



BOTANICAL SOCIETY OF AMERICA

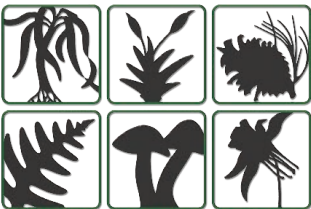
PLANT SCIENCE BULLETIN

SPRING 2015 VOLUME 61 NUMBER 1



CAN YOUR RESEARCH QUALIFY YOU FOR A BSA AWARD.....?

IN THIS ISSUE.....



BOTANICAL SOCIETY OF AMERICA

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FROM THE EDITOR

Greetings! I am delighted to write to you for the first time as Editor-in-Chief of the *Plant Science Bulletin*. This year, 2015, marks the 60th anniversary of the *PSB*. For more than half a century, the articles and editorials in the *PSB* have documented the history of the Botanical Society of America and chronicled the contemporary concerns of practicing botanists. It is with great pleasure that I step in as curator of this legacy.

It is my goal that, during my tenure, the *PSB* will be a platform for lively discussions on the issues currently facing us, as botanists. I hope that you will look to the pages of this publication as a source for news, perspectives, and inspiration, as well as for resources for teaching and outreach. However, none of this will be possible without your contributions. I encourage you to reflect on the ideas and perspectives that you can bring to the *PSB* and to let your voice be heard. You can read more about my vision for the *Plant Science Bulletin* on page 5.

This is also a time of transition for the *American Journal of Botany*. Hear from Editor-in-Chief Pam Diggie on page 8 and find a summary of new features rolling out in 2015. I also want to draw your attention to a new section of the *PSB* devoted to student news and perspectives. In its debut, this section features an interview with 2014 Karling Award winner, Catherine Rushworth (page 15).

Thank you to everyone on the BSA staff who has worked to make my transition into this position as smooth as possible, particularly Richard Hund, Amy McPherson, Beth Parada, and Johanne Stogran. These dedicated people work tirelessly and skillfully behind the scenes to produce a quality publication and have been nothing but positive and patient while I have learned the process of putting this publication together. I especially want to thank Marsh Sundberg for his exceptional work as *PSB* Editor-in-Chief over the last 15 years and for his help in showing me the ropes.

I look forward to guiding the *Plant Science Bulletin* through the next five years and to reading your compelling and insightful contributions.



Mackenzie

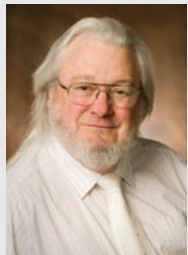
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Botany 2015

Science and Plants for People

Shaw Convention Centre - Edmonton
July 25 - 29, 2015
Abstracts and Registration Sites now open
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BSA ENDOWMENT FUND: THE FUND THAT KEEPS ON GIVING THE BSA'S FUTURE IS SECURE BECAUSE OF MEMBERS LIKE YOU



*By Joseph Armstrong, At-large
Director Development*

A robust endowment is an essential component of every nonprofit organization, and the case for a strong endowment to ensure long-term financial sustainability is vitally important to the BSA. As we move forward in our mission, Endowment Fund contributions are critical to achieving the financial flexibility necessary to continue supporting our members with our many programs, publications, awards, and education programs.

Only nine years ago, a small group of our long-time members came together to establish this very important fund by creating a Legacy Society. Their foresight, generous donations, shared purpose, and deep commitment to our mission set a very powerful example—now, every year, the BSA Legacy Society continues to grow in membership.

While members of our Legacy Society have provided an important foundation for our endowment, each year we encourage all of our members to consider contributing to the fund so that it may grow and sustain in perpetuity all that we as a Society have built. Our Endowment Fund is what allows us to plan for the future and secure our mission.

If the BSA has assisted you during your botanical career and/or the advancement of your science, please consider contributing to our endowment. Whether it is through publishing, sharing/gathering research at meetings, receiving an award, supporting your students, or importantly, having fellowship with other botanists, we trust the BSA has made more possible for you. Visit <https://donations.botany.org/endowment/> to make a gift.

We are grateful to each of our members who now continue to provide yearly gifts toward the endowment, and we would like to acknowledge them and applaud the numerous first-time contributors to the fund during 2014. It is through your dedication to the vision and mission of the BSA that we may thrive today and continue to thrive in the future.

Thank you on behalf of every BSA member, and our future members. For more information about the Legacy Society, visit <http://botany.org/legacy/>. To donate, please visit <https://donations.botany.org/LegacySociety/>.

BSA ENDOWMENT FUND

DONORS 2014

- James Ackerman
- Gregory Anderson
- Annie Archambault
- Joseph Armstrong
- Tina Ayers
- Nina Baghai-Riding
- Amy Berkov
- Lynn Bohs
- Kyle Bolenbaugh
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Erik Smets	P. Leszek Vincent	
Allison Snow	Naomi Volain	

NEW EDITOR MACKENZIE TAYLOR ON THE FUTURE OF THE *PLANT SCIENCE BULLETIN*

Mackenzie Taylor, assistant professor at Creighton University, has been a long-time reader of the Plant Science Bulletin, so when she accepted the position as its new editor, she saw an opportunity to honor the past 60 years of publication while moving the PSB into a new era. Marian Chau of Lyon Arboretum/University of Hawai'i at Mānoa---and fellow former BSA student representative along with Taylor---spoke with Taylor about her vision for the next 5 years of the PSB.



Mackenzie Taylor - The new PSB editor.

Chau: What made you decide to pursue the Editor-in-Chief position for *PSB*?

Taylor: I have loved reading the *Plant Science Bulletin* since I first became a member of the Botanical Society of America. When I first started considering the possibility of becoming editor of the *PSB*, I got very excited because I firmly believe that the *PSB* is an invaluable resource for BSA members and the entire botanical community. I knew that Editor-in-Chief Marsh Sundberg had been working very hard, in cooperation with the BSA staff, to continually refresh the *PSB* and keep it relevant, even as the way we obtain information changes. The idea of being able to contribute directly to the legacy of the *Plant Science Bulletin* and to shape the future direction of this publication is extremely attractive to me.

As a long-time reader of the *PSB*, what have you always liked about the issues? What features have you always wanted to see more of?

There are many things that I like about the *Plant Science Bulletin*. The *PSB* is, for me, a way to stay connected to the botanical community year-round. I appreciate that this publication is truly centered around BSA members, highlighting the successes, concerns, and activities of the membership. I enjoy reading about the contributions that members are making in the realms of education, outreach, and advocacy. These activities often don't receive the recognition that they deserve, even though they are, in my opinion, as important as contributions to scientific research. I think it is essential that the *PSB* showcase and promote these endeavors.

I also enjoy the variety of topics that each issue covers. A particular issue might include an article with a historical focus, followed by an article discussing strategies for teaching, accompanied by a profile of an award-winning member. Ideally, there is something for everyone in each issue. Further, in many cases, the articles and notes published in the *PSB* focus on successes, either for the society or for individual members. I find these positive features refreshing and inspiring.

Over the next five years, I would like to see input from an increasing proportion of the BSA membership. Members of the BSA come from a variety of professional settings and from all possible career stages. They have diverse interests, face a variety of professional challenges, and bring unique and valuable perspectives to the society and to the field of botany. I want to make sure that those voices are heard in the pages of the *PSB*. With that goal in mind, we are asking the student membership and the student representatives have taken on the challenge of organizing this section. I also want to encourage post-docs and other early-career scientists, as well as botanists who work outside of the traditional academic setting, to consider submitting articles and essays.

In the coming issues, I hope to facilitate even more discussion regarding issues of public policy and science advocacy. In today's academic and political climate, it seems especially important that BSA members be equipped with information and strategies for promoting botany, and indeed science, at local, national, and international levels.

“Members of the BSA . . . bring unique and valuable perspectives to the society and to the field of botany. I want to make sure that those voices are heard in the pages of the *PSB*.”

I know being a Student Representative on the BSA Board was a career-changing experience for me. What did you gain from your experience as the first BSA Student Representative that you can apply to your position as *PSB* Editor-in-Chief?

