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Thriving with Diversity

Botany

2018

July 21-25
Rochester, Minnesota

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From the Editor

Greetings,

In this summer issue of *Plant Science Bulletin*, you will find lots of important Society News. We have information about the upcoming Botany 2018 meeting in Rochester and the traditional pre-conference list of award winners and election results. I am also happy to bring you this year's reports from the annual Congressional Visits Day.

I want to draw your attention to a special feature in this issue. One of the most important things many of us do is publish scientific articles; publishing is how we communicate new knowledge and, for many of us, how we prove our worth to tenure committees and grant panels. However, publishing can be fraught with challenges. In this issue, Theresa M. Culley addresses the danger of predatory publishing and tips for avoiding inadvertently submitting your work to questionable journals.

If you would like to discuss these issues, as well as other strategies for successful publishing, please note that there will be a discussion session on publishing held on Sunday, July 22 in Rochester, MN.

See you in Rochester!



Mackenzie

PLANT SCIENCE BULLETIN Editorial Committee Volume 64



**Kathryn LeCroy
(2018)**

*Environmental Sciences
University of Virginia
Charlottesville, VA 22904
kal8d@virginia.edu*



**Melanie Link-Perez
(2019)**

*Department of Botany
& Plant Pathology
Oregon State University
Corvallis, OR 97331
linkperm@oregonstate.edu*



**Shannon Fehlberg
(2020)**

*Research and Conservation
Desert Botanical Garden
Phoenix, AZ 85008
sfehlberg@dbg.org*



**David Tank
(2021)**

*Department of Biological
Sciences
University of Idaho
Moscow, ID 83844
dtank@uidaho.edu*



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SOCIETY NEWS

BSA 2018 Election Results



President-Elect
Linda Watson
University of Oklahoma



Secretary
Rachel Spicer
Connecticut College



Director-at-Large Education
Chris Martine
Bucknell University



Student Representative
Ya Min
Harvard University

BSA AWARD WINNERS

Dr. Madelaine Bartlett

Receives BSA Emerging Leader Award



Dr. Madelaine Bartlett, University of Massachusetts–Amherst, is a strongly dedicated scientist, driven by her multi-disciplinary research on plant evolution and development with particularly strengths in molecular and genomic evolution, plant developmental genetics, and comparative and experimental plant evolutionary biology. Her research uniquely combines these various focal areas of expertise, making her one of the top plant evolutionary and developmental geneticists of her generation.

Bartlett is fearless in developing cutting-edge research designed to understand fundamental processes in plant development and genetic evolution, that ultimately play a key role in plant adaptation and diversification. Through her research, teaching and mentoring, and outreach, Bartlett has positioned herself to have a major impact on the future of scientific research and education in botany, plant evolution, and developmental biology. Her scholarship, creativity, energy, and drive make her the ideal embodiment of a BSA Emerging Leader.

Dr. Lena Struwe Receives Charles Edwin Bessey Teaching Award

The 2018 recipient of the Bessey Award is Dr. Lena Struwe (Rutgers University). The following people praised Struwe for her accomplishments:

“In my opinion, the energy that Lena Struwe has expended on teaching botany to people of all ages (and the success she has had in her efforts) is unparalleled. I can’t imagine there being a person who is more deserving of the Bessey Award.” - Dr. Christopher Martine

“Lena views herself as a learner and participates in communities that support educators. She reflects on her teaching experiences and adapts her courses to meet developing educational needs. She has demonstrated herself as an excellent and effective educator in specific courses, in face-to face public outreach, and with her online presence.” - Jennifer Blake-Mahmud



“There cannot be anyone more deserving of the Bessey Award than Lena Struwe, who has inspired me and many others with her passion and creativity for many years. When I was preparing to teach Plant Systematics, Lena is the person I reached out to for ideas and guidance, because she epitomizes what I would like to be as a teacher. I can only hope to have a fraction of her influence on her students, colleagues, and the public. She is everything that is exceptional and desirable about a teacher—brilliant, positive, creative, engaging, generous, supportive, effective—the entire package.” - Dr. Amy Litt

BSA Public Policy Award

The Public Policy Award was established in 2012 to support the development of of tomorrow's leaders and a better understanding of this critical area. The 2018 recipients are:

Tanisha Williams, Ph.D. Student, University of Connecticut

Timothy Batz, graduate student, California State Polytechnic University

The J. S. Karling Graduate Student Research Award

Rebekah Mohn, University of Minnesota (Advisor: Dr. Ya Yang), for the proposal: *Dissecting the Evolutionary History of North American Sundews (Drosera, Droseraceae)*

Ecology Section Student Travel Award

Francesco Martini, Guangxi University (Advisor: Dr. Uromi Goodale), for the presentation: *Forest regeneration in a subtropical forest: factors shaping seedling community along elevation*

The BSA Graduate Student Research Awards

Jared Beck, University of Wisconsin-Madison (Advisor: Dr. Donald Waller), for the proposal: *Do natural enemies regulate herbaceous plant diversity? Examining patterns of distance- and density-dependent mortality in temperate forests*

Taylor Chae, Miami University (Advisor: Dr. Richard Moore), for the proposal: *Differential gene expression in Carica papaya associated with reverse sexual transition from dioecy to hermaphroditism*

Joseph Charboneau, University of Arizona (Advisor: Dr. Michael Sanderson), for the proposal: *Verifying and screening for chloroplast genome inversions in New World Astragalus (Fabaceae)*

Katherine Culatta, North Carolina State University (Advisor: Dr. Alexander Krings), for the proposal: *Taxonomy, Population Genetics, and Status Assessment of Nuphar sagittifolia (Walter) Pursh (Nymphaeaceae)*

Aayudh Das, University of Vermont (Advisor: Dr. Jill Preston), for the proposal: *Testing the influence of extrinsic versus intrinsic factors on the evolution of grass stress tolerance*

Andrea Fetters, University of Pittsburgh (Advisor: Dr. Tia-Lynn Ashman), for the proposal: *Pollination gone viral: pollinators as novel agents of plant pathogen transmission*

Mahboubeh Hosseinalizadeh Nobarinezhad, Mississippi State University (Advisor: Dr. Lisa Wallace), for the proposal: *Fine-scale genetic structure in rhizosphere microbial communities associated with Chamaecrista fasciculata (Fabaceae)*

Stacy Jorgensen, University of Arizona (Advisor: Dr. Mark Beilstein), for the proposal: *Transcriptomic desiccation response in diploid and polyploid xerophytic species of Selaginella subg. Rupestrae*

Christopher Krieg, University of Florida (Advisor: Dr. Emily Sessa), for the proposal: *How understanding the evolution of physiological traits and environmental niche can help save the world's most threatened plant group*

Katherine Kucera, Northwestern University and the Chicago Botanic Garden (Advisor: Dr. Andrea Kramer), for the proposal: *Characterizing genetic changes in the production of multi-source seed lots in Penstemon pachyphyllus*

Kali Mattingly, The Ohio State University (Advisor: Dr. Steven Hovick), for the proposal: *Assessing the extent of hybridization between the invasive species Lythrum salicaria (purple loosestrife) and the horticultural species L. virgatum*

Samuel McCauley, University of Idaho (Advisor: Dr. David Tank), for the proposal: *Biogeographically-mediated evolution and diversification of Thalictrum (Ranunculaceae)*

Juan Isaac Moreira Hernandez, University of Missouri-St. Louis (Advisor: Dr. Nathan Muchhala), for the proposal: *Interspecific pollen transfer and gene flow during the rapid diversification of Neotropical bat-pollinated bellflowers (Campanulaceae: Burmeistera)*

Kirsten Nolting, University of Connecticut (Advisor: Dr. Kent Holsinger), for the proposal: *What makes a 'biodiversity hotspot' hot? Trait-mediated species coexistence in seedling communities in a fire-driven ecosystem*

Lindsey Riibe, University of Florida (Advisor: Dr. Emily Sessa), for the proposal: *Phylogeny & biogeography of endemic ferns in a biodiversity hotspot*

Gabriella Rossetto, Pennsylvania State University (Advisor: Dr. Peter Wilf), for the proposal: *Araucarian conifer fossils of Eocene Patagonia may reveal an Australasian rainforest connection*

Aniket Sengupta, University of Kansas (Advisor: Dr. Lena Hileman), for the proposal: *Of central importance: control of carpel zygomorphy in tribe Antirrhineae by CYCLOIDEA-RADIALIS interaction*

Shengchen Shan, Florida Museum of Natural History (Advisor: Dr. Doug Soltis), for the proposal: *Developmental and genetic dynamics of the inflorescence in reciprocally formed allopolyploid Tragopogon miscellus (Asteraceae)*

Mathew Sharples, University of Colorado-Boulder (Advisor: Dr. Erin Tripp), for the proposal: *Investigating the Origins of Apetaly in the Cosmopolitan Genus Stellaria L. (Caryophyllaceae)*

Genetics Section Student Travel Awards

Yi Huang, University of California-Riverside (Advisor: Dr. Amy Litt), for the presentation: *Genetic Variation and habitat differentiation in a group of taxonomically difficult plants: Arctostaphylos glandulosa (Ericaceae)*

Shujun Ou, Michigan State University (Advisor: Dr. Ning Jiang), for the presentation: *The genomic composition and domestication of Asian rice revealed by 3,400 rice genomes*

Serena Macias, University of Missouri-St. Louis (Advisor: Dr. Christine Edwards), for the presentation: *Phylogenomics of Passiflora sect. Decaloba reveals strong biographic structuring of clades*

Kali Mattingly, The Ohio State University (Advisor: Dr. Steve Hovick), for the presentation: *Assessing the extent of hybridization between the invasive species Lythrum salicaria (purple loosestrife) and the horticultural species L. virgatum*

Vernon I. Cheadle Student Travel Awards

(BSA in association with the Developmental and Structural Section)

This award was named in honor of the memory and work of Dr. Vernon I. Cheadle.

Glen Morrison, University of California-Riverside (Advisor: Dr. Amy Litt) for the Botany 2018 presentation: “Testing the utility of morphological traits in delimiting a variable subspecies group, the *Arctostaphylos glandulosa* complex.” Co-authors: Yi Huang, Natalie Saavedra, Thomas Stoughton, Dylan Burge, V.T. Parker, and Amy Litt

Farahnoz Khojayori, Virginia Commonwealth University (Advisor: Dr. Wenheng Zhang) for the Botany 2018 presentation: “CYC2-like genes elucidate floral symmetry evolution following a major biogeographic disjunction.” Co-authors: Jingbo Zhang, Elena Kramer, Charles Davis, and Wenheng Zhang.

The BSA Young Botanist Awards

The purpose of these awards is to offer individual recognition to outstanding graduating seniors in the plant sciences and to encourage their participation in the Botanical Society of America. The 2018 “Certificate of Special Achievement” award recipients are:

Shayda Abidi, Humboldt State University (Advisor: Dr. Mihai Tomescu)

Nicholas Drews, Eastern Michigan University (Advisor: Dr. Margaret Hanes)

Caroline Edwards, Oberlin College (Advisor: Dr. Michael Moore)

Michelle Gaynor, University of Central Florida (Advisor: Dr. Eric Hoffman)

Georgia Hann, Connecticut College (Advisor: Dr. Chad Jones)

Dan Hayes, Bucknell University (Advisor: Dr. Chris Martine)

Laban Kayitete, Arizona State University (Advisor: Dr. Kathleen Pigg)

Mae Lacey, Bucknell University (Advisor: Dr. Chris Martine)

Hanna Makowski, St. Mary's College - Notre Dame (Advisor: Dr. Cassie Majetic)

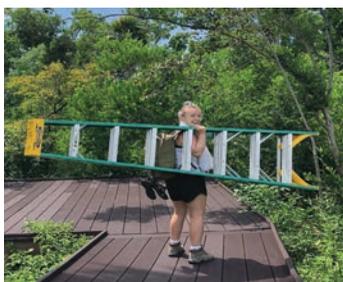
Mallory Malecek, South Dakota State University (Advisor: Dr. Maribeth Latvis)

Sarah McDonald, University of Guelph (Advisor: Dr. Christina Caruso)

Kelly Pfeiler, Humboldt State University (Advisor: Dr. Mihai Tomescu)

Pasteur Magine Uhaweniman, Arizona State University (Advisor: Dr. Kathleen Pigg)

Andrea Wallace, Hillsdale College (Advisor: Dr. Ranessa Cooper)



The BSA PLANTS Grant Recipients

The PLANTS (Preparing Leaders and Nurturing Tomorrow's Scientists: Increasing the diversity of plant scientists) program recognizes outstanding undergraduates from diverse backgrounds and provides travel grants and mentoring for these students.

- Liliana Benitez**, New College of Florida (Advisor: Dr. Emily Saarinen)
John Christman III, Christopher Newport University (Advisor: Dr. Janet Steven)
Inesha Ellis, Widener University (Advisor: Dr. Katherine Goodrich)
David Flanery, South Dakota State University (Advisor: Dr. Maribeth Latvis)
Andrew Gonzalez, California State University - Sacramento (Advisor: Dr. Clayton Visger)
Alexis Kantor, University of Colorado-Boulder (Advisor: Dr. Stacey Smith)
Carina Motta, University of California-Santa Barbara (Advisor: Dr. Susan Mazar)
Simone Oliphant, Florida International University (Advisor: Dr. Suzanne Koptur)
Asa Peters, Connecticut College (Advisor: Dr. Chad Jones)
Megan Rasmussen, SUNY-Farmingdale (Advisor: Dr. Eric Morgan)
Keana Tang, California State University - Long Beach (Advisor: Dr. Amanda Fisher)
Nicole Tineo, The College of New Jersey (Advisor: Dr. Wendy Clement)
Matthew Treanor, Plymouth State University (Advisor: Dr. Diana Jolles)
Delecia Utlej, Howard University (Advisor: Dr. Janelle Burke)

The BSA Developing Nations Travel Grant Recipients

- N. Ivalu Cacho**, Instituto de Biología, UNAM, Mexico
Eliezer Cocoltzi, Universidad Veracruzana in Xalapa, Mexico
Orlando Adolfo Jara, Jardín Botánico de Bogotá, Columbia
Satish Khadia, S.D.Agricultural University, India
Nicholas Le Maire, University of Stellenbosch, South Africa
Viviana Londoño Lemos, Universidad de los Andes, Columbia
Maria Laura Pipo, INIBIOMA (UNCo-CONICET), Argentina
Boni Souleymane, University of Parakou, Benin

The BSA Professional Member Travel Grant Recipients

- John Chau**, University of Johannesburg, South Africa
Verónica S. Di Stilio, University of Washington
Jaime Fagundez, University of A Coruña, Spain
Joseph Gallagher, University of Massachusetts-Amherst
Ed McAssey, University of Georgia
Erik Nilsen, Virginia Tech
Tilottama Roy, Western Missouri State University
Adam Schneider, University of Toronto-Mississauga, Canada
Laura Skates, University of Western Australia, Australia
Evelyn Williams, Chicago Botanic Garden

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.

Danielle Black, University of California-Santa Barbara (Advisor: Dr. Scott Hodges), for the proposal: *Identifying the genetic basis of serpentine adaptation in Aquilegia eximia*

Sarah Carey, University of Florida (Advisor: Dr. Stuart McDaniel), for the proposal: *Developing near-universal sex-linked markers for mosses*

Developmental & Structural Section Student Travel Awards

Amanda Katzer, University of Kansas (Advisor: Dr. Emily Sessa), for the presentation: *How understanding the evolution of physiological traits and environmental niche can help save the world's most threatened plant group*

Dustin Ray, University of Connecticut (Advisor: Dr. Cynthia Jones), for the presentation: *Mechanical and physiological traits do not trade off in petioles*

Cecilia Zumajo, New York Botanical Garden (Advisor: Dr. Barbara Ambrose), for the presentation: *Expression and functional studies of basal eudicot REPLUMLESS homologs during flower and fruit development*

Triarch “Botanical Images” Student Travel Awards

This award provides acknowledgement and travel support to BSA meetings for outstanding student work coupling digital images (botanical) with scientific explanations/descriptions designed for the general public.

