, corn is invisible and ubiquitous. It is



## EVOLUTION

transformed into chicken, pork, beef, and corn spirits. The invention of wet milling allowed production of corn starch, and from there it was simple chemistry to producing fructose and high fructose corn sweeteners. What more could we ask for? Let's read about methanol or GM corn.

The last five chapters deal with the human culture of corn in the Midwest. It begins with various celebrations of corn, from corn palaces (yes, there were more than just Mitchell, South Dakota) and corn festivals to county, state, and world's fairs (in Chicago, 1893; Omaha, 1898; and St. Louis, 1904). It includes a history of ethnic immigration and its influence on corn cuisine (with a chapter of recipes). The final chapter addresses questions and issues related to the future of corn in the United States. My only question is why Olivia, Minnesota? Why does this small town of a few thousand people, proclaimed "Corn Capital of the World," have "nine seed-research companies, two leading contract seed-production companies, the world's largest seed-corn broker, and an agricultural environmental solutions company...?"

–Marshall D. Sundberg, Professor of Botany, Emporia State University, Emporia, Kansas, USA.

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- Staller, J. E., R. H. Tykot, and B. F. Benz. 2006. *Histories of Maize in Mesoamerica*. Left Coast Press, Walnut Creek, California, USA.

## ***How the Earth Turned Green: A Brief 3.8-Billion-Year History of Plants***

Joseph E. Armstrong

2015. ISBN-13: 978-0-226-06977-7

Paperback, US\$45.00. 576 pp.

University of Chicago Press, Chicago, Illinois, USA

Joseph Armstrong's new book, *How the Earth Turned Green: A Brief 3.8-Billion-Year History of Plants*, is a remarkable volume on the evolutionary history of green life on our planet. It is a thoroughly enjoyable and readable book on what might have been a dry and tedious subject: plant evolution and diversity. I highly recommend this book as a text for a class on green plant evolution or plant diversity, as a reference book on green plant structure and evolution, or as general reading for anyone interested in the topic.

The book, structurally, is laid out in a way typical for a textbook, but that is where the correlation with "typical" ends. It begins with a humorously written preface, and is followed by 11 chapters, a brief postscript, a lengthy appendix, notes, a glossary, references, and an index. All standard stuff, it seems. However, the book is far from standard, and, for a textbook, the content is presented in a unique manner that makes it stand out from the crowd. Material in the text is unapologetically evolutionary in outlook and organization, as should be the case, since evolution is the foundation on which all modern biological science rests. Chapter subtitles and introductory quotations help make each chapter accessible and engaging. The language used throughout is non-technical (insofar as is possible when discussing scientific concepts) and readable, but for the educated (high school biology or college biology), not for those without an understanding of the basics of biological science. In style, the writing is engaging and filled with humor, and the reader is drawn on from one chapter to the next by the building of story upon story, and layer upon layer, of the history of green organisms. Well-executed drawings, as well as photographs, charts, and graphs, all serve to clarify terminology and concepts as they are introduced in the text, which adds to the accessibility of the information being presented.

Beginning with the basics (how science works, evolutionary principles, plate tectonics, biogeography, ecology, taxonomy/nomenclature, origins, cosmology, etc.), the discussion progresses through organizational levels and phylogenetic strata to end at the present-day diversity of green organisms on our planet and how we interact with plants. Along the way, Armstrong discusses the structure of green organisms and their evolutionary relationships, physiology, reproduction, and biogeography. Coverage of technical details in the chapters themselves, while not as deep as might be found in older plant morphology texts such as those of Bold (1973) or Foster and Gifford (1974), is certainly deep enough that the reader comes away with a fundamental understanding of the natures of the groups under discussion, and it is all presented in a manner that is not plodding and pedantic, but more fluid and holistic. Some of the details are saved until the end, in a very comprehensive appendix.