I think that my experiences as the student representative will be extremely beneficial as I take on the responsibility of the *PSB*. I learned a great deal about the governance of the Botanical Society of America and gained a much deeper understanding of, and appreciation for, the BSA mission. As the student representative, I had many conversations about the challenges facing students, in particular, but also other early-career scientists, and I was exposed to a variety of perspectives that I might not have come to understand otherwise. I think that these experiences will help me move the *PSB* forward, while honoring its history.

The *PSB* has been around for 60 years now. How do you maintain the legacy of a publication like this while also staying current, looking to the future, and engaging younger readers?

I believe that the key to maintaining the legacy of the *Plant Science Bulletin* is staying true to its original mission. When the *PSB* was established, the goal of the publication was to unify the botanical community. The original editor Harry J. Fuller envisioned the *PSB* as a forum for discussions about important issues facing botanists and as a place where people could share an array of information, including strategies for coping with the academic environment, resources for teaching and scholarship, information about conservation activities, and discussions about issues of academic freedom. The need for these types of discussions hasn't changed.

Staying current first requires that the issues presented and discussed in the *PSB* be relevant to the membership. It is my hope that we can engage younger readers and others who aren't currently reading the *PSB* by including articles and notes that are of interest to those demographics. We

will also employ strategies for reaching and engaging readers who access information in new and different ways. For example, we plan to make short items, including news and announcements, available electronically in a more timely manner than is possible with the quarterly publication cycle and, ultimately, upgrade the *PSB* website so that content from the print publication is more directly accessible in a digital format.

Do you think the way we talk (and write) about the discipline of botany has changed in recent times? Does this affect the type of *PSB* submissions you would like to see?

I've spent quite a bit of time reading the back issues of the *PSB* and the significant issues that concern botanists are strikingly similar throughout the last 60 years. In my opinion, the majority of editorials and articles published in the first five volumes of the *PSB* easily could have been written in the last five years, although there are several references to playing Bridge that are less culturally relevant.

For example, the first issue of the *PSB* includes an essay entitled *The Challenge to Botanists* by Sydney S. Greenfield, chair of the Education Committee. In this article, he sets out the challenges facing botanists in 1955, including a decline and elimination of botany from undergraduate curricula, an underrepresentation of botanists in biology departments and among general biology educators, and a lack of appreciation for botany by the general public. If you read the issues from the 1970s and 1980s, the same general themes continually pop up and we continue to struggle with these issues today.

“I firmly believe that the *Plant Science Bulletin* should reflect the concerns of the current membership and provide resources that will help its readers be more successful teachers, scholars, and citizens.”

I want to see *PSB* submissions that are useful to the BSA membership. I firmly believe that the *Plant Science Bulletin* should reflect the

concerns of the current membership and provide resources that will help its readers be more successful teachers, scholars, and citizens.

How does someone, especially an early-career botanist, benefit from submitting an article to you?

The *Plant Science Bulletin* is an excellent venue for anyone who wants to communicate information that doesn't fall into the traditional scientific research article format. We are especially interested in publishing articles and essays that focus on education, public policy, outreach, professional resources, and history. Any botanist, including those early in his or her career, may have an interest in these areas, be particularly involved in outreach or advocacy activities, or have developed course materials or resources that might not be quite appropriate for publication in an education journal. The *Plant Science Bulletin* provides an outlet for those types of scholarly outputs that might not be published otherwise. Moreover, articles published in the *PSB* as "Feature Articles" undergo peer review. This elevates the quality of articles published in the *PSB* and benefits the author, as these articles should be considered peer-reviewed publications in CVs and dossiers.

Publishing in the *Plant Science Bulletin* is also a great way for early-career botanists to network with colleagues who have similar interests and to get their names out into the botanical community. Articles and essays in the *PSB* have the potential to reach the entire BSA membership, as well as those with a passing interest in the botanical sciences.

The *PSB* also publishes book reviews and this section is one of our members' favorite features. I would encourage everyone, particularly early-career scientists, to consider contributing to this section. If you are interested in reading a particular book, why not go the extra step and prepare a review of that title? You will receive a complimentary review copy of the book, have the opportunity to contribute to the scientific community, and have a published book review for your records.

What if someone has an idea for an article but isn't sure about the next step?

If you have an idea for an article or essay, the easiest first step you can take is to email me at psb@botany.org. I will be more than happy to discuss your idea and we can strategize about preparing the article for publication in the *Plant Science Bulletin*. You can also find information about the types of articles we publish and instructions for authors at <http://botany.org/PlantScienceBulletin/>. If you already have an article prepared, you can submit it directly for review using the submit button found at <http://botany.org/PlantScienceBulletin/>.

What can readers look forward to in 2015? What is your ultimate vision for the *PSB*?

Readers can look forward to regular contributions from BSA committees, particularly the public policy and education committees, as well as the student membership. This increased focus on the activities of BSA committees and other groups is intended to keep the membership aware of what is happening within the society.

As I mentioned earlier, we are experimenting with new ways to deliver *PSB* content to the membership that will supplement, not replace, the print version of the *Plant Science Bulletin*. In particular, we are working toward having URLs for individual articles so that they can be accessed directly and publicized on social media platforms. Readers should also expect to see a fresh look to the print *PSB* starting in 2016.

My vision for the *Plant Science Bulletin* is for it to be the voice of the Botanical Society of America. The *PSB* should feature content that reflects the varied interests of BSA members, be a dependable source for resources and perspectives, and provide a forum for lively discussion and constructive debate. However, the composition of the *PSB* is ultimately in the hands of the BSA membership. The *PSB* depends on member submissions and it is those contributions that our readers are eager to read every quarter. I am looking forward to receiving those submissions and guiding the *Plant Science Bulletin* forward through the next five years.

PAMELA DIGGLE, NEW EDITOR-IN-CHIEF, DISCUSSES THE FUTURE OF THE *AMERICAN JOURNAL OF BOTANY*

Pamela Diggle recently stepped into the role of Editor-in-Chief of the American Journal of Botany, and she has started to implement some changes for AJB in 2015 while maintaining the journal's legacy. Nic Tippery, from the University of Wisconsin-Whitewater, recently spoke with Diggle about her vision for the journal.



Pam Diggle takes the reins of the AJB.

Tippery: What inspired you to pursue the Editor-in-Chief position for the *AJB*?

Diggle: Did you see my tweet? #Iamabotanist! I am committed to research, teaching, learning, and outreach about all things botany. The Botanical Society of America and its flagship journal, the *American Journal of Botany*, are central to all of these activities, and the Editor-in-Chief position provides an opportunity for me to support botany and botanists.

What strengths do you think you can bring to the position?

The Editor-in-Chief will need to understand what areas of plant science research are growing, what graduate students are interested in, what people are teaching, and what societal issues are relevant to research in plant science. My recent experiences as a Program Officer at the National Science Foundation and continuing service on various NSF panels, and my leadership in two very broad-based biology departments (Chair of one, Associate Head of the other), provide me with a profound appreciation of the depth and breadth of

science that should be encompassed within *AJB*. I am also committed to exploring new opportunities to remain abreast of developments in botanical science. Attending scientific meetings of diverse disciplines, and interacting with scientists who attend them, will be an important activity that will supply new ideas and focus.

The *AJB* just celebrated 100 years of publication. How do you perceive the legacy of the *AJB*?

AJB has a special role in the botanical sciences. From its inception, *AJB* has been a forum for scholarship from diverse areas of botanical research. In this era of hyper-specialization, and organization of academic departments and journals around particular areas of research, *AJB* provides a venue for publications that span levels of organization ranging from molecules to ecosystems. Papers in the *American Journal of Botany* are read by people in the same field, but are also seen by readers from diverse fields, with the potential to be incorporated into new research programs, graduate discussion groups, and graduate and undergraduate coursework.

The spectacular series of Centennial Review papers that began in 2014 perfectly embodies the legacy of *AJB* (see www.amjbot.org/content/by/section/AJB+Centennial+Review). To celebrate the tremendous achievement of 101 years of influential publication of the *American Journal of Botany*, then Editor-in-Chief Judy Jernstedt invited leading scientists to address long-standing questions in botanical research. Each topic has a long history of coverage in *AJB*, and the range of topics covered in these reviews demonstrates perfectly the breadth and impact of articles published in the journal. They range from the very origins of multicellularity, through phloem development and function, to diverse aspects of evolutionary dynamics including gene flow, hybridization, polyploidy, and many others; these papers epitomize the high standards that are the legacy of *AJB*: breadth of topics covered, rigorous scholarship, innovative and insightful analyses, and a view to emerging areas of interest.