FIRST PLACE



Rebekah Mohn
University of Minnesota
“Dewy Tentacles”

Glandular trichomes, specialized hairs that excrete mucus, cover the leaf of insect-eating sundews like this *Drosera menziesii*. Insects become stuck to the gooey liquid excreted at the tip of each trichome. Once the plant detects the insects by the combination of movement and chemical changes in the mucous, the leaf and trichomes wrap like tentacles around the insects. The presence of an insect also triggers the hairs to begin to excrete proteins like chitinases, which can break down the insect's body to absorb their nutrients. This provides the plant with nitrogen and phosphorous which are often limited in the soils were these species grow.

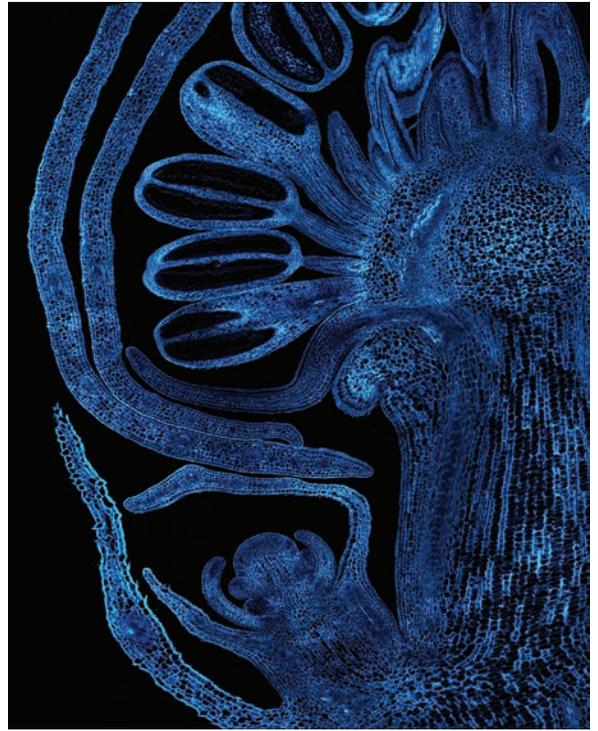
SECOND PLACE

Ya Min

Harvard University

“Floral Morphogenesis”

Plants generate new organs continuously throughout their entire life spans. Floral organs are made from a group of stem cells located in the floral meristems, and new floral meristems are produced by the flanks of flower-subtending leaves (bracts). Because plant cells are bounded by cell walls, we can trace back every cell division that have occurred during the process of making a flower from a floral meristem.



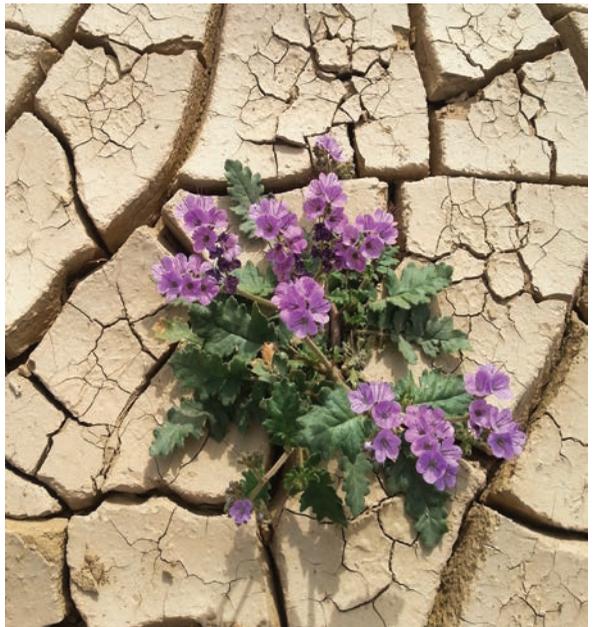
THIRD PLACE

Iona Anghel

University of California-Los Angeles

“Extreme Living”

This image was captured in Death Valley after a wet winter in the desert in 2016. This *Phacelia* species was thriving in the clay pans of the valley flats. Its presence in this rough environment highlights the resilience of plant life, illustrating this species’ ability to grow quickly before the water dries out in the heat of the desert spring, as well as its ability to develop roots through a very dense soil substrate. The fact that it has reached reproductive maturity is a testament to its successful adaptation in this ecology.



Public Policy News

2018 Engaging Policy Makers: BSA Member Involvement and Opportunities

The BSA Public Policy Committee is pleased to announce the 2018 Public Policy Award recipients: Tanisha Williams from the University of Connecticut and Timothy Batz from California State Polytechnic University, Pomona. In addition, the ASPT Environmental and Public Policy Committee awarded a Congressional Visits Day Travel Award to ASPT member Naomi Fraga of the Rancho Santa Ana Botanical Garden. These awards cover travel expenses for Congressional Visits Day, an annual AIBS-sponsored event in Washington, D.C. involving science advocacy training and a day on Capitol Hill meeting with legislators and staff. This year, a Communications Boot Camp for Scientists was also offered as an optional training. Williams, Batz, and Fraga share their experiences below.

The BSA PPC has granted two Public Policy Awards annually since 2013, and the ASPT EPPC has granted one award annually since 2016. Application guidelines are provided on the awards pages of the BSA (www.botany.org) and ASPT (<https://aspt.net/>) websites, with the next deadline in January 2019.

If you would like to explore the many ways in which botanists connect their science to policy before then, please join us at the BOTANY 2018 workshop, “Using our Science to Inform Public Policy,” on Sunday, July 22. We will introduce participants to the shared work of the BSA PPC and ASPT EPPC, hold a panel discussion with scientists working at the intersection of science and public policy, and run breakout groups to help attendees learn new skills. This is a great opportunity for botanists at all career stages to connect with those involved in science policy and discover potential entry points to this exciting area of work!

Timothy Batz’s Experience

The field of botany has profoundly affected our lives. Countless scientists have toiled to understand the plant kingdom, from the tallest tree to the smallest cell. Discoveries from the plant world have benefitted us with reliable harvests, clothing materials, and medicines—not to mention the appealing parks and gardens we all enjoy. Despite our reliance on these organisms, most people take plants, and the science that studies them, for granted. This indifference of the general public and politicians

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By **Ingrid Jordon-Thaden** (*University of California Berkeley*), **ASPT EPPC Chair**, **Krissa Skogen** (*Chicago Botanic Garden*), and **Kal Tuominen** (*Metropolitan State University*), **BSA PPC Co-Chairs**

must change. A warming planet coupled with unprecedented population growth threatens to greatly impact our lives and the planet itself. Plants will play a large role in how we adapt as a society to increasing demands for food and fuel. Conversely, plants will also need our help in diminishing the harmful effects our lifestyles have on their environment. We need scientifically informed policy to face the challenges that affect us and the world. For this reason, I applied for the Public Policy Award to represent the Botanical Society of America in Washington DC.

I traveled to the Capitol with fellow botanist Tanisha Williams to meet with other scientists interested in promoting scientific investments to our representatives. Our fields were diverse, from immunology to ecology and chemistry, but we all had the common bonds of NSF and NIH funding. I was surprised to learn that scientists, like almost every other organization of people, must lobby to representatives to voice their concerns directly. Like most of the other scientists who gathered for this lobbying event, I had no previous experience in government. To better prepare ourselves for this meeting opportunity, we underwent a two-day communication boot camp led by Dr. Rob Gropp of the American Institute of Biological Sciences (AIBS), a non-profit association dedicated to public policy, education, and public understanding of science.

After a briefing on the current state of federal funding as well as communication techniques highlighting the economic and societal benefits of science, we engaged in exercises of radio and television interviews to practice condensing technical language into relatable stories for journalists and the public. After the second day, we had greater confidence in our ability to reach the ears of



Batz in front of the U.S. Capitol during Congressional Visits Day.

voters and policy makers alike. However, our objective still seemed daunting. Congress holds the purse strings to the U.S. Treasury, and the time had come to appropriate funding decisions to federal agencies and departments. Unfortunately, the current administration had proposed deep cuts to science-based agencies, including a 20% cut to NOAA and 24% cut to the EPA. The White House also planned to rescind science funding allocations for the 2018 fiscal year. Our goal was to ask Congress to maintain a stable funding level of \$8.45 billion (<1% of the \$1.2 trillion federal budget) for the upcoming 2019 fiscal year.

We divided into regional teams to promote our national scientific effort to as many representatives as possible. My group included botanist Naomi Fraga, Ph.D. student Jo Bairzin, conservationist Dana

Green, and Jeff Brown and Faerthen Felix of the UC Berkeley Sagehen Field Station. Our schedule was full of meetings with our district and state representatives. Being a majority Democratic state, our plea for science funding was heard by most congressional staff we met, especially California Senators Kamala Harris and Dianne Feinstein. Meeting the staff of California Republican Doug LaMalfa offered an opportunity to expand our discussion beyond usual supporters. I stressed the importance of NSF funding in plant biology research that safeguards grape and rice crops grown in his district against disease and pests. Jeff and Faerthen promoted their science to solutions approach in forest management by emphasizing the economic benefit of utilizing thinned unwanted trees for an emerging timber market in the district. We can only hope that our ten-minute meetings with staff were summarized and taken into consideration when the time comes to vote on appropriations.

Many of us apply to and utilize federal grants to conduct important research, but the data produced and tested by those funds often fail to influence the decisions of elected officials. The public image of a lone scientist working in the lab requires reinvention.

By experiencing how our government works in Washington, I realize the need for scientific literacy in our legislature, especially on matters of funding and policy. Many of us apply to and utilize federal grants to conduct important

research, but the data produced and tested by those funds often fail to influence the decisions of elected officials. The public image of a lone scientist working in the lab requires reinvention. More of us need to communicate to policy makers and the public at large about our work if we truly want to make changing impacts. Scientific literacy should not be restricted to academic journals and conference meetings. It is our responsibility to translate technical language into effective conversation that is reachable by everyone, from our next-door neighbors to the President of the United States. The consequences of ignoring this fact have repercussions in our environment and at the voting booth. I would like to thank the members of the BSA Public Policy Committee for this incredible opportunity and encourage readers to participate in the AIBS (<https://www.aibs.org/home/index.html>).

Tanisha Williams's Experience

I grew up in Washington, DC, and I was bitten by the policy bug long ago. I have always been interested in how science influences public policy, and I have sought opportunities that would help me communicate effectively with policy makers. What an honor it was to be recognized by the Society through the Public Policy Award!

My first two days in DC were spent at the offices of the American Institute of Biological Sciences (AIBS) where I met other graduate students, postdocs, and field station scientists seeking to learn more about the role of scientists in policy and effective communication. Our communications training included topics like the curse of knowledge (forgetting that your audience does not understand the details that

fascinate you, which requires that you tailor your message to make it easily understood), crafting stories and elevator pitches, and media 101 (understanding the diverse types and roles of media). We also participated in mock interviews. The trainings demonstrated that being an effective communicator is not only important for science policy, but also as a life skill.

With our trainings complete and elevator pitches refined, we spent a half day preparing for the congressional visits. We received insights on what science policy is, an overview of the federal budget, and lessons on how to talk to lawmakers. We also participated in mock congressional meetings. Once the trainings were done, we separated into regional teams to further refine our collective pitches. My team decided that each scientist would take the lead for their home state or district, which meant the leader would introduce the group and share state- or district-specific support stories. I was the lead for three congressional meetings! We were also given talking points that highlighted the importance of select Representatives and Senators who voted to oppose deep cuts to science funding proposed



Matthew J. Rubin, Williams, Elizabeth Carlen, and Dr. Elizabeth Long in front of Senator Chris Murphy's (CT - D) office.

by Trump's FY 2018 budget. Besides thanking the Senators and Representatives for their service, we also made an ask for FY 2019: We asked that Congress fund the National Science Foundation (NSF) at \$8.45 billion, which is needed to continue to fund non-medical basic research at all academic levels.

On the third day I met with the Connecticut/New York team in the Longworth House building to review our message before our busy day on the hill. We met first with Representative Faso (R - NY) and one of his staff members to discuss the importance of funding science agencies like NSF to support innovation, education, outreach, and keeping ahead of the global market. We also met staff members from the offices of Senator Kirsten Gillibrand (D - NY), Senator Richard Blumenthal (D - CT), Senator Chris Murphy (D - CT), Senator Charles Schumer (D - NY), Representative John Katko (R - NY), and Representative Adriano Espaillat (D - NY). Representative Joe Courtney (D - CT) welcomed us to his office before attending another meeting, and we continued our meeting with one of his staff members. During each of our eight meetings, I shared exciting facts about my research and how NSF made it possible for me to do what I love in science, international (science) diplomacy, education, and outreach. I also stressed how important funding from NSF is to all levels of education and research through offering stories about how my home institution, the University of Connecticut, is using NSF funding to promote science research and education through a state-of-the-art collections facility and teaching greenhouses managed by my department, Ecology and Evolutionary Biology. Lastly, I stressed the importance of such funding to my department, focusing on how NSF provides undergraduates, graduates, postdocs, and faculty resources to conduct



*Williams explaining to Rep. Joe Courtney how she used herbarium samples to understand the effects of climate change on flowering phenology within the genus *Pelargonium*.*

cutting-edge research, both locally and globally. Most offices were quite supportive of science and research funding. Their eagerness showed in their questions about specific NSF programs that promote science discovery or diversity, and in their desire to hear tangible examples that show how important funding the NSF is to science research and education.

Prior to my trip, I had heard that developing a relationship with your Representative or Senator is mostly a matter of continually showing up and reaching out. It is like the saying goes, the squeaky wheel gets the oil. Being active by holding meetings to not only discuss what issues you are concerned about, but also thanking your policymaker for their service helps build a relationship. It sounds easy, but I did not believe that one person could build this connection, let alone a graduate student. Yet only two weeks after my visit, Congressman Courtney's office contacted me and scheduled a visit to my department of Ecology and Evolutionary Biology at the University of Connecticut! I was stunned and delighted that Congressman Courtney and his staff member remembered me and wanted to see where I work. It

was a whirlwind tour of my department's greenhouses, where Representative Courtney learned about a few extinct to the wild species that we have at our facilities, the NSF-funded collections facility, how I use herbarium samples to understand the effects of climate change, and meeting graduate students from my department. I was amazed how easy it was to talk with Representative Courtney and his staff members, and I was delighted to see how interested they were in learning more about what my department is doing and how NSF funds many of our research and teaching programs. This visit was an amazing opportunity to start a partnership with Representative Courtney and his office that started with BSA! I am truly grateful for the opportunity to participate in the Congressional Visits Day, and I thank BSA for providing the support! I look forward to staying involved with AIBS and BSA's Public Policy Committee.

Naomi Fraga's Experience

As Director of Plant Conservation Programs at Rancho Santa Ana Botanic Garden in Claremont, California, I oversee a diverse program focused on plant conservation. I am privileged to engage in a spectrum of botanical work that both spans and *links* "pure" scientific research to on-the-ground conservation efforts. At the center of my work is my desire to increase the understanding, appreciation, and conservation of plant diversity. Therefore, I was incredibly excited to receive the American Society of Plant Taxonomists (ASPT) travel grant to participate in Congressional Visits Day (CVD) hosted by American Institute for Biological Sciences (AIBS). The event provided me an opportunity to advance my goals of being an effective advocate working on behalf of plant conservation and allowed me to hone my communication skills toward

increasing my effectiveness as a plant scientist and conservationist.

Prior to the CVD event I took part in a two-day science communications training where I worked on developing my talking points to prepare for meetings with congressional staffers. Our goal was to advocate for the importance of federal funding in the biological sciences and provide information on how federal funding is important to our research. I was also particularly interested in discussing important policy issues facing plant conservation in my home state of California. When I arrived at the training, I was pleasantly surprised to meet a fellow southern Californian and plant advocate, Tim Batz from Cal Poly Pomona (my undergraduate alma mater). Tim and I had a lot of overlapping experience and interest, including advocating for initiatives that increase representation of underserved groups in STEM fields. On the actual Congressional Visits Day we had a full day of meetings set up with congressional staffers, and I got to work with Tim and an excellent team of scientists from Arizona and California.