The chapters in the book build on one another, beginning with bacteria and archaea, progressing through endosymbiosis and early eukaryotes to “algae” and life in oceans. Then follow chapters on the invasion of land, including structural and reproductive changes necessary for that to occur; pioneer organisms; and the rise of flowering plants. Along the way, the reader learns about many topics, including (to name a few) such basic things as what defines a plant, symbiosis, photosynthesis and the origin of chlorophyll, stromatolites, unicellularity and multicellularity, bryophytes, vascularity, the origin of seeds, and that ever-popular topic, sex. To me, the appendix at the end of the book, which covers lineages of green organisms (except angiosperms!), is the meat on the bones of the 11 chapters that precede it, and gives the book its status as a textbook. Here are presented the details that will give a budding botanist a foundation for growth in the science.

One of the things that makes this book a success is the joy with which Armstrong discusses plants. His stated goals for the book include combating “plant-blindness,” and he accomplishes this with great success. He strives to get the reader beyond an “angiosperm-centric” view of plants by helping the reader obtain “a more sophisticated perspective” of what the green organisms of our planet are all about. The book is full of things we, as botanists, may think of as common knowledge. These things should be more widely known among the general populace so that our planet and the organisms that

inhabit it can continue; this text works to make that happen.

–Michael A. Vincent, *Department of Biology, Miami University, Oxford, Ohio, USA. vincenma@miamioh.edu*

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- Foster, A. S., and E. M. Gifford Jr. 1974. *Comparative Morphology of Vascular Plants*, 2nd ed. W. H. Freeman and Co., San Francisco, California, USA.

## HISTORY

### ***Fathers of Botany: The Discovery of Chinese Plants by European Missionaries***

Jane Kilpatrick

2015. ISBN: 978-0-226-20670-7

Cloth, US\$60.00. 224 pp.

University of Chicago Press, Chicago, Illinois, USA

The evergreen subject of botany or the study of plants has fascinated human minds and imaginations through the ages. The knowledge of plants and their intricate relationship with humans has been studied by several pioneering and brilliant minds during different phases of the history of botanical research, expeditions, and explorations. The contributions of both professional and amateur botanists in remote corners of the globe must be remembered by modern-day plant scientists, academics, and researchers with due respect for the unimaginable hardships and obstacles that these pioneers endured during their working life. Their dedication in collecting plant samples; drawing high-quality images of exotic specimens; preparing biogeographical maps revealing the distribution of plant species from specific regions; documenting the detailed descriptions and potential economic importance of plant species; and preparing classical descriptive studies on plant morphology and anatomy, taxonomic treatments, and identification keys has provided the basic foundation of the subject of botany to which modern plant science research is heavily indebted.

Some of the first botanists to enrich the subject and to introduce several of the currently globally celebrated ornamental and horticultural species

of plants from China were the French Christian missionaries. These French missionaries were the first serious plant explorers to travel, explore, collect, and document plants from China and to introduce these species to European gardens through their painstaking collection of seeds during the second half of the 19th century. The author has highlighted this period in botanical history through the contributions of four famous French missionaries and pioneering botanists who are recognized as “fathers of botany”—namely, Pères Armand David, Jean Marie Delavay, Paul Guillaume Farges, and Jean André Soulié. She has also documented the contributions of several other French and European priests and missionaries, as well as the German Protestant pastor Ernst Faber, for their seminal work in collecting specimens and data on Chinese plants and introducing these plants to the West and to Western botanical scholars.

Their contributions have changed the dynamics of botany and enriched the lives of countless plant lovers, botanists, horticulturists, and researchers across the globe. The author has meticulously organized the volume with documentation (possibly the first of its kind) on the lives and contributions of these nearly forgotten early pioneers. In doing so, she vividly describes that age in relation to the sociocultural history of China and presents the opportunities and challenges that emerged with it. She has drawn a fairly accurate picture of the constant hardships, struggles, and obstacles these pioneers endured in exploring the plant resources of China following the post-1842 Opium War treaty that opened China to the European missionaries. The efforts of these men to successfully introduce several species of the Chinese flora to Europe are described in lucid language that allows readers to visualize the history as it unfolds.