The legacy of *AJB* also derives from the dedication of the many people who work very hard to ensure the quality of the journal, each and every month. They include the professional editorial staff, the Board of Associate Editors, the BSA Director-at-Large for Publications, the Publications Committee, the many, many reviewers, our authors, and BSA members. The legacy of *AJB* is a legacy of the commitment of the community that supports it.

What do you see as the main challenges to publishing in 2015, and what strategies do you think will benefit the *AJB* in the current publishing environment? What challenges do you anticipate the journal will face over the next ten years? How are you addressing those challenges?

The primary challenge faced by *AJB* is the same challenge faced by the publications of all scientific societies: How will the Journal maintain relevance in this rapidly evolving world of diverse outlets for dissemination of science? As mechanisms for distributing and accessing data and other types of information become more diverse and immediate, why will scientists need journals? Why should authors and readers choose *AJB*?

As Editor-in-Chief, my job is to understand what authors, subscribers, and society members want from the journal. My most important first priority has been to listen to and learn from that community. I held a series of conference calls with small groups of scientists—in collaboration with Sean Graham, BSA Director-At-Large for Publications, and Amy McPherson, Managing Editor of *AJB*—who have very diverse research interests and are at different career stages, for wide-ranging conversations about publication in general and how we might enhance the value and impact of the journal. The people we spoke to valued rigorous, constructive, fair, and timely review most highly out of all of the topics discussed, and these will remain critical goals for *AJB* as we move forward.

“Audience” is also widely considered to be an important factor that scientists consider when choosing a journal. Our participants valued the broad range of readers that *AJB* brings, and it is clear that enhancing our readership will be a valuable asset in attracting new authors. *AJB* currently serves authors and readers by publicizing papers in multiple outlets: new papers are featured on the society and journal websites, and promoted via social media and press releases. Special Issues and Special Papers also bring new authors and readers to *AJB*. It will be important to continue to develop exciting new ways to push our articles out into the broader community of scholars.

As a result of our initial discussions with members of the botanical community, I have already brought some significant changes to the journal. Beginning with the January issue, *AJB* now has a prominent new “News and Views” section. In this section will be a novel type of essay, “On the Nature of Things.” These are short essays that concisely summarize

a new and exciting issue or research area, take a new look at an established area, or explore an idea or concept. I envision a single journal page with a bit of background, a summary of the current state of thought or data, and then a brief explanation and thoughtful summary of the unanswered questions or where the field might be going. The most important element of these essays is the *forward-looking* part. I hope readers anticipate these essays every month to see what their colleagues are thinking about—and that they’ll want to share their own ideas. The first article of this kind is from Ken Feeley (of Florida International University) whose essay on the pitfalls of predicting future species distribution and the promise of new approaches just appeared in the February issue of *AJB* (www.amjbot.org/content/early/2015/02/03/ajb.1400545.full.pdf+html)

“From its inception, *AJB* has been a forum for scholarship from diverse areas of botanical research. In this era of hyper-specialization, and organization of academic departments and journals around particular areas of research, *AJB* provides a venue for publications that span levels of organization ranging from molecules to ecosystems.”

AJB now also features a “Highlights” section that summarizes selected articles in each issue. These are intended to entice readers to want to know more about the journal’s contents.

A second challenge to the future of society publications like *AJB* is financial; *AJB* does not have the deep pockets of a large publishing company. Our operating budget comes largely from library subscriptions, but library budgets are shrinking and, as open access (for which authors pay to publish via grants or their personal funds) grows, librarians are loath to buy what is available for free. The consequence is the cost of publishing is shifting more and more to authors. *AJB* has adopted multiple strategies to shield our authors from this burden. Bill Dahl, the Executive Director of the BSA, the BSA Board of Directors, and the professional staff of

the BSA and *AJB* monitor financial developments within the publishing industry closely, and we are in constant discussion about the financial security of the journal. Meanwhile, make sure that your libraries know how much you value *AJB*!

Do you have any suggestions for people who might be thinking about submitting an article to the *AJB*?

AJB aims to publish papers that make a significant contribution to botanical sciences. Authors should frame their papers so that the significance is evident to the general (but well informed!) reader. If in doubt, I encourage potential authors to contact me for feedback.

How can BSA members contribute to maintaining the *AJB* as a strong journal in our field?

Send your best work and cite papers in *AJB*! Volunteer to review manuscripts or to serve on the

publications committee of the BSA. Make sure that your library subscribes to *AJB*. Participate in my ongoing discussion about how we can enhance the value and impact of the journal.

What is your ultimate vision for the *AJB*?

The *AJB* has changed dramatically over the past century of publication and I will collaborate with all of you to ensure that it continues to evolve in exciting new ways. At the same time, the foundation of the journal should remain unchanged. The *American Journal of Botany* is one of the premier outlets for all aspects of botanical discovery and knowledge, with papers that stand the test of time, and continue to shape the intellectual horizons of our discipline. I look forward to leading *AJB* over the coming five years, and I especially look forward to reading your very best research papers there.

THE AMERICAN JOURNAL OF BOTANY WELCOMES A NEW EDITOR-IN-CHIEF AND LAUNCHES NEW FEATURES

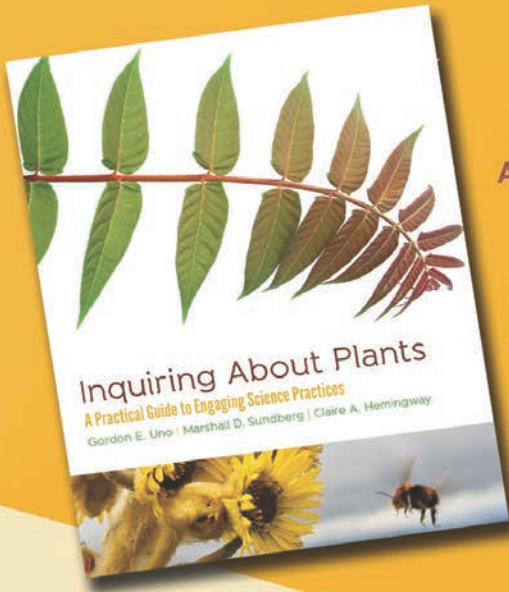
The January issue of the *American Journal of Botany* begins the tenure of new Editor-in-Chief Dr. Pamela Diggle and outlines new features rolling out in 2015 as well as other upcoming developments.

Beginning in January, *AJB* features a new front section titled “News and Views,” which will include editorials, commentaries, letters to the editor, and a new article type called “On the Nature of Things” (OTNOT for short). These brief, open access essays—a hybrid of a blog-post and a mini-review—are meant to provide succinct and timely insights into multiple aspects of plant science. They will summarize the current state of thought, technology, or understanding, with the bulk of the essay devoted to looking forward to what might be on the horizon for this issue, question, or area of research. The feature debuted in the February issue with “Moving forward with species distributions,” by Kenneth Feeley at <http://www.amjbot.org/content/102/2/171.full>, and has continued with “Parasitism disruption a likely consequence of belowground war waged by exotic plant invader” by Chris Martine and Alison Hale in the March issue at <http://www.amjbot.org/content/early/2015/03/02/ajb.1500025.full.pdf+html>.

In addition to this new article type, *AJB* now includes a “Highlights” page at the beginning of each issue. The Highlights point readers quickly to selected articles of interest. Visit <http://www.amjbot.org/content/102/1/1.full> for a sample of this feature that debuted in January.

For more information on these features and more, see Dr. Diggle’s Editorial from January at <http://www.amjbot.org/content/102/1/3.full.l>

In addition, *AJB* will focus on two special issues to be published later in 2015 and early 2016: “Evolutionary insights from studies of geographic variation: Establishing a baseline and looking to the future” and “The Ecology and Evolution of Pollen Performance.” More information will be forthcoming—stay tuned!