I was able to start off CVD with a constituent breakfast hosted by my California State Senator, Diane Feinstein, who I found to be incredibly inspirational. Our team had several meetings scheduled throughout the day, so we had our work cut out for us! On

CVD I was able to meet with the Legislative Director for Norma Torres, the representative for my home congressional district, and staff from the offices of Diane Feinstein, Kamala Harris, and John McCain. In addition, we met with staffers that represent other districts in California. Overall I found the day to be very enjoyable and inspirational. I left the event feeling encouraged and motivated to stay in contact with my legislators. I came to better understand the effect that we can have on policy and budgetary decisions, both individually and collectively. I would encourage others to get in contact with their

I came to better understand the effect that we can have on policy and budgetary decisions, both individually and collectively. I would encourage others to get in contact with their legislators and possibly set up a meeting.

legislators and possibly set up a meeting; I personally found it to be a very empowering experience. The training combined with CVD was incredibly educational, and I am very thankful to have had the experience!

Publishing at a Crossroads in a Changing Climate

When the month of May rolls around, the season of professional conferences begins in earnest for many of us. For your friends in the BSA Publications office, that often means attending the annual meetings of the Council of Science Editors (CSE) and the Society for Scholarly Publishing (SSP), among others. This year in early May, Beth Parada and I attended the CSE meeting in New Orleans, which had the theme “Publishing in the Changing Climate of the Research Ecosystem.” In late May Richard Hund and I went to the SSP meeting in Chicago, the theme of which was “Scholarly Publishing at the Crossroads: What’s working, what’s holding us back, where do we go from here?”

Every year these two meetings bring together hundreds of professionals who work in scholarly publishing—editors and publishers of scholarly journals and books; commercial and not-for-profit service providers; commercial publishers; consultants; librarians; and others involved or interested in these endeavors.

Your BSA Ed. folks return from these meetings energized and *wake* on new and old issues. We

assume that our authors, reviewers, editors, and readers are aware of and concerned about similar issues. Is it true? Are these issues you are thinking about, too? If not, what *are* you thinking about? Let us know!

Artificial Intelligence and Machine Learning: These were huge, and provocative, topics at this year’s conferences. If published research cannot be read by a machine, it is virtually undiscoverable. On a practical level, that is why we are concerned about properly applied metadata, JATS and BITS XML structure, proper tagging and formatting of literature references (machines are counting citations), persistent identifiers (e.g., ORCID), among other things, in the context of data and text mining.

AI is also being used to curate what we see when searching the internet, and it is being used by publishers to source new content, inform and improve content, and suggest new product development. Algorithms may review scientific papers more efficiently than humans. More than once we were told that for the first time, in 2018, a machine is able to answer questions more quickly and accurately than a human. The session “(Don’t) Rage Against the Machine” highlighted incredible advances that are being made in technology in the name of progress, but I left thinking that we need to be careful. AI is only as good as the information it receives, so it needs ALL the information—and who decides *how* the machines process it?



By Amy McPherson
*Director of Publications
 of Managing Editor
 Botanical Society of
 America*
 ORCID 0000-0001-7904-242X

Inherent Biases in Digital Technology, and the Importance of Diversity and Inclusion:

Related to advances in AI and machine learning, we learned about implicit biases built into digital technologies. When you search on Google, are you aware of what informs the algorithms that bring up the most “relevant” content? Algorithms are written by people, and according to Safiya Umoja Noble, in her excellent SSP keynote and recently published book (Noble, 2018), they are shaped by and infused with values that are not impartial or lacking a position. Not every person or every work is treated fairly, and what is even meant by “fair”? Noble challenged all people in publishing and academia to address the biases inherent in the tools we use, the work we produce, and the decisions we make. (See also Courtland, 2018, for a fascinating discussion of the topic.)

Communicating science in a “post-truth” world:

Of course, we are not really living in a totally Orwellian “post-truth” world (not yet!), but I think most of us know that we need to engage the larger community to be less intimidated by science and to think openly and critically about what we read and hear about the world around us.

If we need an example of someone who has really “gone to the mat” for communicating science, we just need to look at Michael Mann, climatologist, professor, and author of many books, including *The Hockey Stick and the Climate Wars* (Mann, 2013). At considerable personal cost, he is striving to “cut through the fog of disinformation that has been generated by the campaign to deny the reality of climate change”—and we are called to stand up and do our part, in whatever area of science we’re in. And we might need to learn effective ways to engage the broader community. Steve Mirsky, author of the “AntiGravity” column in *Scientific American* and host of the

60-Second Science podcast, shared ideas for communicating science that have worked for him—humor and persuasion. Chris Martine’s YouTube series “Plants Are Cool Too!” came to mind for me.

This is meant to be a brief essay, so I am not going to elaborate on other Big Issues we learned about—but if any of these, or anything else, are of interest to you, please let me know and we can chat at Botany 2018 or we can explore in a future essay.

Data sharing and accessibility policies: FAIR data principles, i.e., making sure that data are Findable, Accessible, Interoperable, and Reusable (see Force11).

Peer Review: Which system is the best, and why?

Preprint Servers: Is everyone on board—why or why not? How do they fit in with the research ecosystem and what comes next?

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In Memoriam



Barbara D. Webster (1929-2017)

Barbara D. Webster, Professor *Emerita* in the Department of Plant Sciences, University of California, Davis, died September 7, 2017, in Davis, at the age of 88. Born and raised in the Boston area, Barbara earned a B. S. in botany from the University of Massachusetts, Amherst; an M. A. in biology from Smith College; and a Ph.D. in biology from Harvard University. An NSF Postdoctoral Fellowship and a new spouse took her to Purdue University, where her career-long research into abscission began in the laboratory of Prof. A. Carl Leopold. The scope of Barbara's research extended from her Ph.D. research on morphogenesis in bracken fern to include reproductive biology and pollination mechanisms in legumes,

effective and ineffective nitrogen fixation in legumes, environmental stresses in relation to morphogenesis and yield of crop plants, and, always, abscission and senescence in higher plants. Her research approaches combined anatomy, morphology, ultrastructure, and physiology.

Barbara arrived in Davis, CA in 1966 without a job but with a major NSF grant in hand. Her husband, Grady L. Webster, had been hired as a full professor in the Department of Botany at UC Davis. In the early months in Davis, Barbara was, as she put it, "underemployed" as a lab technician. In 1967, she was hired as a Lecturer and Assistant Research Morphologist, split between the Department of Agronomy and Range Science and the Department of Vegetable Crops (now combined into Plant Sciences). Over the next 12 years, Barbara held part- and full-time positions, sometimes paid in soft money and sometimes in hard money. She pursued research on leaf and pod abscission in common beans, and flower, fruit, and seed development in other crop plants. During her career, she received research grants from the USDA, USAID, NSF, and California Dry Bean Advisory Board, and she and her students and other collaborators published their work in prominent national and international botanical and horticultural journals. Barbara supervised graduate student research, mentored undergraduates, and, at intervals, taught an upper division undergraduate course in crop morphology. In 1979, Barbara's appointment was converted to Professor of Agronomy and Agronomist in the Agricultural Experiment Station, with tenure.

Once officially on the faculty at UC Davis, Barbara trained additional graduate students

and postdocs, often women and minorities, and sought out leadership and administrative opportunities. She served as the Associate Vice-Chancellor for research from 1989-1992 and before that, as Associate Dean, Division of Biological Sciences (1981-1982). She served on and chaired numerous panels, boards, and committees for the National Science Foundation, National Research Council, USDA, Associated Western Universities, W. K. Kellogg Foundation-Grants, and National Center for Atmospheric Research. She was a Senior Fulbright Research Fellow at the University of Nairobi, Kenya. Barbara was the first woman elected as Treasurer of the Botanical Society of America (1977-1981) and later served as President (1983). She was a distinguished fellow of the Botanical Society of America (2008), and a fellow of the AAAS and the American Society for Horticultural Science; she received the university medal from Universidad San Francisco de Quito (Ecuador), and was a Visiting Scholar, People's Republic of China. Locally, Barbara served as chair of the City of Davis Planning Commission, Board of Zoning Adjustment and co-chair of the grants committee of the Davis Regional Science Center.

For obvious reasons, Barbara had a long-standing interest in creating and improving opportunities in academia for women and other under-represented groups. She was a frequent contributor to faculty development workshops for new and junior faculty at UCD, always emphasizing the importance of understanding the academic system, of understanding expectations for professional advancement, of choosing a mentor, and of choosing one's battles (Webster, 1989). She was a strong advocate for women in science, particularly women graduate students, and a vigorous proponent of support networks and interest groups to enhance collegiality and share information about resources and

strategies for a successful career in academia. In the late 1980s and early 1990s, Barbara also traveled to academic institutions across the country, where she gave talks on the challenges for women in the sciences in general and academia in particular. She was active in the UCD Women's Resources and Research Center Network and a co-founder of the Faculty Women's Research Support Group, in which colleagues met regularly to provide direction to new women faculty and to encourage the appropriate balance of research, teaching, and service to be successful in the promotion and tenure process.

Barbara retired from UC Davis in December 1992, staying active in the UC Davis Emeriti Association, the Davis Branch of the League of Women Voters, and several book groups. She is survived by her daughter, Susan V. Webster, the Jane Williams Mahoney Professor of Art History and American Studies at The College of William and Mary; her son-in-law Hernán Navarrete; her sister Dorothy Sears and brother William Donahue; and numerous nieces, nephews, grandnieces and grandnephews. Her brother Robert Donahue preceded her in death. Grady pre-deceased her in 2005. In 2006, Barbara and Susan established the Grady L. Webster Award of the Botanical Society of America and of the American Society of Plant Taxonomists in his honor. The Grady L. Webster Memorial Fund also was created in 2006 to support research in the Department of Plant Sciences at UC Davis. A celebration of Barbara's life was held in June, 2018, in the UCD Arboretum.

-Judy Jernstedt, University of California, Davis

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In Memoriam



Jochen Heinrichs (1969-2018)

Jochen Heinrichs, a professor on the faculty of biology at the University of Munich, Germany, passed away on April 22, 2018, following a long battle with an autoimmune disease. Jochen was born in 1969 in Mönchengladbach near Düsseldorf and early on developed an interest in botany and especially bryology. He earned a master's degree at the University of Düsseldorf (1989–1996), with a thesis on the systematics of a genus of mosses, and then moved to the University at Göttingen for his doctoral research under the supervision of Robbert Gradstein. His thesis, in 2002, consisted of a taxonomic revision of three sections of *Plagiochila*. Still in Göttingen, Jochen obtained his habilitation (2007)

while working as a curator of the Göttingen University Herbarium (2001–2012). He reorganized the collection and initiated the establishment of a digital herbarium, which he supervised until he left Göttingen for Munich in 2013 to assume the position of professor for Molecular Systematics of Lower Plants at the Ludwig-Maximilians-University.

Jochen loved field work and participated in expeditions to Bolivia (1997), Costa Rica (1999), and Ecuador (2004), during which he focused mostly on liverworts. Many of his specimens of liverworts, bryophytes, and flowering plants have gone to the two (intercalated) herbaria in Munich, M and MSB. In spite of his comparatively young age, Jochen published more than 200 research articles (see Bibliography in Krings et al., 2018), with his most influential contributions addressing the taxonomy of *Plagiochila* and liverwort systematics and taxonomy in general. Jochen was awarded the Sullivant Award of the American Bryological and Lichenological Society for the best paper published in *The Bryologist* in 2005. By about 2008, Jochen became increasingly interested in, and fascinated by, fossil bryophytes, especially the copious record of these plants in amber, which naturally led to an interest in the calibration of 'molecular clock' and reconstructions of trait evolution and geographic range change. Jochen's research on amber fossils resulted in more than 40 papers on liverworts and mosses, as well as ferns, fungi, and lichens, all beautifully illustrated, usually with color photos of the fossils. One of the last manuscripts Jochen was working on was "A comprehensive assessment of the fossil record of liverworts in amber," an invited contribution to the commemorative volume

for the late Thomas N. Taylor (1937–2016; Krings et al., 2018).

Jochen loved teaching, and during his barely six years at the University of Munich, he mentored dozens of Bachelor students, several M.Sc. students, and two Ph.D. students. His seminars in our institute seminar series were fresh and fascinating, whether one cared about liverworts or not. Jochen served as an editorial board member of several scientific journal, Editor-in-Chief of the series *Bryophytorum Bibliotheca* (since 2005), and on the Committee for Bryophytes of the International Association for Plant Taxonomy (1999–2005).

As described in a fuller appreciation of his many contributions (with a full list of his

publications; Krings et al., 2018), Jochen was an outstanding scientist and passionate person who will long be missed by his friends and colleagues, not only across Germany but throughout the world.

--*Susanne S. Renner, Systematic Botany and Mycology, Department of Biology, University of Munich (LMU), Menzinger Str. 67, 80638 Munich*

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- Join the Fern Foray - Do the overnight adventure or just come for the day!



Saturday Trips

- Explore the Big Woods and go Kayaking - Check out the video on the site!
- Visit the Cedar Creek Ecosystem Science Reserve
- Collect and identify Sedges at the Whitewater Wildlife Management Center
- Hike the Weaver Dunes Prairie - and then canoe the marsh and look for the American Lotus!
- Check out the Glacial Relics and the fire-dependent Plant communities



Sunday Trips

- Hike through Whitewater State Park
- Visit Mystery Cave State Park
- Walk through the Minnesota Landscape Arboretum and then Prince's private estate - Paisley Park
- Discover the New Bell Museum, the MIN Herbarium and Surly Brewing Company



Post-Conference Thursday Trips

- See the Karst bedrock and tour the Whitewater Valley
- Another chance to go Kayaking on the Cannon River



Photo by Jason Husveth





How to Avoid Predatory Journals When Publishing Your Work

Introduction

For researchers looking to publish their work, there now exists a dizzying array of possible outlets. Over the past decade, the publication landscape has exploded from print-based, subscription journals published by respected scientific societies and legitimate publishing companies to an almost equal number of disreputable, open-access journals backed by for-profit companies (Beall, 2012, 2016b; Shen and Björk, 2015; Beninger et al., 2016; Laine and Winker, 2017). Known as predatory journals (Beall, 2012), these journals charge publication fees with promises of rapid publication but often have a sham peer review process, leading to low article quality (Beall, 2016a, b; Eriksson and Helgesson, 2017; Shamseer et al., 2017). Consequently, these journals are not accepted for indexing in major bibliographic databases, like Web of Science or

PubMed. Many predatory journals purposely dupe authors—especially young investigators and academics from low-resource countries—into submitting manuscripts with deceptive advertising designed to resemble legitimate scholarly journals (Beall, 2012, 2016a).

Key Words

fake impact factor; open access; predatory journal; predatory publisher.

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By Theresa Culley

Department of Biological Sciences, University of Cincinnati, 614 Rieveschl Hall, Cincinnati, OH 45221-0006

E-mail: theresa.culley@uc.edu, Tel: 513-556-9705

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In some cases, predatory publishers even create counterfeit websites of respected journals to deceitfully obtain manuscripts—essentially “hijacking” the legitimate journals (Tin et al., 2014; Beall, 2016a; Eriksson and Helgesson, 2017; see <https://predatoryjournals.com/hijacked/>). Many predatory publishers state that they are located in the U.S., Canada, Australia, and the U.K., but are actually in other countries (Beall, 2012; Gasparyan et al., 2015; Shamseer et al., 2017) where many predatory journals originate. Predatory publishers have even created sham “meetings” and “conferences,” in which they divide up ballrooms in a hotel in a popular tourist city to hold multiple “conferences” together on the same weekend, with limited staff and very few attendees (Hunziker, 2017). In short, these entities are scams targeting academic authors for their own financial benefit (Anderson, 2017) and to “generate profits rather than promote academic scholarship” (Stratford, 2012). Consequently, authors must carefully navigate where to submit their papers for scientific dissemination (Barroga, 2015; Eriksson and Helgesson, 2017).