The volume includes more than 250 color plates, covering spectacular images of plants; biogeographical maps; original illustrations and maps prepared by early pioneers; original herbarium specimens of the period; mind-blowing photos of the different ecological habitats and biomes within China explored by the pioneers; and archival images of several pioneer botanist-missionaries, priests, pastors, clergymen, and the botanical regions they visited and explored. The volume not only captures the exploits of the pioneer botanist-missionaries in China, but also nicely portrays the sociocultural flavor of China during that period.

The current volume is divided into 17 chapters, along with a nice introduction, exploring the life and work of these missionaries in China; events are presented chronologically. Also included are a list of short biographies of the botanists and explorers covered in the volume; a gazetteer that provides the current and old names of different geographic locations of China discussed in the volume; and three handy appendices—Sources and General Bibliography, Notes and References, and a comprehensive index to aid serious researchers who wish to dig further.

The current volume presents an age that has been nearly forgotten. The author explores this history through published articles and reports, personal letters, rare and old travel journals, botanical magazines, and government and/or official documents. The volume will be a useful reference for both undergraduate- and graduate-level students in botany, plant sciences, forestry, horticulture, and economic botany.

–*Saikat Kumar Basu, University of Lethbridge, Lethbridge, Alberta, Canada*

## SYSTEMATICS

### ***A Californian's Guide to the Trees Among Us***

Matt Ritter

2011. ISBN-13: 978-1-59714-147-5

Paperback, US\$18.95. 192 pp.

Heyday Books, Berkeley, California, USA

The urban landscape is an underutilized classroom for botany. As a recent transplant to California, I am often stymied when students ask about common street trees in the area. Despite well-curated floras and field guides for native and naturalized plant life, similar resources for street trees are often lacking—particularly guides that are not restricted to a single city and that balance scientific rigor with ease and enjoyment of use.

*A Californian's Guide to the Trees Among Us* expertly fills this need. Detailed yet accessible entries feature 150 of the most commonly planted species in the state. This book is a cornucopia of information that is accessible to the novice enthusiast or most devoted urbanite yet will also be interesting to the professional botanist.

Each page usually represents a single species or a collection of related species that are commonly planted street trees in California. A header introduces the scientific name (with its etymology, pronunciation, and most recognized synonyms), botanical family, most typically used common name, native range, and mating system. Following the header is a paragraph that notes distinguishing features along with other interesting information such as ecology, phenology, economic and other human uses, and distribution within California. Finally, beautiful color photos at several scales visually reinforce the written description, distinguishing features of each tree such as habit, bark, fruit, flowers, cone, and leaves.

These descriptions form the core of the book but by no means are its only merit. I was particularly impressed with the dichotomous key at the beginning of the book. Clear and concise, it relies greatly on vegetative characters although fruits or flowers may be necessary for a complete ID. Moreover, the keys are forgiving of human error. For example, you can still correctly identify *Casuarina* even if you misinterpret the slender green branchlets as leaves or determine that leaves are absent all together. The key also includes several dozen less-common species that do not have complete entries but may be encountered nonetheless. I tested this key using 10 randomly selected street trees from around the San Francisco Bay area. Eight of the plants I keyed successfully, one was not included in the book (*Solanum rantonnetii*), and one was not in the proper phenological stage for identification.

Sprinkled throughout this book are other gems: Tree-related quotes are offered like small but inspirational after-dinner mints. Several top 10 lists rate which trees are California's showiest, largest, most common along roadways, show the best fall color, or (importantly) most likely to trip you on the sidewalk. Through science, humor, and the arts, the author's goal of fostering a holistic appreciation and reverence for trees shines through.

Like any work, this book is not without flaws. For example, treating palms in a separate section from the angiosperms may be convenient for perusing photos, but it unnecessarily obscures the evolutionary relationships. Aside from a list buried on page 9, discussion of native trees appropriate for an urban or suburban environment is absent. Such a discussion, perhaps as an appendix, would have been an excellent opportunity to connect the urban, natural, and historical treescapes of

California. However, such criticisms are minor and do not detract from this overall informative and enjoyable field guide. Photographer George Cedric Wright wrote, "What man may acquire from trees is immeasurable." This book is the scythe with which one may begin to reap such a harvest—a tool I wholeheartedly recommend to anyone in or near California who is interested in better understanding and appreciating the literal "urban jungle."