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RAISING THE NEXT GENERATION OF BOTANISTS



By *Catrina Adams,*
Education Director

What first sparked your interest in science, and in plants? Were you always science-minded, or did you ever have to choose to pursue science over competing fields of interest? Did you know from an early age that botany would be a lifelong interest? Or did you fall into studying plants later in your science career, perhaps after meeting a botanist or botany teacher who inspired you, joining an exciting research project or coming across a particularly intriguing plant? What fascinated you enough to shift your research interests toward botany?

The mission of the BSA is to promote botany, and inspiring interest in plants is a key part of that mission. As Education Director, I'm keenly interested in understanding when and how that decision comes about, when children or adults become fascinated with the plant world enough to choose to make botany their life's work.

The challenges of the 21st century--climate change, population increases, energy needs, shrinking biodiversity--require a thriving community of botanists who understand and advocate for the plant world. Who knows what contributions future colleagues will bring to the field?

Inspiring the great thinkers of the next generation and turning the interest of the science-minded toward plant biology can be a challenge when science, and especially plant science, is too often such a small part of primary and secondary education. The chance to experience science as a process of discovery, and not just a set of formulas and facts to memorize, can be instrumental. Learning about plants from enthusiastic professionals who are excited to share their life-work can be much more impactful than learning about plants from zoologists who see plants as a

backdrop for animal interactions, or from out-of-field science teachers with no botany training and who themselves have never had the opportunity to learn how exciting plants can be.

So it is up to us, who find plants utterly fascinating, to share that interest and excitement with the next generation. And, because so many young scientists make decisions about whether they will be scientists at a young age, we need to be sharing this interest and excitement not just with our graduate students, or undergraduates, but with secondary students and even primary students.

As Wandersee and Clary (2006) noted, "The presence of a plant mentor earlier in one's life (someone who helped the mentee observe, plant, grow, and tend living plants) is a key predictor of that person's awareness, appreciation, and understanding of plants throughout the lifespan."

Please consider reaching out, even in a small way, to make a lasting impact.



Fascination of
Plants Day
May 18th 2015

FASCINATION OF PLANTS DAY

One perfect opportunity to share your fascination with plants is through the upcoming Fascination of Plants Day (FoPD) on May 18, 2015.

"FoPD is an internationally coordinated activity designed to sow constantly germinating seeds in the collective mind of the World Public to appreciate and understand that plant science is of critical significance to the social, environmental and economic landscape now and into the future."

Join other BSA members from around the world in hosting a plant walk in your community on May 18 and share your group's discoveries with a worldwide audience. University classes may be out, but it is a perfect time to make a connection with a local primary or secondary school, park, garden, nature center, or museum.

Learn more about open events, get ideas for

planning and sharing your own local events, and see what initiatives are planned nationally (blog.aspb.org/fascination-of-plants-day) or internationally (www.plantday.org).

CONGRATULATIONS TO FALL
PLANTINGSCIENCE STAR PROJECT
WINNERS!



Anne and Arvind of PlantingScience star project winning team “The Bio Bunch” collect iris seeds for their experiment on optimal conditions for seed germination.

Through PlantingScience.org, the BSA promotes plant biology and authentic science research for students in middle and high schools around the United States and world.

Each fall and spring, the most exemplary projects are recognized in our Star Project Gallery. The fall sessions’ winners included “The Bio Bunch” from High Technology High School, who developed a sophisticated proposal to determine the optimal natural conditions for iris seed germination. The team worked closely with their scientist mentor Andrew Schnabel to generate ideas for a testable question, craft a research prediction and research design from their question, and prepare a full proposal. In the process they learned a lot about what it means to propose authentic research, and are excited about conducting their planned research.

The Bio Bunch will carry out their ambitious research proposal this spring session with their mentor’s guidance. You can follow along with the team’s progress at: <http://tinyurl.com/biobunch>.

All Spring projects are available to view at plantingscience.org, using the “Research” tab.

If you would like to be a PlantingScience mentor and help student teams discover the joy of scientific discovery and become fascinated with plants, we are now recruiting mentors for the fall session (mid September – mid October). Register any time at plantingscience.org/newmentor.



PlantingScience star project winning team “The Bio Bunch” tackle iris seed germination research project.



PUBLIC POLICY NEWS



by *Marian Chau, and Morgan Gestel*
Public Policy Committee Co-Chairs

The start of 2015 has ushered in a major change in the composition of Congress. Results of the 2014 midterm elections mean that majority turnover has taken place in the U.S. Senate and the retirement and/or defeat of several Congressional Representatives has meant that important Congressional committees in the house are also welcoming new faces. One change of particular interest to scientists is that Senator John Thune (R-SD) will be the new chair of the Commerce, Science, and Transportation Committee (visit this link to read more about specific committee changes: http://www.aibs.org/public-policy-reports/2014_12_29.html#034840). Federal funding for basic research will be sure to face strong rhetoric in the 114th Congress. The Public Policy Committee works to provide you with the information you need to be aware of including important votes, impending policy changes, and communication networks necessary to let your voice be heard. *We need your help* to engage with politicians and other societies, and advocate on behalf of botany!

HOW YOU CAN HELP:

Become involved with the American Institute for Biological Sciences (AIBS) through their Legislative Action Center (<http://policy.aibs.org/>) and sign

up for public policy alerts every 2 weeks at <http://www.aibs.org/public-policy-reports/>. Look out for a survey from the Public Policy Committee with questions regarding your specific policy interests. We want to make sure we disseminate the policy news that is relevant to our membership and the only way we can do this is if we hear from you.

WHAT WE WOULD LIKE TO DO IN THE FUTURE:

- Encourage proactive, rather than reactive, policy involvement
- Help BSA members influence policy at multiple levels (from local to national)
- Expand our interactions with other societies, including a new collaboration with the ASPET Environmental Policy Committee
- Offer AIBS Public Policy Workshops at future meetings, including Botany 2015

Most importantly, we would like to develop a charge to grow toward and in that regard, we're interested in what it is that you'd like to see from the Public Policy Committee.

UPCOMING POLICY EVENTS:

- May 13–14, 2015: Congressional Visits Day hosted by the Biological and Ecological Science Coalition. The BSA will sponsor two awards in support of travel and lodging for this event. The BSA has participated since 2012. The AIBS also sponsors an annual award in support of travel and participation in the CVD, which you can learn more about at <http://www.aibs.org/public-policy/eppla.html>.
- Quarterly policy reports in the *Plant Science Bulletin*.
- Upcoming BSA Member survey for Public Policy Engagement. Please watch for this survey in your email inbox! You can help guide the future of the BSA Public Policy Committee so that we can serve you better.

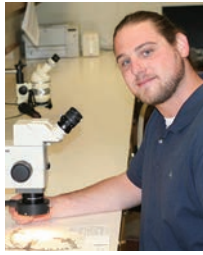
BSA PUBLIC POLICY COMMITTEE OVERVIEW

Since the formation of the Public Policy Committee in 2011, we have:

- Awarded six Public Policy Awards (2013 - 2015). We have already funded travel for six BSA student and early career members to Washington, D.C.
- Partner with other societies, including the AIBS, ASPB, BESC, and ESA, in support of policy initiatives for botany and federal funding of research.
- Author sign-on letters to Congress in support of sustained funding, in response to sequestration, and in support of science policy efforts.



A WORD FROM THE STUDENT REPRESENTATIVES



by Angela McDonnell and Jon Giddens,
Student Representatives

Beginning with this issue of the *Plant Science Bulletin*, the student representatives to the Botanical Society of America Executive Committee will organize and contribute content for a dedicated student section. It is our hope that these articles will allow for more connectivity within the student community of BSA, but it will also keep all members informed on issues important to students and the general news within the society.

In the future, we'd like to include short articles about new methods and techniques, new and interesting student-written publications, information about the annual meeting, and interviews with noteworthy students.

If you have any ideas or suggestions on content for future issues, we'd love to hear about them! Feel free to contact **Jon Giddens** (gidd8708@gmail.com) and **Angela McDonnell** (angela.mcdonnell@okstate.edu), the current student representatives, any time with your ideas. Alternatively, you can connect with us on our Facebook group page by searching for Students of the Botanical Society of America.

A MOMENT WITH CATHERINE RUSHWORTH, WINNER OF THE 2014 J. S. KARLING AWARD

Jon and Angela catch up with the fantastic Ms. Catherine Rushworth of Duke University, who was awarded the 2014 J. S. Karling Award for her top-rated proposal titled "Insights into the origin and persistence of apomixis in the Boecheera holboellii species complex." Below, Catherine discusses her thoughts on the BSA, her research, and how she stays inspired.