This proliferation of predatory journals can be traced to a relatively recent shift in publication models (Beninger et al., 2016), but the reality is that anyone with a computer and internet connection can create a “journal.” In the past, traditionally printed journals were large complex operations, financially supported by personal and library subscriptions. Although this ensured high quality of published articles, one disadvantage was that readership was potentially limited; non-subscribers could only read articles if they personally paid for the journal or had access to it through their institution. The open access model reversed this idea so that the published paper is freely available to all readers, after authors themselves pay the publication cost (typically

called an “article processing charge,” or APC). Although the intent of the open access model was honorable, it has now been exploited by for-profit predatory journals focused solely on increasing their own income by requiring author fees (ranging from US\$100 to several thousand dollars) on as many articles as possible without any concern for quality or scientific rigor. Although not all open access journals are predatory—many are indeed legitimate—all predatory journals are open access.

The extent of predatory journals is never more apparent than through “sting operations” in which bogus manuscripts are submitted to journals to test whether they would publish a clearly flawed paper. In one classic example, a working neuroscientist and anonymous blogger submitted a nonsensical Star Wars–inspired study to nine journals in response to e-mailed invitations (Neuroskeptic, 2017). Written by the fictional Dr. Lucas McGeorge and Dr. Annette Kin, the manuscript detailed “midi-chlorians,” or “microscopic life forms” said to live inside the cells of Jedi and give them their powers. If that were not enough to warrant rejection along with references to “Yoda’s ataxia” and “Wookiee’s Disease,” the manuscript also included an embedded monologue about a Dark Sith Lord. Yet, four journals accepted and published the clearly fictitious paper. Just a few days after the sting was publicized, all four journals deleted the paper (which is available by the author at: <https://www.scribd.com/document/354932509/Mitochondria-Structure-Function-and-Clinical-Relevance>).

In yet another case, a joke manuscript that consisted entirely of repetitions of seven words (“Get Me Off Your F----- Mailing List”; <http://www.scs.stanford.edu/~dm/home/papers/remove.pdf>), complete with obviously bogus figures, was accepted by the *International*

Journal of Advanced Computer Technology in 2014, but the author declined the fee of \$150 (Stromberg, 2014a). At least one anonymous reviewer rated the manuscript as “excellent.”

Finally, a reporter for the *Ottawa Citizen* constructed an entirely fictional manuscript that combined the topics of soil, cancer treatment, and Mars by cutting and pasting text from valid scientific papers. He submitted the manuscript to 18 journals, and 8 of those agreed to publish the paper for a fee ranging from \$1000 to \$5000 (Stromberg, 2014b). Clearly, there was no peer review or editorial oversight in any of these cases.

WHY CARE?

Authors must be aware of these predatory journals for several reasons (Hunziker, 2017; Rydholm, 2017), not the least of which is their unethical nature, promotion of counterfeit science, and the “watering down” and devaluation of solid scientific research. Furthermore, some predatory journals are not transparent about their publication process (Beall, 2016a), sometimes tricking authors into paying exorbitant fees. An example is as follows: An author submits a manuscript in response to a journal’s spam e-mail request, but the manuscript is immediately published (indicating no peer review) and the author is then invoiced a large amount of money—usually over \$1000. If the now-suspicious author asks to withdraw the manuscript, the publisher refuses unless a “withdrawal fee” is paid. In short, the author must pay either the publication fee or the withdrawal fee because the manuscript cannot be submitted elsewhere since it is already considered published (Stratford, 2012; Hunziker, 2017). According to Beall (2016a), this is akin to holding the manuscript “hostage” until a fee is paid. In

other cases, predatory journals can charge fees that are much lower (median = \$100 per article) than the open access fees of higher quality legitimate journals (\$2500 to \$3000; Shamseer et al., 2017). In this way, predatory journals can attract more authors and publish more articles, garnering more profit for the journal at the expense of quality.

Publishing in a predatory journal can also be detrimental to a researcher’s career because institutions are now recognizing their low quality. Specifically, articles in illegitimate journals are increasingly being discounted from the publication record of scientists seeking employment or promotion. For example, the Department of Biological Sciences at the University of Cincinnati recently revised their promotion and tenure requirements to specifically exclude articles published in predatory journals. The concern for institutions is that unscrupulous authors may intentionally pad their dossiers by sending their manuscripts to these fake journals because of guaranteed acceptance (Beall, 2017; Kolata, 2017). This also applies to unknowing authors who may be duped into submitting an article to a predatory journal.

The ongoing proliferation of predatory journals also causes confusion among authors and readers, endangering the reputation of legitimate journals. For example, some legitimate open access journals in developing countries or journals that are newly launched may be improperly labeled as “predatory” (Regier, 2018). This can further exacerbate existing biases in scholarly publishing against non-Western and non-English studies, even though these legitimate journals may serve as important publishing outlets in critical areas of the world.

So how can researchers—especially those just

beginning their publishing career—know where to publish their work and specifically, how to avoid inadvertently submitting their manuscripts to an inferior, predatory journal?

SIGNS OF PREDATION

The first list of predatory publishers and stand-alone journals appeared in 2012 as a blog titled *Scholarly Open Access* by Jeffrey Beall, a scholarly communications librarian at the University of Colorado (Beall, 2012). Beall had become concerned about the proliferation of low-quality, for-profit, online-only journals that masqueraded as legitimate publishing outlets. He first coined the term “predatory” in reference to these publishers and journals (Beall, 2016a). The impetus for his list started in the 1990s when many academic libraries in North America, facing declining library budgets and increasing subscription prices along with the appearance of many new academic fields, were forced to become more selective in their journal subscriptions (Beall, 2017). As poor-quality, predatory journals began to increase in number, Beall created his list to share this information with other librarians who were considering how to refine their subscription lists. Known as “Beall’s List,” this resource became very popular, although it had a limitation in that some publishers could have a mix of predatory and seemingly legitimate journals. Unfortunately, Beall shut down his blog in 2017 following pressure from his employer, caused in part by threats of lawsuits by some of the very publishers he had identified as “predatory” (Beall, 2017). Although an archived Beall’s List is still being updated today by an anonymous researcher (see Chawla, 2018), listing of predatory journals has now been taken over by Cabell’s International (<http://www2.cabells.com>), a well-regarded publisher of a directory of

journals. In early 2017, Cabell debuted a Blacklist as well as a Whitelist (Anderson, 2017; Chawla, 2018). In contrast to Beall’s List, Cabell’s Blacklist is not freely available but requires a subscription, with prices set institutionally.

The publishing community has also been working to address the issue of predatory journals and publishers. In 2013, the Committee on Publication Ethics (COPE) developed *Principles of Transparency and Best Practice in Scholarly Publishing*, which included 16 guidelines for member organizations on how to best promote transparency and scientific rigor (COPE, 2014). These guidelines are also helpful for authors in confirming the scientific validity of any journal. For example, they require member journals to conduct peer-review using experts in the field (not only the editorial staff), to possess a journal name that cannot be easily confused with another journal (and thus mislead authors), and full disclosure of names, affiliations, and contact information for the editorial board and staff. If any journal or publisher violates one or more of these points, it must address the issue satisfactorily or risk losing their membership in COPE, the Directory of Open Access Journals (DOAJ), the Open Access Scholarly Publishers Association (OASPA), and/or the World Association of Medical Editors (WAME).

In addition, several legitimate publishers and library groups started an initiative in 2015 called *ThinkCheckSubmit* (<http://thinkchecksubmit.org>) to educate authors about what to look for when selecting a journal in which to publish (Beall, 2016b). Another resource to identify deceptive journals or publishers was created by the Council of Science Editors (2018). However, even these resources do not prevent unethical, predatory

journals from continuing to market to and engage unsuspecting (or deceitful) authors. Based on published resources (e.g., COPE, 2014; Tin et al., 2014; Beall, 2016a,b; Beninger et al., 2016; Eriksson and Helgesson, 2017; Hunziker, 2017; Laine and Winker, 2017; Shamseer et al., 2017; Council of Science Editors, 2018), I created a combined checklist to help authors identify whether a given journal is predatory or legitimate.

COMMON RED FLAGS OF A PREDATORY JOURNAL

Authors should be wary of journals containing more than one of the following flags when considering where to submit their work for publication:

Journal Information:

- Journal name could be easily confused with a different legitimate journal
- Only a small number of articles are published per year, with articles typically of poor quality
- Focus of the journal is very broad, often encompassing more than one field of study that are usually not treated together
- Title of the journal includes “International,” “World,” “American,” “European,” “British,” “Innovative,” or “Advanced” [Note that this also pertains to some legitimate journals.]
- Editorial board is not clearly defined or consists of an inordinately large number of researchers (many non-experts) from different locations around the world
- Claims an unrealistic peer review-to-publication turnaround time (e.g., one week)
- Articles are sent to their editorial board for

“peer review” rather than to ad-hoc experts in their field

- Asks the recipient to also send their resume to be considered for their editorial board
- Falsely claims to be indexed by databases such as Web of Science, PubMed, or SCOPUS
- Falsely claims to be a member of the Open Access Scholarly Publishing Association (OASPA) or COPE, or if an online journal, deceptively claims to be registered in the Directory of Open Access Journals (DOAJ)
- Direct marketing e-mails often contain spelling errors, grammatical mistakes, and the use of pretentious and ostentatious words (“honored,” “impressive,” “eminent”)
- E-mails requesting submissions are sent multiple times, spamming potential authors
- In the e-mail, authors are asked to send their manuscript as an attachment without any indication of a website for verification of the authenticity of the journal; the e-mail address may be personal (i.e., a gmail address)

Website:

- Appearance and/or content of website may mimic another journal or publisher’s website
- Website contains many grammatical errors and/or images with poor resolution (having been copied from other online sites)
- Publisher has no functional telephone number or postal address, or consists of a residential address
- Full names of editors and their affiliations are not provided
- Names and contact information of editorial staff are not provided; editorial assistant

- may only be known by their first name or a combination of two typical American first names
- The periodicity of publication is not clearly stated and/or is inconsistent
- Peer reviewing process is not adequately described
- Uses words such as “impact factor” or “index factor” for non-existent organizations; or mentions indices, such as Google Scholar (which does not consider the quality of any listed articles) or Index Copernicus
- Does not clearly indicate information about the ownership and/or management of a journal
- Copyright information is not readily apparent or provided on the website; publisher may in fact retain the copyright
- No clear statement about research integrity and how misconduct will be dealt with; no statement about conflicts of interest of editors, reviewers, and authors
- No clear statement of archiving or how access to journal content will be preserved in perpetuity (if the journal is no longer published), such as in CLOCKSS or PubMed Central

Finances:

- Author charges are either unclear or are not stated on the website.
- If posted, APCs are either extremely high (several thousand dollars) or extremely low (e.g., \$60–\$100)
- Authors are required to pay a fee (often excessive) in order for the paper to be first sent for “review”

- The advertising policy is not clearly stated
- The method of access for readers, including subscription fees or pay per view, is not provided

A TEST CASE

To better understand the challenges faced by researchers seeking a publication outlet, I collected all e-mails I received over a three-month period (October 2017 to January 2018) that invited submission of a manuscript to a journal. From these e-mails, I extracted and compared the journal names, publishers, characteristics of the e-mail (sender, contact information, grammar, etc.), and frequency of contact. I then used the checklist above, Beall’s List of publishers and some stand-alone journals, and Cabell’s Blacklist of journals to determine whether the journal/publisher referenced in each message was legitimate or predatory.

In all, I received 86 e-mails during the 103-day collection period, ranging from 0 to 4 e-mails per day. The e-mails originated from 68 journals from at least 30 publishers (in 11 cases, the publisher was not apparent; Table 1), and some journals sent multiple e-mails. The largest number of e-mails were received on a Tuesday ($n = 19$), followed by Monday (17), Thursday and Friday (16 each), Wednesday (9), Saturday (7), and Sunday (2). The most common publishers behind these e-mails were OMICS International (including SciTechnol and Insight Medical Publishing) with invitations to submit to 16 of their journals, sometimes repeated. The next most common publishers were Open Access Publishers (OAP) with invitations to 5 of their journals and Science Research Publishing with 3 journals. OMICS International and OAP are considered predatory by both Beall and

Cabell, and their e-mails were characteristic of the checklist above. In particular, OMICS International was labeled by Beall as “the worst of the worst” (see also Stratford, 2012). Eriksson and Helgesson (2017) also reported how OMICS International is particularly skilled at manipulating their reported “impact factor,” and Stratford (2012) emphasized that their websites are often deceptive.

Of the 86 e-mails that I received, only 9 (10.5%) were determined to be from legitimate journals and the remaining 77 (89.5%) were from questionable sources. Of these, 57 (66.3%) e-mails originated from a predatory journal or publisher as identified by Beall and/or Cabell, and 21 (23.3%) e-mails contained many of the characteristics of predatory journals (see checklist above), but did not appear on the Beall or Cabell lists. Even if multiple requests from the same publisher were excluded, only 11.8% of e-mails could be tracked to a legitimate journal with 88.2% originating from a known or presumed predatory journal or publisher (consisting of 64.7% listed on Beall and/or Cabell and 23.5% with characteristics of predatory journals).

During my review of these emails, the most common red flags that indicated a predatory journal were as follows:

1. *Inappropriate E-mail Presentation and Tone:* Predatory journals often have an international origin and as such, may spam researchers with repeated e-mails that are replete with grammatical errors, odd word choices, effusive praise, and nonsensical sentence structure. Noteworthy examples include (boldface as in the original message):

Dear Dr. Theresa M Culley,

Good Morning.....!

I hope your morning is as bright as your smile!

Well, in order to apply ISSN we are in need of one Research Article. Is it possible for you to support us with your eminent work? In fact, we are offering best partial waiver for the first 5 articles which are received foremost.

Your trust in my efforts is the highest form of our motivation, I believe in you that your eminent manuscript brings out the best citation to our Journal.

Predict to hear your optimistic response.

Regards,

JOJ Horticulture & Arboriculture (JOJHA)

Dear Dr. Theresa M. Culley,

Greetings from SciFed Journal of Astrophysics.

We just wanted to take a minute to wish you peace and prosperity.

*On behalf of **SciFed Journal of Astrophysics**, we would like to invite you to publish your recent research work for the second issue. **SciFed Journal of Astrophysics Journal** accepts articles in the form of Research Articles/Review Articles/Case Reports/Short Communications etc.*

Please kindly share your recent research paper related to Journal of Astrophysics.

*We hope you will respond to this invite with a **yes** and will allow us to have one of the brilliant and most gifted minds of this century.*

We are looking forward to hearing from you.

If you have any concerns, we will be glad to assist you.

Best Regards,

***George Philip
Assistant Scientific Editor
SciFed Journal of Astrophysics***

Dear Dr. T M Culley,

Hope all is well at your end. Apologize for bothering in your busy schedule. We are delighted to inform you that, we are planning to release our **Upcoming issue** by the **End of Current month** and require your kind support to do this in due time.

We are planning to get **ISSN number** to our journal within **2months** for which we have to publish more Research and Review articles as per the guidelines of Cope. Hence, we need your kind support, as we have gone through your profile in online and very much delighted & surprised by your eminent articles which are quite interesting and informative.

Where, you are an eminent author to our journal, we kindly request you to contribute your manuscript to increase the scope of our journal or else you can suggest your friends/colleagues/students to submit their manuscripts towards our Journal. Kindly follow the below link for online submission <https://www.medwinpublishers.com/submit-manuscript.php>

If you are unable to submit article by the given timeline, kindly send us **2 Page Editorial/Mini Review/Short communication/Opinion**. Hope it would not consume your much valuable time.

We are positive that this Journal will offer you an enriching experience and hope to achieve great successful endeavors.

Kindly acknowledge this email receipt within **24 hours**.

Await your reply.

Kind Regards

Lori Elizabeth

Assistant Managing Editor

Genomics & Gene Therapy International Journal (GGTIJ)

MedWin Publishers

Email: genomics@medwinpublishers.com

If you wish to not to receive our e-mails, kindly unsubscribe

2. *Promises of a Quick Review and Acceptance:* One e-mail I received from the *International Journal of Management and Economics Invention* promised notification of acceptance within 2 to 3 days of submission and online publication within 24 hours—despite the publisher’s statement that “RAJ is committed to peer review integrity and practices the highest standards of ethical publishing...” Notably, the charge for U.S. authors was \$100 per article, to be paid through PayPal. The website for *World Journal of Research and Review* (<https://www.wjrr.org/page/faq>) mentions that it only takes 3 to 4 working days for the review process and that online publication is 1 to 2 days after “registration”; payment is by credit card or PayPal.