—Adam C. Schneider, Jepson Herbarium and Department of Integrative Biology, University of California, Berkeley, California, USA. [acschneider@berkeley.edu](mailto:acschneider@berkeley.edu)

### **The Plants of Sudan and South Sudan: An Annotated Checklist**

Iain Darbyshire, Maha Kordofani, Imadeldin Farag, Ruba Candiga, and Helen Pickering (editors)

2015. ISBN-13: 978-1-84246-473-1

Paperback, US\$125.00. 400 pp.

Kew Publishing, Royal Botanic Gardens, Kew, Richmond, Surrey, United Kingdom

Preliminary to a full flora of a region, a complete, synonymized checklist provides a useful guide to the species present. It can have varied applications beyond establishing a baseline for professional taxonomists. Gentry (1978: 148) points out that "[a]n accurate checklist of plant species is exceedingly useful to non-taxonomists wishing to identify the plants of an area. Such species checklists can greatly facilitate land use planning, for example, in selection of critical areas to be preserved as forest preserves and national parks."

This collaboration between the Royal Botanic Gardens, Kew, the University of Khartoum, and the University of Juba updates F. W. Andrews' *Flowering Plants of the Anglo-Egyptian Sudan* initiated 65 years ago (vol. 1, 1950—vol. 3, 1956). Former Sudan, the *largest country in Africa* before the secession of *South Sudan*, contains a varied *ecology and biodiversity* that ranges from extremely arid and semiarid in the north to the Sudd wetlands in South Sudan, providing habitats for myriad species.

The Sudan checklist was developed through literature searches, relying primarily on the completed floras of adjacent regions: the Flora of Ethiopia and Eritrea and the Flora of Tropical East Africa, along with reference to select herbarium

specimens. The most extensive historical herbarium collections from Sudan are held at Kew and the Natural History Museum, London; some recent herbarium collections are housed at the University of Khartoum.

The contents are organized as follows: (1) a 7-page introduction to Sudan's geography, climate, and regional vegetation; (2) a 14-page historical review about the early exploration of Sudan, portraying the principal plant collectors in the region; (3) explanatory notes; (4) a bibliography (6 pp.) and index (12 pp.); (5) a preliminary list of potentially threatened plant species, along with an assessment of the status of exploration in each region; and (6) the inventory, by far the central contribution of the book. Each species is listed with selected synonyms, habitat, and collection-based geographic range. The arrangement is alphabetical by the botanical rank of order, monocotyledons first, followed by dicotyledons. However, within each order, the sequence of families does not always appear to follow either the Angiosperm Phylogeny Group (Stevens, 2001 onwards) or alphabetical order; it is unclear to this reviewer what plan is being used. Arrangement of families by taxonomic order may seem sensible for an audience of users who are strictly taxonomists or evolutionary botanists who understand those contiguous relationships; however, for an audience of generalists, an alphabetical arrangement by family name might make searching more effortless, enabling the client unfamiliar with higher-order taxonomic relationships to more readily locate the group of interest without using the index. As molecular phylogenetic analyses provide fresh evidence, hypotheses regarding the relatedness of taxonomic groups are ever more fluid and evolving. Arrangement by family in alphabetical order might be a more stable organizing principle, as was used for the Bolivia checklist (Jørgensen et al., 2014).

Done properly, checklists—the results of protracted field surveys and lengthy library research—can provide important, current, baseline information for the appraisal of potentially endangered, restricted taxa. However, checklists may be biased by the recorders' selection of sources or a decision to settle on one perceived expert, without searching further. That is apparently what happened in some treatments. For example, the editors' own stated procedures were not followed in the following case. On p. 53, they assert that: "We have attempted to use the most recent taxonomic works available" and "In

general, we have followed the accepted names and synonymy in the African Plant Database." However, in the case of Pedaliaceae, neither practice was adhered to. The source turned to for nomenclature (Ihlenfeldt, 2006) uses the Latin binomial *Sesamum orientale* L. for the crop plant sesame, although the more widely used synonym *S. indicum* L. has been conserved over the former name (McNeill et al., 2006). Admittedly, that reference was written by an acknowledged specialist, but it is unfortunate that the editors failed to search the latest literature. More editing and reviewing should have occurred by this point in time, here as well as for the Bolivia checklist (Jørgensen et al., 2014), as such errors can become quite persistent in the literature. While an attempt was made to consult family specialists in a few cases, it would be beneficial to invite consultants to check those details for each family.