Jon & Angela: When and why did you join BSA?

Catherine Rushworth: I joined BSA at the beginning of my grad school career. In my area of research, most researchers are more stimulated by the questions they're asking than the organisms they work with. I'm really a bit more organismal in focus—my questions are motivated by the peculiarities of a focal plant group. I love plants, and I wanted to be part of an organization in which the members love plants as much as I do!

What is your favorite thing about BSA?

My favorite thing about BSA is the enthusiasm its members have for plants. At the conference in Boise last year, it was so nice to meet other researchers and enjoy an instant connection with them. Even if their research was very distant from mine, we could share excitement about the plants.

What is your research about?

I study the evolutionary factors maintaining apomixis and sexual reproduction in populations of the mustard *Boecheera*. Apomicts are nearly always polyploid and the result of hybridization, but *Boecheera* apomicts can be polyploid or diploid. I focus on the diploid apomicts in order to eliminate one confounding variable. I'm especially interested in how sexual and asexual *Boecheera* coexist in populations. We know very little about how sexual



Catherine Rushworth



Cathy's research focuses on hybrid apomicts in the genus Boechera. An example of one is shown here, likely involving parental species B. sparsiflora and B. retrofracta.

and asexual reproduction are maintained at the population level in nature, and I'm lucky enough to have a great study system to address these questions in the field.

What has been the most challenging part of your research?

I love doing fieldwork, but it can be really difficult. Our lab spends 2-3 months every year living in an RV park in rural Idaho. Working outdoors is fantastic, but it's hard to maintain forward progress on your dissertation when you're isolated for that long with only a couple other scientists and a bad internet connection! And, statistics is hard.

What has been the most rewarding part of your research?

The most rewarding part is putting it all together. I'm nearing the end of my dissertation and all my experiments are nearly done. I'm learning how to analyze my data properly and writing it up, and amazingly enough, there are some answers to my questions!

How has winning the J.S. Karling award affected you and your research?

The J.S. Karling award has affected me in a couple of different ways. First, monetarily, of course! It enabled me to do an extra experiment this year that I otherwise couldn't have paid for, and I'm really excited about the results. Second, I'm thinking about postdoc projects, and having my face on a giant screen definitely helped facilitate networking

with potential collaborators at the Boise meeting!

What advice do you wish someone would have given you about graduate school?

There are too many things to list! But I wish someone had sat me down on my first day of grad school and said: "You are now a scientist. Everything you do from here on out is your career, so take it seriously and don't discount yourself or your abilities. You will meet a lot of smart people. Don't be intimidated by them, don't be shy, and don't compare yourself to them; those things won't help you but will add stress to your life. This is school, and you're here to learn, so be prepared to feel stupid a lot. Ask as many questions as it takes until you figure a new concept out. And never forget that you're doing something you love!"

What do you do to de-stress?

I try to take tiny breaks, even 30 seconds, throughout the day whenever I need to mentally shift gears. They're kind of like little palate cleansers between courses of a fancy dinner; it helps me switch to a new topic and keep going. If I'm really stressed, and I can afford to take a big break, closing the computer for a bit and spending time with my husband and our cat always helps. And going for walks! Getting outside is important.

What are you reading right now that's inspiring?

Right now I'm not really reading anything but papers, but recently I started listening to this podcast called Meet the Composer. (www.wqxr.org/#!/programs/meet-composer/) I've been struck by the similarities of the creative process that both composers and scientists go through. I love hearing how composers conceive of new pieces and mesh styles of music, and the own unique ways in which they put them down on paper, and how they create pieces for certain musical groups (quartets or whatever) based on those musicians' specific skills. There is no right or wrong way to think and create, and I find that very inspiring. Maybe we could start encouraging a bit more diversity in this area in science.

What are your future aspirations?

I have an "unconventional" background (i.e., I didn't major in Biology in undergrad) so I never thought I'd be faculty member material. But I've come to find that I love research, I love teaching,



The Mitchell-Olds lab conducts field work in the Rocky Mountains of central Idaho. Shown here is the view from one of their experimental gardens.

I love taking on leadership roles and mentoring, and I kind of like writing. So it seems like academia would be a good fit for me, after all. After my upcoming postdoc at UC Berkeley, I'm going for it!

Anything else you'd like to include?

Thanks for this opportunity! And thank you, BSA!

AWARD SEASON UNDERWAY

Although the year is just beginning, it is important to keep in mind that the award season is open!

The J. S. Karling Award is one of many awards made by the society to graduate student members in support of their research. This award is named for Dr. John Karling (1897-1995) who was an internationally renowned authority in mycology (fungi) from Austin, Texas. In 1924 he received his Ph.D. from Columbia University. Following graduation, Dr. Karling had a long and distinguished career at Purdue University where he served as the Director of the Department of Biological Sciences and was also Purdue's first John Wright Distinguished Professor of Biological Sciences. After retirement, he was named Fellow of the Indiana Academy of Sciences and co-founder

of both the Mycological Society of America and the American Institute of Biological Sciences.

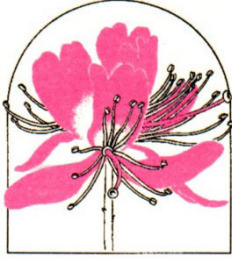
The J. S. Karling Award is awarded to the top-ranked proposal that is submitted for consideration for a Graduate Student Research Award. The purpose of the Graduate Student Research Awards is to support and promote graduate research in the botanical sciences. In response to student feedback in recent years, the number of these Awards given by the society has greatly increased from just ten awards in 2004 to twenty awards in 2014.

The BSA also awards up to seven Undergraduate Student Research Awards to fund quality research performed by undergraduate students.

The solicitation for the 2015 Graduate and Undergraduate Student Research Awards can be found on the BSA website under the "awards" subheading (http://botany.org/awards_grants/detail/bsagsra.php; http://botany.org/awards_grants/detail/bsaUNDERgsra.php). The deadline for these awards is **March 15**. Be sure to start writing your proposal early and have it reviewed by your peers and your PI well before you intend on submitting it. And, if you're not a student and you're reading this, please remind the students you know to apply! Good luck!



ANNOUNCEMENTS



NEW ENGLAND BOTANICAL CLUB 120TH ANNIVERSARY RESEARCH CONFERENCE

The New England Botanical Club is preparing to celebrate its 120th anniversary by hosting a major botanical research conference June 5-7, 2015, at Smith College in Northampton, Massachusetts.

This conference will bring together members of the many botanical clubs and organizations that are active in northeastern North America, as well as students, academic researchers, naturalists, citizen scientists and professional botanists. The keynote speaker is Dr. Pamela Diggie, Editor-in-Chief of the *American Journal of Botany* and Past President, the Botanical Society of America.

We invite you to contribute to the conference by presenting a talk or poster on your activities. There will also be display space in which you can highlight your organization, your latest botanical discoveries, and new initiatives you are pursuing. On Sunday, June 7, we will host a “working breakfast” in which officers of clubs and societies can gather and strategize about ways to make botany relevant to an expanded audience. A botanical foray of Smith College’s MacLeish Field Station will follow.

We encourage you to submit your full conference paper for publication in our peer-reviewed journal, *Rhodora*. All accepted abstracts will be published as well.

This conference, including all meals and a reception, is free. A full conference program and online registration are available at NEBC Conference.

Space is limited; register and submit an abstract now! The final deadline for registration is **April 1, 2015**. Please visit <http://www.rhodora.org/conference2015/> for more information or direct questions and comments to conference@rhodora.org.

EAGLE HILL INSTITUTE NATURAL HISTORY SCIENCE FIELD SEMINARS

Eagle Hill Institute, located on the eastern coast of Maine, will host seminars and workshops focusing on natural history during Summer 2015. These workshops are in support of field biologists, researchers, field naturalists, faculty members, students, and artists with interests in the natural history sciences.

Courses include Trees and Shrubs of Northeastern North America: Identification and Ecology; Plant Identification and Herbarium Techniques; Mosses: Structure, Ecology, and Identification; Introduction to Maine Seaweeds: Identification, Ecology, and Ethnobotany; Lichens and Lichen Ecology; Grasses of Northeastern North America: Practical Identification for Field Biologists; and Taxonomy and Biology of Ferns and Lycophytes, among many others.