3. *Odd Editorial Office Contacts:* Another common characteristic of predatory journals is that e-mails to authors are commonly signed by an editorial assistant with either a single name followed by an abbreviation for the last name (Murray L or Amanda T) or two common English names put together (e.g., George Phillip, John Abraham, Isaac Brian). However, my favorite senders were “Monalisa,” the Assistant Managing Editor of the *Journal of Plant Sciences and Agricultural Research*, and “Scarlett Johansson,” the purported journal coordinator of the new *Journal of Environmental Research* (not to be confused with Elsevier’s legitimate *Environmental Research*).

4. *Large Number of Editorial Board Members:* Predatory journals typically have a very long list of editors or editorial board members, often from a scattering of different topical areas (Shamseer et al., 2017). In some cases, the “editors” may turn out to be reputable scientists who have no idea that their name and information has been purloined

(Gasparyan et al., 2015). For example, in 2016 I received an e-mail from *Biological Systems: Open Access*, published by OMICS International, requesting a review article. The e-mail caught my attention because it was very poorly written with grammatical mistakes, yet reportedly was from their Editor-in-Chief—a name that I happened to recognize as a researcher at a neighboring university. When I contacted him, the person had no idea that his information and photograph had been surreptitiously used in this manner, having been copied from his university website. Several years ago, I politely declined a request to join an editorial board of a journal, mentioning that it was completely outside my area of expertise and I was already too busy as an editor-in-chief—to which the journal asked me to reconsider, mentioning that I did not need to do anything at all. In yet another example involving a sting operation, a resume from a fictitious scientist named Anna O. Szust (based on the Polish word for “a fraud”) was submitted to 360 journals to serve on their editorial board; 40 predatory journals accepted her as an editor (some offers were conditional on receiving payment) and 4 journals appointed her as editor-in-chief—with at least one mentioning that she would have “no responsibilities” (Sorokowski et al., 2017). Finally, the fictional Dr. Lucas McGeorge mentioned earlier in the Star Wars sting operation was subsequently sent an unsolicited e-mail to serve on the editorial board of a different journal (Neuroskeptic, 2017).

5. *Misleading Statements of Importance and False Impact Factors*: Predatory journals sometimes provide a fake impact factor to misrepresent their importance (Beall, 2016b; Gasparyan et al., 2015; Beninger et al., 2016; Eriksson and Helgesson, 2017; Hunziker,

2017). Impact factors are calculated each year by Clarivate Analytics (which took over the calculations from Thomson Reuters), and it can take at least two years for a journal to be selected to be included in their well-regarded Journal Citation Report (JCR). However, Thomson Reuters originally never trademarked the name “impact factor,” so a number of companies (such as Index Copernicus) have emerged to supply bogus “impact factors” to predatory journals (Eriksson and Helgesson, 2017; Shamseer et al., 2017). Furthermore, predatory journals may claim inclusion in an irrelevant indexing service that does not include any measure of article quality, such as Google Scholar (Beall, 2016a). To check the authenticity of reported metrics, the group known as Stop Predatory Journals provide a list of such indexing services (<https://predatoryjournals.com/metrics/>). Some predatory journals also state falsely on their websites that they are registered in the Directory of Open Access Journals (DOAJ), which can be easily checked (<https://doaj.org>). Finally, Digital Object Identifiers (DOIs) are provided for materials regardless of their quality, so the fact that a journal provides DOIs for their articles should never be taken as an external recognition of the importance of that journal.

One of my favorites is the following e-mail from the predatory journal *American International Journal of Contemporary Research*. It was sent from “Emily Michael” and has even been updated to include that the journal is indexed in Cabell’s. It is certainly included there—but on their Blacklist. The underlined and bold-faced portions are as in the original e-mail.

Call for Papers
American International Journal of Contemporary Research
 ISSN 2162-139X (Print), ISSN 2162-142X (Online)
 DOI: 10.30845/aijcr

American International Journal of Contemporary Research (AIJCR) is an open access, peer-reviewed and refereed multidisciplinary journal published by Center for Promoting Ideas (CPI), USA. The main objective of AIJCR is to provide an intellectual platform for the research community. AIJCR aims to promote contemporary research in business, humanities, social science, science and technology and become the leading journal in the world.

The journal publishes research papers in three broad specific fields as follows:

Business and Economics

Management, marketing, finance, economics, banking, accounting, human resources management, international business, hotel and tourism, entrepreneurship development, business ethics, development studies and so on.

Humanities and Social Science

Anthropology, communication studies, corporate governance, criminology, cross-cultural studies, demography, education, ethics, geography, history, industrial relations, information science, international relations, law, linguistics, library science, media studies, methodology, philosophy, political science, population Studies, psychology, public administration, sociology, social welfare, linguistics, literature, paralegal, performing arts (music, theatre & dance), religious studies, visual arts, women studies.

Science and Technology

Astronomy and astrophysics, Chemistry, Earth and atmospheric sciences, Physics, Biology in general, Agriculture, Biophysics and biochemistry, Botany, Environmental Science, Forestry, Genetics, Horticulture, Husbandry, Neuroscience, Zoology, Computer science, Engineering, Robotics and Automation, Materials science, Mathematics, Mechanics, Statistics, Health Care & Public Health, Nutrition and Food Science, Pharmaceutical Sciences, and so on.

The journal is published both in print and online versions.

AIJCR publishes original papers, review papers, conceptual framework, analytical and simulation models, case studies, empirical research, technical notes, and book reviews.

AIJCR is indexed with and included in Cabell's, EBSCO, Ulrich's, IndexCopernicus International, and Gale. Moreover the journal is under the indexing process with ISI, ERIC, ProQuest, Scopus, DOAJ and Econlit.

DOI number

Each paper published in American International Journal of Contemporary Research is assigned a DOI number. The DOI of this journal is 10.30845/aijcr.

AIJCR is inviting papers for Vol. 8 No. 2 which is scheduled to be published on June 30, 2018. Last date of submission: June 20, 2018. However, an early submission will get preference in case of review and publication process.

Send your manuscript to the editor at editor@aijcrnet.com

For more information, visit the official website of the journal www.aijcrnet.com

With thanks,

Dr. Andrew Lessard

The Chief Editor

American International Journal of Contemporary Research

Contact: editor@aijcrnet.com

6. *Invitations to Submit to Irrelevant Journals*: Although most journals e-mailing to solicit a manuscript were usually of some relevance to my own research as a botanist, there was also a subset of highly irrelevant journals. These included the *SciFed Journal of Astrophysics* (which sent three identical requests and another this May, asking why they have not heard back from me), *Advances in Automobile Engineering*, and *Journal of Stem Cells and Regenerative Therapy*, to name a few. Some of these journals also sent insistent, follow-up e-mail solicitations, often directly referring to one of my own unrelated publications by title.

WHAT TO DO NEXT

The appearance of new predatory journals will undoubtedly continue as long as researchers remain ambivalent, ignorant, or accepting of this publishing trend. As one of their main targets, junior scientists such as graduate students writing their first paper need to be especially wary of predatory journals. Given that I, as a full professor with over 18 years of publishing articles, received so many requests from predatory journals, it would be interesting to determine if it might differ for graduate students, post-doctoral researchers, and junior tenure track faculty members in the United States. Authors in countries with limited financial resources may also be attracted to these journals because the cost is often much lower than legitimate journals. For example, a review of articles published in predatory journals from 2010–2014 revealed that 75% of the authors were from Africa or Asia (Shen and Björk, 2015). However, it is important to remember that legitimate, open access journals from these regions of the world can also be improperly labeled as “predatory,” so lists such as those above should be used with caution with non-Western and non-

English journals (Regier, 2018).

As emphasized here, authors should avoid submitting their manuscripts to these illegitimate journals, but there are also other implications of the proliferation of predatory journals. First, when authors are searching for relevant citations to include in their own manuscripts, they now must decide which articles are valid to cite and which to ignore (Beall, 2016a); it is not enough to always simply trust in the reputation of the journal itself. In addition, fake literature will continue to infiltrate academia as students and others unknowingly reference illegitimate articles found on the internet. Third, the onus now falls upon academic search committees to carefully vet the curriculum vitae of their job applicants to avoid applicants who pad their publication record with articles in low-quality, predatory journals (Kolata, 2017). Finally, the scientific community still needs to consider the role of paid editing services for non-English speaking authors (Gasparyan et al., 2015). In the end, authors, reviewers, and editors must remain vigilant about the predatory journals and publishers. This is the only way that we can thwart persons and companies who wish to devalue science for their own personal profit.

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Table 1. Journals that sent 68 e-mails to the author inviting journal submissions over a 103-day period. Shown for each journal is the publisher, sender of the e-mail invitation (Sender), and the following characteristics for each e-mail: fitting much of the criteria in the checklist above (Classic example), containing multiple grammar and spelling mistakes (Mistakes), containing one or more statements of effusive praise (Effusive praise), the sender listed as a single name or a combination of common American or British names (Simple sender name), whether the e-mail is from a journal from an unrelated field (Non-relevant field), and the number of times an e-mail was received (N). Journals are arranged by publisher in alphabetical order and grouped according to whether they are considered predatory by Beall, Cabell, both Beall and Cabell, or are not listed by either but contain characteristics of predatory entities, and legitimate journals.

Classic example	Mistakes	Effusive praise	Simple sender name	Non-relevant field	N	Journal Name	Publisher	Sender
Listed by Beall Only								
X	X	X	X	X	1	Journal of Biomass to Biofuel	Avestia Publishing, ASET Inc.	Prof. Seyed Gh. Etemad (CEO)
				X	1	Journal of Biomedical Engineering and Biosciences	Avestia Publishing, ASET Inc.	Prof. Seyed Gh. Etemad (CEO)
X	X	X	X	X	1	International Archives of Clinical Pharmacology	CliniMed	Christopher A (Editorial office)
X	X	X	X	X	1	Journal of Molecular Biology and Techniques	Elyns Publishing Group	Spandana. M (Assistant Managing Editor)
X	X	X	X	X	1	Current Opinion in Gynecology and Obstetrics	Gratis Open Access Publisher	Henry Nicholas (Editorial Office)
X	X	X	X	X	1	Journal of Pharmaceutics and Therapeutics	Gratis Open Access Publisher	Henry Nicholas (Editorial Office)
X	X	X	X	X	1	Journal of Alternative Complementary & Integrative Medicine	Herald Scholarly Open Access	Emma Lynch
X	X	X	X	X	1	British Journal of Research	Insight Medical Publishing (OMICS)	Professor Yokoyama Kenji (Editor)
X	X	X	X	X	1	Journal of Environmental Research	Insight Medical Publishing (OMICS)	Scarlett Johansson (Journal Coordinator)
X	X	X!	X	X	2	Journal of Plant Sciences and Agricultural Research	Insight Medical Publishing (OMICS)	Monalisa (Assistant Managing Editor)
	X	X!	X	X	2	Genomics & Gene Therapy International Journal	MedWin Publishers	Lori Elizabeth (Assistant Managing Editor)
				X	1	Journal of Advances in Plant Biology	Open Access Pub (OAP)	John Abraham (Editorial Office)
				X	1	Journal of Alternative Medicine and Mind Body Practices	Open Access Pub (OAP)	John Abraham (Editorial Office)
				X	2	Journal of Fertility Biomarkers	Open Access Pub (OAP)	John Abraham (Editorial Office)
				X	2	Journal of Preventive Medicine and Care	Open Access Pub (OAP)	John Abraham (Editorial Office)
				X	1	The Journal	Open Access Pub (OAP)	John Abraham (Editorial Office)
X	X	X!	X	X	3	SciFed Journal of Astrophysics	Scientific Federation	George Philip (Assistant Scientific Editor)
X	X	X	X	X	1	Journal of Soil Science and Health	SciTechnol (OMICS)	Komal Gupta (Journal Coordinator)
				X	1	Internal Medicine Review	Unknown	A. Lesnevsky, M.D. (Senior Editor)
X	X	X	X	X	1	Unknown Name	Sift Desk Group	Davis (Asst. Editorial Manager)

X	X	X	1	International Research Journal	Multidisciplinary Publishing	IJEAS Team
Listed by Cabell Only						
X	X	X	1	International Journal of Research in Environmental Science	ARC	Naresh B (Editorial Assistant)
X	X	X	1	Journal of Investigative Genomics	MedCrave Group	Isaac Brian
Listed by Both Beall and Cabell						
X	X	X	1	Journal of Geography and Earth Sciences	American Research Institute for Policy Development	Executive Editor
X	X	X	4	International Journal of Applied Science and Technology	Center for Promoting Ideas (CPI)	Dr. Jorge J. Santiago-Aviles (Chief Editor)
X	X	X	1	International Journal of Humanities and Social Science	Center for Promoting Ideas (CPI)	Dr. J. Sabrina Mims-Cox (The Chief Editor)
X	X	X	3	American International Journal of Biology	American Research Institute for Policy Development	Geneva McNicholl, on behalf of Editor-in-Chief Evytene
X	X	X	1	International Journal Environmental & Agricultural Science	Bio Accent	
X	X	X	1	International Journal of Education and Human Developments	Center for Global Research Development	Dr. Clayton Kennedy
X	X	X	1	Journal of Earth and Environmental Sciences	Gavin Publishers	Cathy Williams (Editorial Coordinator)
X	X	X	1	Forestry Research and Engineering: International Journal	MedCrave Group	Regina Lawsol
X	X	X	1	Net Journal of Agricultural Science	Net Journals	Prof. Kadriye Caglayan (Editor)
X	X	X	1	Advances in Crop Science and Technology	OMICS	Glory Har (Editorial Coordinator)
X	X	X	1	Journal of Bioanalysis & Biomedicine	OMICS	Kristen Nicole (Journal Coordinator)
X	X	X	1	Journal of Ecology and Toxicology	OMICS	Alena S. (Journal coordinator)
X	X	X	2	Journal of Phylogenetics & Evolutionary Biology	OMICS	Managing Editor
X	X	X	1	Research & Reviews: Journal of Botanical Sciences	OMICS	Stella Maris (Journal Coordinator)
X	X	X	1	Advances in Automobile Engineering	OMICS	Anna Watson (Journal Coordinator)
X	X	X	1	Journal of Research and Development	OMICS	Jenny Brown (Managing Editor)
X	X	X	2	Journal of Biodiversity Management & Forestry	SciTechnol (OMICS)	Shiba Kalyan (Journal Coordinator)
X	X	X	1	Journal of Plant Physiology & Pathology	SciTechnol (OMICS)	Associate Managing Editor
X	X	X	1	VEGETOS: An International Journal of Plant Research	SciTechnol (OMICS)	Ananda T (Journal Coordinator)
X	X	X	1	Journal of Biochemistry and Biotechnology	Series Communications	Annabel Wilson (Editorial Assistant)
X	X	X	1	SDRP Earth Sciences & Environmental Studies	Sift Desk Group	Dr. Renato Alencar