Another conundrum for this reviewer as regards the entry about sesame is to understand the meaning of the phrase: "Native of India and Africa (not Sudan)." "Native" species are widely understood to be those that occur within political borders before outside contact, prior to transfer as a result of human influence. Because the object is a cultivated plant, the focus ought to be its center of origin (i.e., place of domestication). Therefore, the wording, which evokes a vast geographic region spanning two continents, is baffling and unlikely. Alternatively, one might simply point out that sesame has been widely cultivated across the tropics for centuries.

Overall, this checklist may be useful for ecologists, taxonomists, and researchers interested in biodiversity evaluation, as well as for the layout of conservation reserves and for projecting the effects of climate change on species distributions. An updated, accurate, and comprehensive checklist was needed to provide a baseline for future botanical and conservation work in the Sudan region. Given that the world's biological diversity is increasingly endangered by human activities, the need for a database that enables researchers to conduct thorough surveys efficiently is obvious. I am eagerly awaiting the publication of the full flora as a follow up, and would be delighted to contribute to that work. Optimistically, its preparation should also spur further botanical studies in the Sudan region.

–Dorothea Bedigian, Missouri Botanical Garden, St. Louis, Missouri, USA

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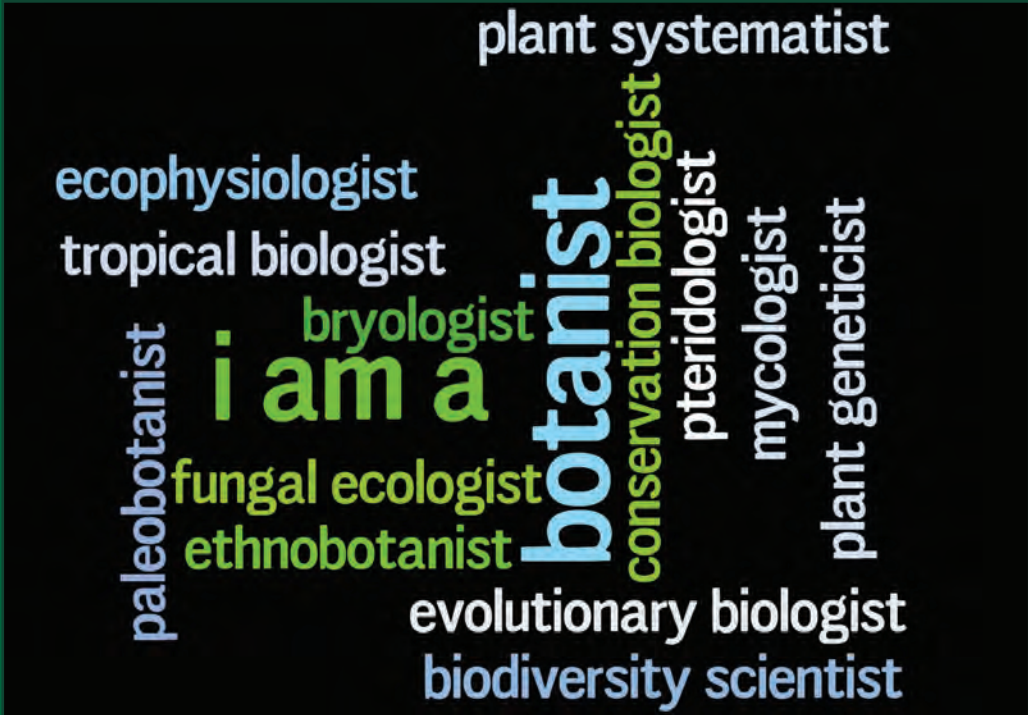
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