A full list of 2015 seminars and workshops, as well as registration information, can be found at <http://www.eaglehill.us/programs/nhs/nhs-calendar.shtm>.

“CLIMATE CHANGE AND THE FUTURE OF PLANT LIFE” SYMPOSIUM HOSTED BY THE NEW ENGLAND WILD FLOWER SOCIETY

Plants are the foundation of global ecosystems, creating the habitats that nurture all other living beings. How will plants respond to the predicted changes in temperature and precipitation from a warming climate?

At this symposium, hosted by New England Wild Flower Society, five noted botanists and ecologists will discuss new findings and current research on the state of New England’s plants; the historical patterns and current evidence of climate-induced adaptation, migration, and loss; and strategies for conserving and managing plant species and natural communities in the face of climate change. Speakers include Dr. Paul Smith, newly appointed Secretary General, Botanic Gardens Conservation International; Dr. Elizabeth Farnsworth, Senior Research Ecologist, New England Wild Flower Society; Dr. David R. Foster,

Director of the Harvard Forest, Harvard University; and Dr. Dov F. Sax, Associate Professor of Ecology and Evolutionary Biology at Brown University and Deputy Director (Teaching) of the Institute at Brown for Environment and Society.

The “Climate Change and the Future of Plant Life” symposium will be held Thursday, March 26 from 9:00 a.m. to 4:30 p.m. at the Microsoft New England R&D Center, 1 Memorial Drive, Cambridge, MA. For more information about the symposium and to register, go to <http://www.newenglandwild.org/sym> or contact Lana Reed, New England Wild Flower Society Public Programs Coordinator, at lreed@newenglandwild.org, 508-877-7630, ext. 330.

THE OXFORD PLANTS 400 PROJECT

The University of Oxford will mark 400 years of botanical research and teaching on July 25, 2021. In celebration of this upcoming anniversary, the University of Oxford Botanic Garden and Harcourt Arboretum, together with the Oxford University Herbaria and the Department of Plant Sciences, has launched the Oxford Plants 400 project. This project will highlight 400 plants of scientific and cultural significance, with one plant profiled each week. Each profile includes images from Oxford University’s living and preserved collections. Check out these plants at <http://herbaria.plants.ox.ac.uk/bol/plants400> and at @plants400 on Twitter.

FROM THE *PSB* ARCHIVES

60 years ago: The first issue of the *Plant Science Bulletin* is published under editor Harry J. Fuller. The editorial board consists of George S. Avery, Harlan P. Banks, Harriet Creighton, Sydney S. Greenfield, and Paul B. Sears.

The Darbaker Prize in Phycology, presented for meritorious work in the study of microscopic algae, is established.

50 years ago: The bylaws for the new Historical Section, created at the 1964 Council Business Meeting, are published.

Stanwyn G. Shetler of the Smithsonian describes a visit to the Komarov Botanical Institute in Leningrad prior to the opening of the Tenth International Botanical Congress in Edinburgh.

25 years ago: New *PSB* editor Meredith Lane asks for “assistance in making the *PLANT SCIENCE BULLETIN* an active and interactive means of communication within the Society” (*a sentiment the current new editor echoes*).

In Memoriam notices are published for Ethel C. Belk and Louis Otho Williams.



BOOK REVIEWS



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(Regnum Vegetabile 156)27

BRYOLOGICAL AND LICHENOLOGICAL

Flore des Bryophytes du Québec-Labrador. Volume 1: Anthocerotales et Hépatiques

Jean Faubert

2012. ISBN-13: 978-2-9813260-0-3 (vol. 1)

Hardcover, C\$80.00. 356 pp.

Société Québécoise de Bryologie, Saint-Valérien, Québec, Canada

This is the first volume of a three-volume set covering the non-vascular plants of Québec and Labrador. The other two volumes, also by Jean Faubert, deal exclusively with mosses (the series was just completed in 2014). This volume covers the remaining two lineages of bryophytes: the liverworts and hornworts. It provides keys, descriptions, habitat information, distribution maps, and helpful hints to aid in identification for all taxa present in Québec and Labrador; it also includes several species that are not yet reported from but are likely to occur in the area. In addition, each genus is depicted by at least one illustration.

As pointed out in the preface, this work represents the first since 1935 dealing exclusively with the region, and the first-ever bryophyte flora exclusively for Québec. Though in no way surpassing Rudolph Schuster's *Hepaticae and Anthocerotae of North America* in its thoroughness and usefulness to professional and ardent amateur bryologists, this work represents a much more affordable, accessible, and practical work for amateur bryologists. In addition, the literature on liverworts and hornworts is generally scattered and inaccessible. Therefore,

this book potentially represents an important resource for anyone in eastern or boreal North America.

An introductory section by the author describes the layout of the rest of the work including how to interpret generic descriptions and maps. Information is provided on how to appropriately collect and dissect bryological specimens as well as on the biology of bryophytes, including the obligatory description of the alternation of generations life cycle. One section of this introduction includes a list of ways in which bryophytes differ from vascular plants and includes a factually tenuous statement that bryophytes are “resistant to the pressures of natural selection” (p. 6).

The keys in this work are nothing special and use qualitative characters typically used in works on hepatics (thallose vs. leafy, incubous vs. succubous leaves, etc.). Hornworts are covered first, followed by thallose liverworts, and finally leafy liverworts. For each genus, an effort is made to allow the user to key a specimen down to the lowest taxonomic level possible. For example, in most floras *Marchantia polymorpha* would be keyable only to species with perhaps a note on its morphological variability. Here, the user is able to key *M. polymorpha* to one of the three subspecies found in Québec. An additional nice aspect of the treatment is that Faubert takes into consideration recent evidence from molecular phylogenetic studies. For example, eastern North American *Conocephalum* was once all placed in the circumboreal *C. conicum*. However, Faubert correctly ascribes material in Québec to the recently described *C. salebrosum*. An effort is also made to tackle difficult taxa such as *Riccia*, Lophoziaceae, and *Scapania*, while at the same time

cautioning the user that fertile material is usually needed to confirm the identification.

As mentioned above, each species or subspecific taxon is illustrated and a description and distribution map are provided. Aside from the keys, which are all typical ones that would be found in a liverwort and hornwort flora, individual species accounts are the most important aspect of a flora. Unfortunately, this is the area where this book most falls short. Three types of illustrations are used in this work. First are typical line drawings. These images are fine and make an effort to illustrate diagnostic features such as the number of cells per gemmae and trigones, although some species might benefit from an additional illustration or two for each species, especially for the hornworts where spore characters are needed for identification but no spores are depicted in this work. The second type of illustration is an in situ depiction of the plant. This is certainly useful in the field, but often not as useful in the laboratory when plants, even when rehydrated, may not look very similar to these photographs. The large size (8.5 × 11 inches) and dense glossy paper used in this book preclude it from being taken in the field, and the immediate utility of these illustrations is somewhat lost unless the collector also takes photographs in the field. The third type of illustration is a three-dimensional rendering of plants solely for “aesthetic reasons to show the beauty of bryophytes.” These illustrations often look more comical than anything else (shoots are often depicted on wood or granitic pedestals) and do not serve any practical purpose. The depictions of the plants in situ do so much more to show the beauty of bryophytes. These three-dimensional renderings would be much better if they had been replaced by images taken of the plants under a microscope as these images would then have the potential to be both beautiful and useful. One final issue with the treatment is that the place of publication is listed for each species. This is much better reserved for a monograph and just wastes space here. One beneficial aspect of these descriptions is that a bibliography of additional resources is provided should one want to learn more about a particular genus or confirm their identification using another key.

The book concludes with an appendix of common names in both French and English, although in some cases the common names seem more complex and harder to learn than the scientific names. Finally, a glossary to bryological terms is provided. While

generally a good thing, this glossary falls short in that it contains terms useful to the identification of liverworts and hornworts but also contains moss-specific terminology, which adds space and only makes it more difficult for the user to find a specific term.