	X	1	Journal of Stem Cells and Regenerative Therapy	ZygoScient Research Insights, Inc.	Emily Watson (Editorial Assistant)
Presumed Predatory					
	X	1	6th Annual International Conference on Chemistry, Chemical Engineering & Chemical Process	Global Science and Technology Forum	Moreganaraj (Programme Manager)
X	X	1	Journal of Plant Science and Phytopathology	Heighten Science Publications Corporation	Murray L.
X	X	1	Journal of Pollution	OMICS	Chandu N (Managing Editor)
X		2	Journal of Plant Genetics and Breeding: Open Access	OMICS	John Brown (Journal Coordinator)
X	X	2	American Journal of Bioscience	Science PC	Editorial Office
X	X	1	and Biotechnology Natural Science	Scientific Research Publishing	Ms. LIU Mengzhu (Managing Editor)
X	X	1	International Journal of Pharmacovigilance	Symbiosis	Victor Daniel
X	X	1	Journal of Pharmaceutical Chemistry & Chemical Science	Unknown	Kristin Hanley (Journal Coordinator)
X	X	2	Journal of Marine Biology and Aquatic Research	Unknown	Jennifer Brown (Associate Managing Editor)
X	X	1	Journal of Aquatic Sciences and Oceanography	Unknown	Reuben Mark (Associate Managing Editor)
X	X	1	World Journal of Research and Review	Unknown	WJRR Journal Team
X	X	1	Agricultural Research & Technology: Open Access Journal	Unknown	Sophia Mathis
X	X	1	International Journal of Environmental Monitoring and Analysis	Unknown	Editorial Office
X	X	1	Letters in Health and Biological Sciences	Unknown	Katherine (Editorial Assistant)
X	X	2	Transylvanian Review	Unknown	
X	X	1	International Journal of Management and Economics Invention	Unknown	Journal Manager
Legitimate Journals					
	X	1	AIMS Genetics	AIMS Press	Dr. Cheng Bi (Managing Editor)
	X	2	Current Pharmacogenomics & Personalized Medicine	Bentham Science	Prof. Adrián Llerena (Editor-in-Chief)
	X	1	Frontiers in Biology	Higher Education Press and Springer	Hongjun Song Ph.D. (Editor-in-Chief) and Xueli Zhang (Managing Editor)
	X	1	Forests	MDPI	
	X	1	Advances in Bioscience and Biotechnology	Scientific Research Publishing	Ms. Jaojiao Yao (Alice) (Editorial Assistant)
	X	1	American Journal of Plant Sciences	Scientific Research Publishing	Ms. DENG Jing (Joy) (Editorial Assistant)
	X	1	Life: The Excitement of Biology	Self-published	Jorge A. Santiago-Blay, PhD

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Rapid A-C_i Response
(RACiR™) Method paper

Stinziano JR, Morgan PB, Lynch DJ, Saathoff AJ, McDermitt DK, and Hanson DT. (2017) The rapid A-C_i response: photosynthesis in the phenomic era. *Plant, Cell & Environment*, 40:1256-1262. doi: 10.1111/pce.12911

LI-COR®



Education News and Notes

PlantingScience participates in NSF's STEM for All Video Showcase

"I'm just also enthusiastic about plants, more than I ever was before – because they are awesome, actually. I'm sorry I missed that, but I'll catch up now." – PlantingScience teacher and Digging Deeper participant

"I'm there to inspire [students] to be better scientists, but they inspire me that the future is actually going to be awesome." – PlantingScience early-career scientist liaison and Digging Deeper participant

Come watch PlantingScience's new 3-minute video with footage from interviews with teachers and early career scientists from last

summer's collaborative teacher/scientist professional development workshop. PlantingScience joins 214 other NSF-funded projects from the DRK-12 and C-STEM programs in the 2018 showcase. This year's theme is "Transforming the Educational Landscape." If you are curious to see how PlantingScience and the Digging Deeper professional development program are impacting teachers and changing the education landscape for the better, please watch our 3-minute video at: <http://stemforall2018.videohall.com/presentations/1086>

Last year's award-winning video provides an overview of the Digging Deeper project and an outline of the research design, which can still be accessed at <http://stemforall2017.videohall.com/presentations/922>.

Make a Difference in Secondary Education: Sign up as a PlantingScience Mentor or Join the Master Plant Science Team

Are you looking for ways to impact the future of botany? To pay forward the mentoring and enthusiasm that made you the passionate botanist you are? Mentoring with PlantingScience takes about an hour a week and can be done from anywhere with an internet connection. The fall session starts September



**By Dr. Catrina Adams,
Education Director**

BSA Science Education News and Notes serves as an 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.

Screenshot from the STEM for ALL 2018 Video Showcase.

15. Sign up at <https://plantingscience.org/mentorjoin/mentorjoinmain> and complete your profile by September 10 for the best chances for team matches. Teachers appreciate the personal attention and motivational boost you give to small student teams, and it is an excellent way to polish your mentoring skills around investigation design and practice communicating with young and diverse learners. You can choose to mentor projects that fit nine broad themes in plant biology. Check out our Star Project Gallery for examples of student/mentor conversations at <https://plantingscience.org/psprojects/starprojectgallery>.

Graduate students and post-doctoral researchers: does mentoring with PlantingScience sound exciting to you? Do you have good communication skills already and some experience with or a strong interest in helping secondary students and teachers? If so, consider the next step: becoming a part of our Master Plant Science Team and serving

as a teacher/scientist liaison. We provide special training in what it takes to excel as an online mentor and reveal behind-the-scenes aspects of how the program works. First, you'll get to mentor several teams to learn the ropes and practice mentoring with diverse groups of students. Then you are paired with one of our participating teachers to help the teacher get the most from the program, make sure the teacher's mentors get the classroom and scheduling context they need to be good mentors, and help to keep the student/scientist conversations going strong. It is an excellent opportunity to see how a variety of mentoring styles play out with students and a powerful way develop your own mentoring and communication style. Liaisons make the program possible! In exchange for your extra help, we sponsor your BSA membership for the year and provide a 50% discount off of meeting registration. Learn more and apply by August 6 at <https://plantingscience.org/joinmpst>.

On the fence? Learn more about the program from participating mentors, teachers, and liaisons at Botany 2018's PlantingScience mentor workshop on Sunday, July 22, from 10 a.m. to noon.

Many thanks to the following BSA MPST 2017-2018 members for their hard work and dedication: Alex Rajewski, Anna Sugiyama, Ben Scott, Christopher Fiscus, Derek Denney, Dr. Chris J. Meyer, Elizabeth Lombardi, Elizabeth Stunz, Foong Lian Chee, Irene Liao, Jacob Suissa, Jaime Schwoch, Kate Eisen, Laura Klein, Liliana Belmonte, Morgan Gostel, Ojo Funmilola Mabel, Rachel Meyer, Sarah Wike, Stephanie Conway, Sukuan Liu, and Tania Jogesh.

Upcoming Education Conferences

Life Discovery – Doing Science Education Conference, March 21-23, 2019: Microbiomes to Ecosystems: Evolution and Biodiversity across Scale, Space, and Time

BSA co-sponsors the Life Discovery – Doing Science Education Conference, a stand-alone education conference for high school and undergraduate biology educators. The call for proposals is opening in July, so sign up soon to present your ideas. This is an interactive conference with many opportunities to network and share ideas with colleagues interested in biology education.

About the conference theme: Our knowledge about the Earth's biodiversity across space, time, and scale is expanding rapidly. New tools, like remote sensing, are creating new data sources, while other tools, like digitization, are freeing traditional datasets from the cabinets and drawers of labs and collections and

making them accessible online. How do we teach students about biodiversity at different scales and contexts with these new data, tools, and resources? How do we best enable and develop the next generation of 21st-century scientists and create data-driven educational programs aligned to national initiatives such as Next Generations Science Standards and Vision and Change for Undergraduate Biology Education? The Life Discovery – Doing Science Biology Education Conference will build on the 2017 data theme and challenge educators to create opportunities for their learners to explore our theme across:

Scale: Through new technologies, we can study biodiversity scaling from an individual's microbiome to the Earth's biomes. How do we help students explore biodiversity concepts and evolution at different scales and investigate interactions across scales?

Space: We now have access to environmental and biodiversity data spanning habitats, ecosystems, and landscapes. How do we help our students think in broader geographical contexts about evolution, biodiversity, ecology, and conservation?

Time: We have the ability to look at life on earth across geologic time through the fossil record and through digitized natural history collections. How do we approach big questions like how have populations, species, and communities evolved over time and how will big-scale processes like climate change and human impacts affect biodiversity in the future?

For more information and to see the request for proposals, please visit <http://www.esa.org/ldc/>.

Two different lightning talk sessions at Botany 2018.
Pick up new ideas 3 minutes at a time!

**HIGH-SPEED
BOTANY
FOR EVERYONE!**



Your colleagues have developed innovative ways to share botany with students and the public. Pick up effective education and outreach ideas you can use to share your passion for plants.

Join us for high-speed presentations, hors d'oeuvres, and plenty of time for conversation.

Monday at the **planting science** reception
7-9PM

2
unique options!

germinating



ideas

new data

new ideas

new approaches

and anything else not ready for a full talk.



Sequential talks with discussion at the end for feedback and refreshments.

Wednesday
3:45-5:30PM



FROM THE *PSB* ARCHIVES

60 years ago: Charles E. Bessey was memorialized in the pages of *PSB* more than 40 years after his death in February 1915. His love of teaching and his scholarly contributions are highlighted, as are some of the more unique aspects of his personality.

“I have talked with scores of Bessey’s students, over the course of a half-century, and in every instance they have told me of some inspiring occasion or statement, often profound sometimes homely, in classroom or elsewhere, that inspired them and endeared the man to them forever. The intensely infectious, and always wholesome enthusiasm of the man left their lasting stamp upon thousands of men and women who never went beyond the Freshman course with him. To this day few of them could distinguish between parenchyma and sclerenchyma, or tell the difference between *Chroococcus*, *Cystopteris*, and *Chenopodium*. But they all proudly testify to the lasting effect of a bit of meristem that he left forever implanted in their future lives, whether, in after college days they became bankers, lawyers, merchants, teachers, clergymen, politicians, biologists, foresters, botanists, geneticists, phytopathologists, or virologists!”

-Pool, Raymond J. “Professor Charles Edwin Bessey, Master Teacher” *PSB* 4(5): 7-8

50 years ago: Editor Adolph Hecht thanked Bill Stern for filling in as “Temporary Editor” and alerted readers to a problem that persists to this day, as the current editor can attest.

“May I take this opportunity to thank Dr. Bill Stern for the superb job he did as ‘Temporary Editor.’ One might assume that this was very easy for Bill to do since he himself had been Editor for several years preceding my current term. . . Among other problems was his need to “scrounge” for appropriate copy to fill our usual eight pages at quarterly intervals. This continues to be my problem, yet surely the botanists of America are engaged in many activities that deserve to be brought to the attention of our readers.”

-Hecht, Adolph. “Notes From The Editor” *PSB* 14(3): 4



STUDENT SECTION

Navigating BOTANY 2018: A Guide for Student Members

The annual BOTANY conference is just around the corner! With 6 days of formal talks, dual poster sessions, workshops, field trips, social events, networking, and more, you're probably wondering how you can get the most out of this year's experience. Well, don't worry because we've got you covered in our student-focused guide below.

Travel and Lodging

1. **Travel Grants:** Although it is too late to apply for BSA-related travel grants this year, please keep these opportunities on your radar for spring 2019! You can find a consolidated list of these awards as well as details pertaining to them online at <http://www.botany.org/>. Once you reach the website, click the "Awards" tab and then scroll down and click the "Travel Awards for Students" tab. A list will pop up with links to each of the following:

- **PLANTS grants** continue to thrive, thereby ushering in a new cohort of undergraduates each year from talented and diverse backgrounds. The PLANTS program has been funded by the NSF and BSA since BOTANY 2010, covering the normal costs of travel, registration, food, and accommodations at the meeting.
- **Triarch "Botanical Images" Awards** provide acknowledgement and travel support to BSA meetings for outstanding student work in the area of creating beautiful botanical digital images. If you already use images of plants in your research, why not submit some of your favorites to show them off?
- **Section Awards:** There are numerous sections within the BSA that provide travel awards to the annual BOTANY conference. Please be sure to check with your sections online for more details!
- **Vernon I. Cheadle Awards** are generally awarded to students who will be presenting in a session sponsored by the Developmental and Structural Section, so please plan accordingly!
- **Finding a Roommate:** Are you looking to save \$\$\$ by splitting hotel costs at BOTANY 2018? Check out BSA's nifty roommate finder tool at <http://images.botany.org/roommate.shtml>. It can be a great way to



By James McDaniel and Chelsea Pretz,
BSA Student Representatives

connect with your peers, make new friends, and forge life-long professional connections! Also, for more information on discounted hotel rates, check out: <http://www.botany-conference.org/hotels.html>.

Volunteer at the Conference: Did you know that you can earn your early registration fee back if you volunteer to assist BSA staff at the conference? In fact, the conference couldn't happen without the gracious help of students who run the registration booth, monitor ticketed events, and make sure that sections, symposia, and colloquia run smoothly. For more information about this wonderful opportunity, be sure to read your BSA newsletters that come via e-mail and keep tabs on the conference website (<http://www.botanyconference.org/>)!

Events for Students

If you have already registered for BOTANY 2018, it is incredibly easy to add events to your conference registration! Navigate to the conference website at <http://www.botanyconference.org/> and click the link "Register Online for Botany 2018". Once you are re-directed to the registration page, then click "Modify Registration". Please note that while some events are free, all of them are reasonably priced!

Workshops

- "Job Search Transparency: Learning the Unwritten Rules to Land your Dream Job", led by your friendly neighborhood BSA student representatives and a diverse group of panelists who will make brief introductions and then open up the floor with an informal question-and-answer session between

the panelists and attendees. The goal of this workshop is to help young professionals navigate and move forward from graduate school or postdoctoral positions on a positive career trajectory. (*Free, but please register!*)

- "The Elevator Speech: Crafting an Effective Pitch that Highlights your Research and Illustrates the Broader Impacts", led by the BSA student reps and featuring tips from our keynote speaker Amanda Grusz, shown below, who will provide helpful tips on crafting an effective elevator speech followed by a breakout session to allow attendees the opportunity to revise and modify their own elevator speeches. (*Free, but please register!*)



- "Tips for Success: Applying to Graduate School", led by Anna Monfils, is a panel discussion designed to introduce undergraduate students to the specific requirements for applying to graduate programs in plant biology. (*Free, but please register!*)

Student Involvement in Botany Luncheon – A Focus on Botanical Career Opportunities

- What can you do with a degree in botany? Make sure that you are present at the annual Student Luncheon to find out! We will kick

off the event with a short talk, “Following Your Plant (or other!) Passion”, from our keynote speaker, Susan Pell, pictured below at left, the Science and Public Programs Manager at the U.S. Botanic Garden. Then you will get a chance to chat with panelists from various career paths in a “speed-dating” format. FYI, the panelists usually have insider information on open positions for graduate school or careers. (\$10 - includes a catered lunch)

Student Social and Networking Event

- This event is an annual favorite! This year we will be at Grand Rounds in Rochester, Minnesota. This venue is a short walk from the Rochester Civic Center and features good food and local brews. Sponsored in part by Wiley—come catch up with old friends and meet new ones while enjoying craft brews and snacks. (\$10 - includes a drink ticket)

WILEY

Undergraduate Student Networking Event

- This is our second annual Undergraduate Student Networking Event, which will be held at the beginning of the conference on Sunday evening. This event was a great success last year! Not only will it provide attendees with an excellent opportunity to meet fellow undergrads, but it will also allow individuals to make some new friends/contacts to help them navigate through the rest of the conference. You’ll also get a chance to hear about different career paths! (Free – food will be included!)

Poster Session

- Whether you are presenting your own work or just there to see what other people are working on, this is a great time to talk science, learn about cutting-edge plant research, and meet people! Poster sessions will happen on July 23. Be sure to check out a detailed schedule on the web at <http://2018.botanyconference.org/engine/search/> or via the Botany Conference app, which will be available soon! (Free - no ticket required)



Field trips

- Rochester has a rich history and diverse local ecosystems, which you can explore first-hand with local experts! This year, a whopping 13 field trips (one overnight) are being offered over the span of four days (Friday, Saturday, Sunday, and Thursday). Whether you have a knack for hiking, collecting, kayaking, or exploring, we bet there's a field trip tailored for you! Discover sedges and other flora of the area, visit the new Bell Museum and MIN Herbarium, wander through the Minnesota Landscape Arboretum, or visit Paisley Park—Prince's private estate! For more information about individual field trips, please check out the following link: <http://www.botanyconference.org/field-trips.html/>. (*Prices vary*)

For most ticketed events, it's not too late to register! Tickets for these events are easy to add to your conference registration: Navigate to the conference website at <http://www.botanyconference.org/> and click the link "Register Online for Botany 2018". Once you are re-directed to the registration page, click "Modify Registration". You can also register for events at the registration booth once you arrive at the conference; however, events tend to fill up fast, so plan accordingly!



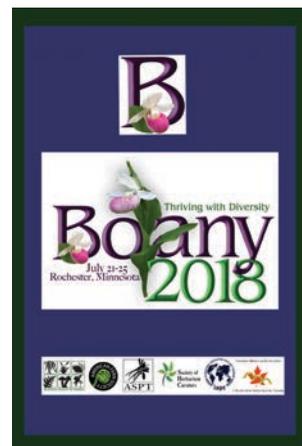
Do you Tweet?
Be sure to join the conversation!

Follow the conference at
#BOTANY2018

We will be tweeting room changes,
restaurant reviews, conference tips, and
other bits of information through
Twitter and our conference App.

The BOTANY Conference App

- **Schedule Planner:** With so many events co-occurring during the conference, planning each day can be a daunting task! However, with the BOTANY conference app, you will have the freedom to effortlessly browse talks and events as well as create your own easily accessible schedule to stay on track. The app for this year has not been released yet, so make sure to read your BSA newsletters that come via e-mail and keep tabs on the conference website (<http://www.botany-conference.org/>) for more details!
- **Share your BOTANY experience:** Social media allows you to share your experiences at the conference, and the number of tweets, posts, likes, and shares are growing every year. The social media aspect lets you share your photos and thoughts throughout the conference, and it can also be a way to share your work and increase your visibility. It's a great way to see what is going on and keep tabs on all of your conference buddies! Keep an eye on the hashtags to use this year, but be sure to use #BOTANY2018 in your posts!



Stay in touch - even if you can't be with us in Rochester!



BOOK REVIEWS

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ECOLOGY

Evolutionary Ecology of Weeds, ed 2

Jack Dekker
 2016. ISBN: 978-1-53540-107-4
 Paperback, US\$60.00. 552 pp.
 CreateSpace Independent Publishing Platform, San Bernardino, California, USA



Weeds are typically the first plants I learn when I have traveled to a new area for work because of their abundance and propensity for upland habitats. Several species that I am familiar with in the East also occur out West, which would follow the pattern of settlers moving across the country. Dr. Dekker makes this point early on: the story of weeds is the story of humans and how we have moved and brought agriculture to different areas throughout the world. Weeds, unless they are invasive, haven't been a focus of any of the work that I've done, but reading this book has given me a broader perspective.

The book is separated into seven units containing nineteen chapters. There are also selected readings, references cited, and an indexed glossary. There is a summary and foreword to kick things off, with a table of contents in between.

Unit 1 is the nature of weeds. This unit only contains one chapter, but explains how many of the plants that we now consider weeds are related to plants and their seeds that are consumed. The history of weeds is the history of agriculture, and many weedy plants have relatives that are still consumed to this day. A list of such species is provided with crop species and their associated weed relatives (pp. 52-76).

Unit 2, "The evolution of weed populations." is described within Chapters 2-5. There is a focus on natural selection and adaptations that have made weedy species able to persist and occupy opportunity spacetime. Natural selection has included human intervention where the attempt to control weeds has

produced stronger variants. This also includes a lot of things discussed in detail later in the book but mainly a plant that can colonize quickly after a disturbance and sometimes lay dormant in the seed bank germinating when the conditions improve.

Unit 3, “Adaptation in weed life history,” is described within Chapters 6-8. Adaptations are further discussed as are abilities like exploiting locally available opportunity, growth form, and strategy per conditions. I don’t know that a plant can have a strategy, but morphological adaptations to survive in different conditions are discussed. Seed size and number is also discussed here and later in the book. A plant has finite resources and, depending upon conditions, the seed size and number can adjust over time to the habitat conditions to increase survival potential.

Unit 4, “Adaptation in local plant communities,” is described within Chapters 9-10. The concept of a “weed guild” is introduced, which would pique the interest of my birder friends, I believe. That’s the only other place that I have heard that term used is by birders, but it seems to fit weeds as well for species that have similar adaptations and habitat preferences. I also appreciated the biogeography theories as an area of study that needs to be further explored.

Unit 5, “Complex adaptive weed systems,” are described within Chapters 11-13. This unit dives into the features of weedy vegetation and complex adaptive system (CAS). CAS includes how the many parts of an organism or community of organisms work together to adapt to the environment in which a species exists.

Unit 6, “Representation of weed biology,” is described within Chapters 14-16. Discussion includes statistical analysis and how it doesn’t

fit these species due to the dynamics and adaptive capabilities of the group and how the assumptions used are typically incorrect. The cultural chapter, Chapter 16, is interesting in that it discusses how species are studied and how perception and opinion have been too heavily intertwined with weed science

Unit 7, “Weed case history,” is described within Chapters 17-19. This unit gives a thorough investigation into species that the author has studied throughout his career and is an in-depth look into the *Setaria* species, *Brassica napus*, and *Abutilon theophrasti*. The life histories, morphology, and adaptations are included within this discussion along with species associations. It would be hard to find a better synopsis of decades worth of research into these groups and species.

This would be a great text for an undergraduate course in weed evolution. There are a few references to Wikipedia that should probably be sourced elsewhere, since it’s not a peer-reviewed source. I would also like to see more selected readings and the addition of chapter review questions since there is no companion text with possible assignments if I were using it to teach. All things considered, this would be a great resource for someone looking for more information on this topic and on the case study species in particular.

-David W. MacDougall, CWB® Consulting Biologist

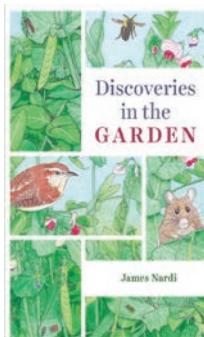
Discoveries in the Garden

James Nardi

2018. ISBN: 978-0-22653-166-3

Paperback, US\$25.00; 280 pp.

The University of Chicago Press,
Chicago, Illinois, USA



For many burgeoning botanists, the garden is the birthplace of a fascination with plants. Dr. James Nardi's new book, "Discoveries in the Garden", harnesses this sentiment and expands on it, giving us a wonderful tour of plant form and function while magnifying plant and animal interactions through the lens of the backyard garden. Through his use of illustration, anatomical photographs, at-home experiments, and thoughtful prose, Nardi introduces an abundance of information without losing the captivating appeal of plants.

The first few chapters take us on a journey through a plant's life from seed to flower, ranging from belowground roots to aboveground stems, leaves, and flowers. These chapters focus on the development of the plant, emphasizing different organs and anatomical structures, as well as the triggers that help plants "know" when and how to grow. Chapter 4 gives an elegant breakdown of pollination, fruit development, and the alternation of generations in plants, representing concisely one of the more complex and confusing concepts in plant biology.

With the basics covered, Nardi transitions into the more in-depth topics of energy collection and plant mobility in Chapters 5 and 6. Photosynthesis is broken down into its respective chemical components, including a comparison of C_3 and C_4 plants. He then introduces us to the macro- and micronutrients that plants obtain from the soil. These explanations are complemented

by suggested at-home experiments that use different fertilizers to illustrate how plants utilize these nutrients. Next, the familiar growth of tendrils and vines is tidily explained and contrasted with the daily movements of leaves and flowers: a fascinating peek into the world of plant behaviors.

"Wisdom of the Weeds", Chapter 7, uses the unique perspective of "weedy" plants to illustrate several plant phenomena, including asexual reproduction, competition, and seed dispersal. This chapter highlights some of the reasons weedy plants are so successful and gives us pause to see these more common plants in a different, perhaps more positive, light.

Chapters 8 and 9 discuss plant chemicals. In sophisticated detail, Nardi reflects on plant pigments, odors, and oils; their utility to the plant; and their utility to humans through dyes, fragrances, and nutrition. A section on companion gardening advises the home gardener perfectly, with insights into ecological competition and large-scale agriculture.

The book concludes with a discussion of non-plant garden inhabitants, focusing on bacteria, fungi, and insects. The inclusion of species interactions and ecosystem functioning here places the plant in the context of a community with its biotic counterparts. Nardi emphasizes belowground soil dynamics and the living components of soil health—an aspect of the garden that may be overlooked by the casual observer.

In each chapter, Nardi does an excellent job of incorporating aspects relevant to a variety of target audiences. The prose of the book is appropriate for all audiences, while sections titled "Observe" will have the home gardener and plant enthusiast looking at their yards in a new light. Sections titled "Hypothesize" suggests different aspects of the plant to look

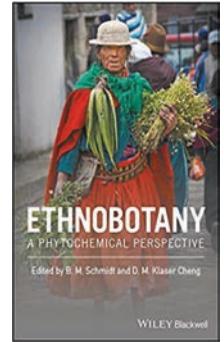
ECONOMIC BOTANY

Ethnobotany, a Phytochemical Perspective

Barbara M. Schmidt and Diana M. Klaser Cheng, Eds.

2017. ISBN: 978-1-11896-190-2
Hardcover, US\$150.00; E-Book \$120.99. 357 pp.

John Wiley & Sons Ltd., Hoboken, NJ, USA



at or manipulate, predictions to make, and experiments to help answer these questions. Some of the experiments seem simple and require little more than the materials a typical gardener would have access to. More intricate experiments are also proposed, requiring more time and some basic scientific equipment (petri dishes, dissecting microscope, etc.). The diversity in recommended experiments allows the reader to pick and choose according to their own interests or teaching purposes.

The aesthetic appeal of the book adds a new dimension to the biology it describes. The scientific figures and anatomical pictures of plants lend insights to the casual gardener that might otherwise only be found in a more technical textbook. The beautiful and detailed illustrations, artfully drawn by Nardi, show the complexity and diversity of the nature found right in our backyards. Nardi uses a rich yet simple prose and quotes from writers, scientists, and philosophers to convey his message and puts the detailed science a more well-rounded context. He breaks down the scientific terminology into its roots in Latin and Greek, which helps to describe concepts in layman's terms, and will delight the language aficionado.

Nardi's focus on a traditional North American or European garden allows him to add a more personal feeling to the book as he references his own home garden in Illinois. Despite his regional specific experience, the scientific principles and many of the references to crop plants and ecology will resonate with a global audience. Nardi explains the science of plants in a clean, charismatic and cultivated way that can be enjoyed by plant enthusiasts and gardeners of all scientific backgrounds. "Discoveries in the Garden" is a wonderful read.

*-Nora Mitchell, Department of Biology,
University of New Mexico, Albuquerque, New
Mexico, USA*

Intended as a textbook for advanced undergraduate or graduate students, there are many things to like about this book, which examines the chemistry of plant medicines, dyes, fibers, flavors, poisons, and insect repellants, among other useful botanicals. Since both editors have industry connections (B.M. Schmidt, Global Leader of Plant Biology, L'Oreal USA; D.M. Klaser Cheng, Senior Scientist, Nutrasorb, LLC and Visiting Scientist, Rutgers University), a logical focus is to unite botany, ethnobotany, and phytochemistry with inputs of applied botany to industry.

The first chapter, one third of the book, introduces ethnobotany. Key topics include the history of plant exploration, current issues such as conservation and intellectual property rights, and a brief review of plant anatomy. Focus on plant taxonomy highlights especially significant, economically important plants. Valuable attention is paid to herbaria and voucher specimens.

Discussion about intellectual property is appreciated, as present-day researchers face hurdles even to collect voucher specimens for basic research in taxonomy, systematics, and chemotaxonomy. Collection for bioprospecting is lightly covered, including the complexities arising from the Convention on Biological Diversity, "benefit

sharing,” and “capacity building”—although considering the authors’ work with industry, that issue may have arisen. I was impressed by this warning (p. 21): “...in some ways, ethnobotany is unintentionally at odds with conservation and the rights of indigenous people. Publishing descriptions of valuable plant species and traditional knowledge as a free exchange of scientific information could contribute to economic exploitation of the area and rob the people of potential economic benefits. The question of whether traditional knowledge should be made public is a topic of much debate. Information in public domain is free for development by commercial interests unless a patent application is filed before publication. So, academics must err on the side of caution when publishing potentially sensitive information.”

The achievements of plant-derived drugs are many and should be celebrated, but many obstacles are put before present-day collectors—so it is unclear whether success stories revealed in the text will be achievable any longer. This may be an historical look at past discoveries.

The uniqueness of this book is its focus on phytochemistry. Fundamentals of secondary metabolism, as well as traditional and modern methods of plant extraction and chromatographic techniques, are summarized in 30 pages.

The remaining two thirds of the book offers a history of plants native to each region and features “Case Studies” about selected plants that changed the course of human history from each continent. Africa holds *Achillea millefolium*, vanilla, and traditional treatments for HIV in South Africa. The Americas feature agave, quinoa, maqui (*Aristotelia chilensis*; an ancient Mapuche medicine with antidiabetic potential), and betalains from *Chenopodium quinoa*.

Asia, the largest continent, holds the longest list of authors (12). Case Studies include the ethnobotany of teeth blackening in southeast Asia, *Artemisia* and human health, the sacred plants *Betula utilis* (*bhojpatra*) and *Quercus oblongata* (*banj*) from Uttarakhand, and neem-based insecticides.

European plants include *Lavandula stoechas* among Anatolian people, fascinating pages devoted to ‘Mad Honey,’ indigo, and insecticides based on plant essential oils. Oceania contributes *Musa* spp., a traditional treatment for diarrhea, and kavalactones from kava (*Piper methysticum*) root.

References placed directly behind each section enable users to peruse sources straightaway. The book closes with a 10-page botanical index and 18-page subject index, including chemical constituents, common names, geography, and prominent persons. Lovely illustrations about ethnobotanical applications enrich the textbook greatly.

The book has 28 contributors; the chapter about Asia has 12; about Africa, 6. Multiple authors multiply the possibility of misinformation, requiring the editors and publication staff to catch and correct contradictions.

I am surprised to observe so few figures and photos are credited. Other editorial issues: equivalent illustrations of *Digitalis purpurea* (p. 85; p. 94), whereas illustrations of hundreds of other economic plants are omitted. More worrisome, the Near East is defined as the center of origin for sesame and millet (pp. 233-234): “The Indus Valley Civilization (i.e., Harappan Civilization, c. 3300-1300 BCE)... grew crops that most likely originated in neighboring regions such as wheat, barley, peas, lentils, flax, mustard, sesame, and millet. Compared to other centers of diversity, few row crops originated in South Asia,” omitting

sesame from Table 6.3, 'Crops that originated in South Asia.' Also oddly, sesame is listed in Table 4.1 (p. 149) among 'Crops that originated in Northern Africa!' References show alternative studies. Some coordination was missing, allowing these discrepancies to creep in.

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

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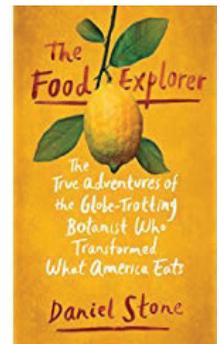
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The Food Explorer: The true adventures of the globe-trotting botanist who transformed what America eats

Daniel Stone
2018. ISBN 978-1-10199-058-2
Hardcover, US\$28.00 (Canada \$37.00); 416 pp.
Dutton, New York.



The Food Explorer presents a uniquely American story, documenting events that contributed to the wealth of food plants and other valuable plant life available to residents in the United States today. David Fairchild (1869–1954) was responsible for the introduction of more than 200,000 exotic plants and varieties of established crops into the United States between 1894 and 1904, including avocados, dates, mangos, nectarines, pistachios, pomegranates, seedless grapes, soybeans, bamboos, and flowering cherries. Certain varieties of wheat, cotton, and rice became especially economically important. Stone's biography recounts Fairchild's fascinating travel adventures acquiring the familiar foods we eat and plants we now utilize without question. He traces early plant introduction to the United States by David

Fairchild and close professional associates, Frank Meyer and Wilson Popenoe.

Fairchild grew up in Kansas in post-Civil War 19th century. Having studied botany and horticulture at Kansas College, he created a way to combine his love of plants and travel into a job with the nascent U.S. Department of Agriculture. At the age of 22, he created the Section of Foreign Seed and Plant Introduction, which he led for 37 years. He traveled to more than 50 countries on every continent, in search of worthwhile seeds and cuttings. At the time, such travel was rare, in an era when international travel was very challenging and done by ship.