Overall, this work represents a successful attempt to provide a flora of Québec and is one of a handful of accessible works on liverworts and hornworts of eastern North America, especially as many of the works are now out of print and expensive. However, solely because the book is written in French, its wider utility to those outside of Québec is limited despite the fact that nearly all species may be found in neighboring parts of Canada as well as the northeastern United States. This book is therefore recommended for those who can understand French; those looking for illustrations would be better served searching on used book websites or should refer to Mary Lincoln's *Liverworts of New England: A Guide for the Amateur Naturalist* (New York Botanical Garden Press).

–Jeff Rose, Department of Botany, University of Wisconsin–Madison, Madison, Wisconsin, USA

PHYSIOLOGICAL

Photosynthesis in Bryophytes and Early Land Plants

Advances in Photosynthesis and Respiration, Volume 37

David T. Hanson and Steven K. Rice (eds.)
2014. ISBN-13: 978-94-007-6987-8
eBook, US\$219.00; Hardcover, US\$279.00.

342 pp.

Springer Science+Business Media, Dordrecht, The Netherlands

The Advances in Photosynthesis and Respiration series continues to grow with the addition of *Photosynthesis in Bryophytes and Early Land Plants*, the 37th volume in the series. Bryophytes are fascinating organisms, in and of themselves, that are also uniquely well suited for the study of evolution and photosynthesis. Bryophytes contain chloroplasts and a photosynthetic machinery quite similar to their tracheophyte kin. However, as they lack vasculature, a cuticle, stomata, and aerenchyma tissues, photosynthesis in bryophytes is very different indeed. In some respects, bryophyte

photosynthetic mechanisms are similar to those in tracheophytes. In others, there are significant differences. Those similarities and differences, along with recent advances in the field, underlie the need for this timely, full-volume treatment of the subject.

The volume is logically arranged. An introductory chapter by the co-editors titled, appropriately, "What Can We Learn from Bryophyte Photosynthesis?" lays out the basic questions to be addressed in the body of the book. The first set of chapters (Chapters 2–4) takes a three-phase evolutionary approach by addressing the algal to bryophyte evolutionary transition (Chapter 2), adaptations of early bryophytes to the terrestrial environment (Chapter 3), and the subsequent diversification of early land plants (Chapter 4). These were among the most intriguing chapters in the volume, with Chapter 4 being especially thoughtful and thought provoking. Indeed, reading these three chapters provides a clear and in-depth background for the uniqueness of bryophytes and the value to be gained by their further study.

The next group of chapters (Chapters 5–12) encompasses a large territory around the basic theme of carbon acquisition. Leaf-based measurements of photosynthesis work well for most tracheophytes, which has, among other things, driven the design of infrared gas analyzer (IRGA) cuvettes. However, bryophytes lack a clearly defined photosynthetic organ. Therefore, Chapter 5 establishes the methods for measuring photosynthesis at multiple scales. Chapter 6 covers CO₂ concentrating mechanisms, a substantial predicament for plants whose photosynthetic surface is more often than not coated with water, not air. The water layer has substantial consequences for gas diffusion. Bryophytes can be found in light environments ranging from deep shade or full sun; therefore, responses to irradiance level are discussed in Chapters 7 (photoprotective mechanisms) and 8 (chloroplast movement). The latter chapter is rather heavy on higher plant examples, but that is where the more relevant literature may be found and the comparison to what is known in bryophytes is revealing. The next two chapters are closely related in that they deal with the scaling of light harvesting in the moss canopy (Chapter 9) and a structural and functional analysis of the canopy itself (Chapter 10). These chapters relate directly to Chapter 5, which dealt with the practical aspects of measuring photosynthesis at the different canopy scales and structures discussed in Chapters 9 and 10. Chapter

11, "Genetics and Genomics of Moss Models," is well done, but somewhat limited in scope. It, or an accompanying chapter, could have perhaps expanded on how recent advances in genomics have impacted studies of bryophyte photosynthesis, limited though they are (as noted by the co-editors in the introductory chapter, section IIIE, and the final chapter, section IIB). While a minor criticism, that absence does leave a gap.

The six chapters of the final section cover the ecology and physiological ecology of bryophytes across a wide range of ecosystems—aquatic, peatland, tropical, and Antarctic. Collectively, they cover various aspects of water relations, desiccation tolerance, temperature and light responses, and mineral nutrition. Chapter 12, the longest chapter in the volume, is a very comprehensive treatment of photosynthesis in aquatic bryophytes and covers everything from light capture to carbon storage, before and beyond. Chapters 13 and 14 concentrate on peatland bryophytes. Chapter 13 has a particular focus on *Sphagnum* photosynthesis, respiration, and growth and production under stress conditions, while Chapter 14 broadens the treatment to include other bryophyte species and various controls on photosynthesis, respiration, and succession in contrasting peatland ecosystems in northern latitudes. Chapter 15 studies the ecophysiology of tropical bryophytes and explores the intriguing phenomenon of the disparity in bryophyte biomass between lowland (low biomass) and montane (high biomass) rainforest ecosystems. Chapter 16 deals with bryophytes at the other end of the hydration spectrum, the dryland biocrust mosses. In addition to heat and desiccation, fluctuating wet-dry cycles that accompany sporadic rainfall patterns are an environmental stress that is unique to dryland bryophytes. Finally, Chapter 17 takes the volume to another habitat extreme, the Antarctic, where bryophytes are the dominant flora. In addition to the obvious challenges with water availability and temperature, polar regions are undergoing some of the most prominent and precipitous climatic change on the planet. High-latitude bryophytes are under particular environmental stress and are likely to see their environment change substantially in the time to come.

An important aspect of Chapters 12–17 is that all six highlight concerns of the future impact global climate change will have on these ecologically distinct bryophyte communities. It takes little to upset the delicate balance of life when living on the edge and, indeed, bryophytes occupy some of the

harshest environments on Earth. They will suffer some of the first consequences as weather patterns change and climate shifts become more extreme.

Although each of the 17 chapters proposes specific suggestions for future research, the volume culminates, correctly so, with Chapter 18, "Opportunities in Bryophyte Photosynthesis Research," by co-editors Rice and Hanson. Forward thinking, it highlights eight prospects for future research directions: (a) linkage between photosynthesis and production, (b) application of genomics, (c) mechanism and ecological significance of mixotrophy, (d) understanding symbioses, (e) scaling across levels of organization, (f) carbon and water dynamics of canopies, (g) complexity of respiratory processes, and (h) characterizing functional diversity. The co-editors have constructed a valuable road map for future studies involving bryophytes.

Similar to the other volumes in the *Advances in Photosynthesis and Respiration* series, *Photosynthesis in Bryophytes and Early Land Plants* is aimed at researchers, graduate students, and advanced undergraduates. I recommend this well-designed volume for those scientists, or indeed for anyone interested in the current status of bryophyte research.

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SYSTEMATICS

Trees of Eastern North America

Gil Nelson, Christopher J. Earle, and Richard Spellenberg

2014. ISBN-13: 978-0-691-14591-4

Flexibound, US\$29.95. 720 pp.

Princeton University Press, Princeton, New Jersey, USA

This book is composed of several short introductory sections giving concise information about the book, the plants it describes, and some common species, followed by an impressive collection of descriptions with consistent and informative illustrations, followed by a glossary and index. The text itself is well put together for the medium- to advanced-level woody perennial identifier, but would be unsuitable for those just beginning tree identification. It is not a key.

The introductory sections are concise and

thorough. They are useful to those of modest to expert levels of plant identification skill, especially the illustrations and definitions of botanical and biological terms. The descriptions of taxonomy, gymnosperms, angiosperms, and forest structure in the introduction are also well done (I would describe them as skillfully abbreviated). The only sections of the introduction that I am not impressed by are the winter twig section and the leaf key section. Neither is useful as a key in the field (regardless of the titles of these sections in the table of contents), and both generally include illustrations that already exist on the pages of the species they refer to (if the illustrations are not included on any of the species pages, they should be). This section would greater serve the reader if it were instead devoted to a dichotomous key to the families, so that users of the book could narrow their search when confronted with an unfamiliar family.

I want to stress that this book does not claim to be a key, and that's fine, but the fact that no true dichotomous key exists means these two sections (leaf key and winter twig key) are misleading in the table of contents. This could be particularly harmful to the buyer who decides whether to buy based on the table of contents. If the authors wish to include a key, let it be a true dichotomous key that serves the reader who is interested in having access to the entirety of the book, regardless of familiarity with all the families included.