Barbour Lathrop, a wealthy philanthropist whom Fairchild met on an ocean liner, financed his travels. Fairchild met people from all levels of society; some were hostile. He committed botanical espionage; he succumbed to typhoid, got arrested in Corsica, was shot with arrows, and nearly fell off a mule on a narrow path beside a deep canyon in the Andes while looking for quinoa. Ultimately, Fairchild developed a strategy of talking with people, visiting markets, and learning by observing what people are eating and what they were growing. Since much economic endeavor in the United States at that time depended on farming, the growth of America was aligned with the expansion and improvement of agricultural commodities. Through Fairchild, and blessed by a variety of ecological zones, the United States was transformed to have a diversified food system, providing rich dietary choices.

Some amusing events are recounted, just as originally told by Fairchild in his autobiography, *The World Was My Garden* (1938). In 1902, he was traveling in Asia, looking for mangos that would thrive in the United States. He bought big baskets of several

cultivars, but the loads in his baskets of whole fruits were deemed to be too large to board onto the ship and the steamer was about to depart. Realizing that the items he needed to send home were only seeds, not whole fruit, Fairchild rounded up a group of local boys on the pier, paying them to eat the fruit and give him the seeds, which he hastily packed in charcoal.

Stone also delves into the life and psyche of Frank Meyer, who was hired by Fairchild as a field explorer once Fairchild had married and settled down to his permanent post in Washington D.C. Meyer was a zealously dedicated collector who traveled in China extensively, much of it on foot, through regions where locals hated foreigners intensely. Eventually danger, deprivation, disappointment, loneliness, and isolation resulted in Meyer's descent into depression. Fairchild was unable to help and unable to provide the necessary supportive counsel. Meyer's trajectory was tragic.

Through Charles Marlatt, a childhood acquaintance of Fairchild who had matured as an entomologist, the reader gets a balanced view but is warned about the downside of those endeavors, because the tons of samples sent home to Washington were not quarantined and thoroughly inspected. Therefore, plant diseases and pests were imported too, such as the codling moth, Hessian fly, asparagus beetle, hop-plant louse, cabbage worm, wheat-plant louse, pea weevil, Croton bug, boll weevil, San Jose scale, gypsy moth, brown-tail moth, Argentinian ant, and alfalfa-leaf weevil. It was nearly impossible to control problems once they were released into the ecosystem.

The plant importation trend introduced a series of errors. Spotted knapweed is an aggressive noxious biennial that suppresses native grasses and has now spread to 7 million

acres. Grazing animals avoid it. Leafy spurge now inhabits 2.5 million acres, and only some types of goats can eat it. As a result, biological deserts are expanding and are extremely expensive to eliminate. Among the gravest ecological catastrophes caused by imported plants was chestnut blight. It was first noticed on American chestnut trees at New York's Bronx Zoo in 1904. At that time, chestnuts were a canopy species in 8.8 million acres of eastern forest. They were majestic, providing an abundance of food for wildlife. Chestnut wood was rot resistant, did not warp or shrink, and was useful in many ways, such as for ornamental interior wood trim. Spores of the blight fungus spread so that within 40 years, the American chestnut was a threatened species. Four billion trees died. Marlatt argued that the blight could have been prevented if the federal government had wisely quarantined and inspected all imported plants. Fairchild thought this was a ridiculous idea, impeding the speed of progress for no good reason. Marlatt was vindicated when Congress passed the Plant Quarantine Act in 1912, and inspections were the domain of the Federal Agricultural Board, which Marlatt controlled.

But missing from these pages is a more considered, analytical assessment about the perils of plant introduction. Stone fails to mention any cautionary notes against bio-piracy—the theft of another country's botanical heritage—nor present-day rigorous regulations by governments protecting their valuable genetic resources. Stone's narrative style is rambling, with many meandering digressions. It may appeal to an audience of amateurs with culinary interests or armchair travelers. However, for any serious seeker, Fairchild's own autobiography is the source Stone rephrases. Several of Fairchild's many archival black-and-white photographs are

reproduced, along with eight lovely botanical illustrations in color on quality paper stock, of Corsican citron, cashew nut, papaya, mangosteen, avocado, grapes, mango, and watermelon. Nine pages of a bibliography, 47 pages of notes, and an 11-page index close the book.

–*Dorothea Bedigian, Research Associate, Missouri Botanical Garden, St. Louis, Missouri, USA*

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HISTORICAL

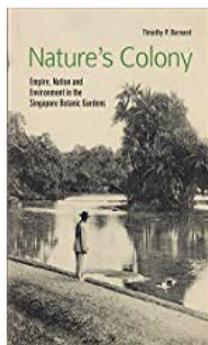
Nature's Colony: Empire, Nation and Environment in the Singapore Botanic Gardens

Timothy P. Barnard

2016. ISBN: 978-981-4722-22-3

Paperback, SGD\$34.00. 304 pp.

NUS Press, Singapore



As an institution connected with a diminutive insular city-state in Southeast Asia, the Singapore Botanic Gardens might seem an esoteric subject for a history monograph. Environmental historian Timothy Barnard's *Nature's Colony: Empire, Nation and Environment in the Singapore Botanic Gardens* makes a compelling case otherwise. In Barnard's handling, the Garden serves as an intriguing case study in the transition from colonial to postcolonial botany, in the relationship between science and state administrative priorities, and in the ecological management of a growing metropolis. On the whole, this is an enjoyable and meticulously researched book that makes a worthy contribution to the history of 19th- and 20th-century botany.

For decades subsequent to Singapore's founding as a British East India Company trading post in 1819, European residents cultivated only a narrow range of commercially valuable crops. It was not until 1859, when a well-heeled association of gardening enthusiasts resolved to establish a "pleasure garden" (23) on the model of an English estate, that the Singapore Botanic Gardens came into existence at its present location. This was a bourgeois colonial institution through and through, with restricted access for non-white and less affluent clientele. In 1874, insufficient revenues prompted the government to assume

jurisdiction over the garden, whereupon scientifically trained botanists from Kew were—for the first time—hired as primary caretakers. Under the tutelage of Henry Murton, and later, Nathaniel Cantley, the Garden acquired a herbarium, arboretum, and zoological menagerie, and played an important role in biodiversity conservation and reforestation. Henry Nicholas Ridley, the first to hold the title of garden Director, brought the Garden unprecedented renown by making it a center for rubber cultivation and experimentation. This marked the beginning of the end of the Garden's dependence on Kew, as it came increasingly to be seen as a hub of botanical expertise in a "polycentric network of science" (169).

By the time Isaac Henry Burkill took on the directorship in 1912, rubber's fortunes had waned, prompting a shift in emphasis from economic botany to herbarium-based study. The burgeoning study of orchids, beginning especially with the directorship of Richard Eric Holttum in the 1920s, was another sign of changes underway. These enthusiasms spilled outside the Garden, in fact, when elite Chinese and European Singaporeans undertook sophisticated orchid cultivations of their own. Orchids took on particular significance after independence, when hybrids concocted in the Garden's laboratories and named after foreign notables came to serve important symbolic cultural and diplomatic functions. Independence also brought challenges, however, as colonial-era institutions like the Garden seemed progressively out of place. Under the rubric of what Barnard calls "developmental botany" (not to be confused with similarly named studies of evolutionary plant biology), this scientific institution was thus subordinated to the needs of a modernizing and industrializing nation-state. Under such constraints, it reverted to the status

of a kind of “recreational park” headed by a “chief administrator” rather than a “director” (244). Beginning in 1988 under the leadership of Tan Wee Kiat, however, who reclaimed the title of “Director,” the Garden experienced something of a renaissance spearheaded by orchid horticulture, conservation, and experimentation. This rehabilitation ran full circle when the Singapore Botanic Gardens achieved UNESCO heritage status in preparation for the 50th anniversary of independence, and perhaps even more so when Nigel P. Taylor—lately of Kew—took up the directorship in 2011.

Depending on their disciplinary standpoint, readers may experience occasional points of frustration. More rigorous interrogation of sources would have helped to contextualize some of the author’s primary and archival materials, not least the repeated reference to “coolies”—meaning indentured laborers or slaves, and now considered a highly derogatory title in many parts of the world—a term used throughout the early chapters without qualification. In light of the Garden’s role as a clearinghouse for plant knowledge in a highly bioculturally diverse region of the globe, further discussion of indigenous knowledge in relation to the collection of plants—beyond cursory reference to the “native assistants” (159) who served on botanical expeditions—would have been welcome as well. Barnard’s thesis regarding the role played by the Singaporean Botanic Gardens in an increasingly “polycentric” botanical network independent from Kew and Britain, moreover, would have been well served by some analysis of the influence of American botanists in the region, especially during the Cold War. Finally, given the wealth of archival research that clearly informs this work, it is disappointing not to see a more detailed breakdown of manuscript sources in the book’s bibliography.

These issues notwithstanding, *Nature’s Colony* is a useful work that will interest a diverse and interdisciplinary readership. Readers will especially appreciate the book’s studious attention to vernacular and Latin plant nomenclature, as well as its gardener’s eye for horticultural detail. Barnard’s regard for the hands-on particulars of working with plants—from Ridley’s method of “calling” rubber from *Hevea brasiliensis* (140-1) to the innovative laboratory process of germinating orchid seeds without the normally required symbiotic fungi—is similarly refreshing. Additionally, many of the anecdotes recounted by the author are absorbing in their own right, such as his description of how a Japanese botanist named Kwan Koriba helped to save the Singapore Botanic Gardens from depredation during World War II, and the almost slapstick-worthy attempts to recapture a crocodile that escaped from the zoological gardens. Environmental humanists, for their part, will welcome the book’s analysis of the postmodern “greening” of one of world’s most urbanized societies. Historians of botany, finally, have gained a proficient survey of an important botanical institution and an invaluable starting point for future research.

-Geoff Bil, *University of British Columbia*

SYSTEMATICS

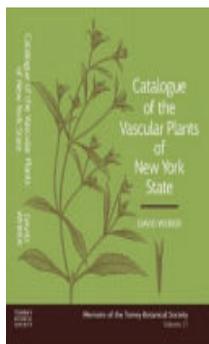
Catalogue of the Vascular Plants of New York State

David Werier

2018. ISBN 978-0-9996525-0-3

Hardcover, US\$35.00; Volume

27; 544 pp. + iv



Memoirs of the Torrey Botanical Society

For my research in the Adirondack Mountains of northern New York, I have relied heavily on the digital atlas of the New York flora at <http://www.newyork.plantatlas.usf.edu/> of which David Werier is one of the authors. *Catalogue of the Vascular Plants* is a greatly expanded and meticulously documented outgrowth of this work. This book is a resource for anyone interested in the plants of New York State. It is also an exemplar of how to compile a flora.

An introduction, methods, results, and acknowledgements comprise the volume. The introduction includes a summary of floristic work in the state—starting, appropriately, with John Torrey—followed by methods. Here we find how the author studies taxa from reliable published sources, a survey of herbaria, and his personal familiarity with the flora. Synonymy is treated with similar rigor. There is a documented flora of 1993 native species for New York State including hybrids and infraspecific taxa.

A great amount of detail is given to the nativity of plants with discussions on where they might or might not persist. If non-native plants are included, the state flora consists of 3524 species, meaning that a remarkable

43% of the total flora are non-native plants and plants of unknown status (uncertainty as to the taxon being native or non-native). Also included is the state ranking of rare and endangered plants.

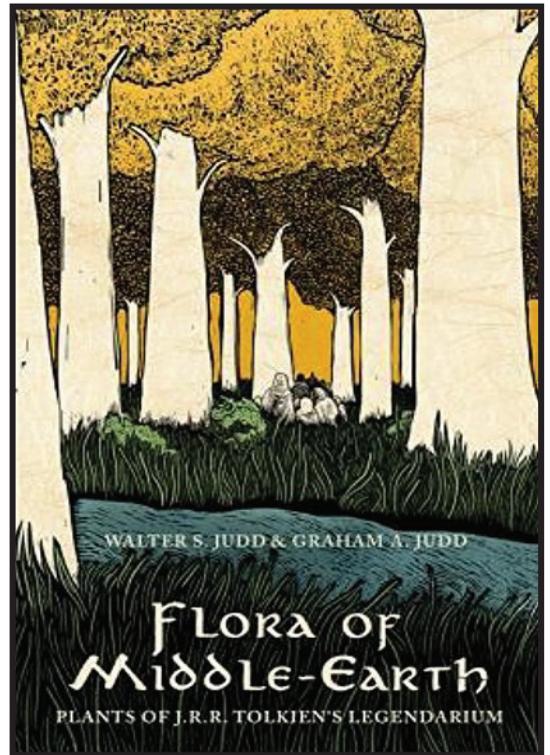
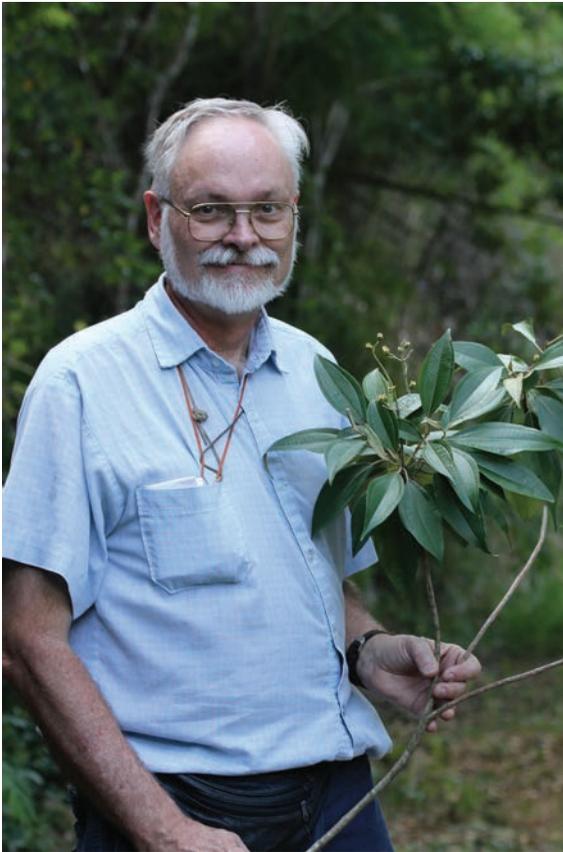
The bulk of the book consists of three “appendices.” The first appendix is Accepted Taxa. For each taxon there is the common name, synonymy, and a voucher—a designated herbarium specimen documenting the presence of that species in the state. The second appendix, Excluded List, is a likewise detailed listing of plants that should be considered as non-native. The third appendix, Expected List, includes plants that can be expected based on reports from contiguous and nearby states. Both the excluded and the expected list are well-documented with literature and herbarium references.

Extensive references and a comprehensive index of common and scientific names conclude this well-edited, sturdily bound volume.

The Torrey Botanical Club is to be commended for publishing this work, continuing their tradition of supporting floristic work in the Northeastern United States. It is an appropriate production for the society’s 150th anniversary.

Catalogue of the Vascular Plants of New York State will be a requisite resource for professional botanists, ecologists, and resource managers interested in the dynamic flora of the state.

-Lytton John Musselman, Department of Biological Sciences, Old Dominion University, Norfolk, Virginia 23529-0266



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Mackenzie Taylor, Editor
Department of Biology
Creighton University
2500 California Plaza
Omaha, NE 68178
Phone 402-280-2157
psb@botany.org

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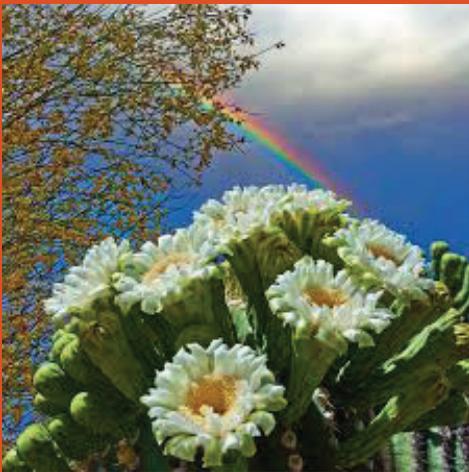


Although BOTANY conferences are always full of fantastic speakers, informative talks and posters, and social events in the evenings, the greatest benefit is the chance meeting, the unexpected conversation, and the sudden partnership or collaboration. BOTANY conferences are great for new connections and old friendships—and we can't wait to see everyone at our upcoming conferences!

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