I am greatly impressed with the thoroughness of the collection of species cataloged. There are few trees that I encounter in my state (New Jersey) that are not included in the text. As far as the species collection goes as a whole, I have very little to say to the negative. I would only suggest that future volumes pay particular attention to groups of species found in the eastern United States that are very similar. If several members of a group are present in the eastern United States (and are not extremely rare), each member should be included with distinguishing characters so that all species found here may be told apart. For instance, *Cedrus deodara* (deodar cedar) and *C. libani* (cedar of Lebanon) are included, but *C. atlantica* (atlas cedar) is not. *Cedrus atlantica* is a popular ornamental in many parts of the eastern United States due to its "glaucous" variety, so it is unusual that it would be excluded when *C. deodara* and *C. libani* are present.

As far as descriptions of the plants themselves are concerned, the book is well-worded, thorough, and generally useful in its worded and illustrated descriptions. Some things to consider for future editions are:

Where there is a character described for one of several similar species within a genus, it should be described for all so we know whether it is a shared character. For instance, *Aesculus flava* and *A. glabra* are very similar species. *Aesculus flava* is described as having 10 or more overlapping scales on the buds, but the number of scales is not mentioned for *A. glabra*. Similarly, *A. glabra* is noted as having an unpleasant smell when the twig is bruised, but no mention of twig smell exists in the entry for *A. flava*. These would be especially useful characters in the “Similar Species” sections where they are different, but I feel it is important to stress that shared characters described for one species within a genus should be described for all included species sharing that character within the genus, regardless of whether they are true synapomorphies (and perhaps especially if they are).

Where there is a visible character that helps distinguish between two or several species within a genus, illustrations of that character (or its lack thereof) for all relevant species within the genus, included side by side and to scale, would be extremely useful. This would allow readers to easily see the difference(s) noted and make the text a more useful field guide for quickly distinguishing between similar species (a job that the book’s level of detail and vastness of species coverage make it generally capable of). Indeed, the “Similar Species” section is exactly this sort of useful quick field distinguisher, and it is incredibly useful where characters are noteworthy enough and do not share too much overlap, but it is wanting within certain genera.

My final suggestion is to avoid using overlapping characters to distinguish between species. For instance, where two species within a genus are described, if one has leaves that are 3–6” long and the other has similar leaves that are 4–8” long, another character would be helpful (if possible) in distinguishing between the two. This is not always possible. I do not have a specific example earmarked from the text at this time, but I remember being confounded by this in the field.

In general, this text has proved remarkably useful in the field. It usually includes necessary characters to get down to the species level, often at any time of

year. Additionally, it includes enough information and illustration to give the user some confidence in his or her knowledge of the tree described. I am extremely satisfied by this guide, and it has become my go-to book for attempting to identify trees I am unfamiliar with in the field, or when I need to brush up on my knowledge of distinguishing characters between similar species in the field. It has been my great pleasure to review this book, and I am very happy to have it in my collection.

–Kieran Hunt, *Department of Ecology, Evolution, and Natural Resources, Rutgers University, Rutgers, New Jersey, USA.*

The Olmsted Parks of Louisville: A Botanical Field Guide

Patricia Dalton Haragan

2014. ISBN-13: 978-0-8131-4454-2

Paperback, US\$50.00. 456 pp.

University Press of Kentucky, Lexington, Kentucky, USA

Late in his career, Frederick Law Olmsted, popularly known as the designer of New York’s Central Park, was commissioned to design a network of parks in Louisville, Kentucky, and the result is considered by many to be one of his greatest accomplishments. Patricia Dalton Haragan now brings the botanical world of these parks to light in her beautiful book, *The Olmsted Parks of Louisville: A Botanical Field Guide*.

The purpose of the book seems narrow at first glance: to aid in the identification of and spark an interest in some of the key plants found in five of the largest of Louisville’s Olmsted-designed parks. Haragan has succeeded at this task masterfully, but the book has value beyond these parks and the city they grace. The plants included are found broadly across the surrounding region, and this field guide can be a valuable tool to those interested in plant identification in the region even if they don’t spend a lot of time in Louisville parks.

The book begins with a beautifully written preface by Daniel H. Jones that speaks inspiringly to the value of field guides in helping us decipher the natural places around us and the stories held within them. This is followed by a very informative introduction by Susan M. Rademacher that provides historical context about Olmsted and the landscapes he shaped in Louisville. Haragan then introduces the book herself by explaining its structure and the

information contained in the individual species entries, and by providing good clear illustrations of the botanical terminology used within. She also describes each of the five main parks, their natural distinctions, and historical contexts.

The bulk of the book consists of one-page entries covering 384 plants selected to represent the botanical world of the Louisville parks. These entries include good botanical breadth of vascular plants: ferns and fern allies, and herbaceous and woody angiosperms including grasses, sedges, and rushes. The author has chosen to give a lot of information about a limited number of species, but a good number of common species as well as some that are rare or of particular interest are included. The entries are arranged in a way that should make the book easy to use—based upon plant type, flowering time, and flower color—but the lack of any kind of identification key is an unfortunate omission.

Each entry is well organized and informative. Common and scientific names for species and family are listed as well as origin. Descriptions include information about plant form, leaves, flowers, fruits, and distribution. Haragan also indicates within which of the Olmsted parks and which of the three major Kentucky physiographic provinces species are found. Lastly, she includes various notes of interest that may include ethnobotanical uses, ecological information, life histories, medicinal uses, or name origins. Some entries also include specific comparisons/contrasts to similar species for assistance in distinguishing them. The species descriptions are written for the nonprofessional botanist and are accessible to non-scientists, but the author doesn't shy away from botanical terminology; instead, she sets out to guide her reader into learning and being able to use this distinct language.

All entries include at least one color photograph to illustrate the species. These photographs are beautiful, and they clearly illustrate the distinguishing characteristics of the flowers of each plant. However, many of the photographs do not show leaves and vegetative characteristics well, and these characters can be invaluable in identification among similar species.

I would encourage any botanist or natural historian—professional or amateur—who lives in or frequents Louisville to acquire this beautiful and informative work. It is a quality tribute to America's greatest landscape architect, these parks he created, and especially the plants that thrive there. More broadly, those looking for good field guides for the

larger region of eastern deciduous forests may also find it useful for its depth of species information and clear illustrations.

—Amy E. Boyd, Department of Biology, Warren Wilson College, Asheville, North Carolina, USA

HAWS: A Guide to Hawthorns of the Southeastern United States

Ron Lance

2014. ISBN-13: 978-0-9903689-0-8

Paperback, US\$29.95. 518 pp.

Published by the author, Mill River, North Carolina, USA. www.floramontivaga.com

The genus *Crataegus*, predominantly represented by shrubs and small trees and belonging to the family Rosaceae, is native to the northern temperate areas of the continents of North America, Europe, and Asia. The plants belonging to this genus are commonly known by several vernacular names such as haw, hawthorn, hawberry, thornapple, hawapple, whitethorn, and May-tree. The taxonomy and identification of the genus *Crataegus* has been extremely challenging and complex; a large number of plants have been placed loosely under this genus, which has been a major source of error and confusion for proper identification. Hence, there has been a historic need for the detailed investigative analysis of several hawthorn species.

The current volume is an excellent monograph on the hawthorns (*Crataegus*) of the southeastern United States by noted biologist and forester Ron Lance. This comprehensive volume is the painstaking effort of an outstanding botanist and serious researcher who, over two decades, has spent countless hours in the field, gardens, herbaria, and libraries observing and documenting the amazingly complex world of hawthorns. The volume is truly a passionate outcome of the serious hard effort of an individual to fill a vacuum by providing, for the first time, comprehensive information about different species under this genus and their variations, hybrids, and putative hybrids reported from the distinct ecoregion of the southeastern United States.

The volume is ornamented with over 700 high-quality color photographs and approximately 120 line drawings of hawthorns with color-coded distribution/range maps, summary tables, excellent identification keys, detailed natural histories, biogeography, botanical anecdotes on different species, taxonomic descriptions, and a bibliography. The volume is divided into a helpful introduction

followed by seven chapters on: the distribution of hawthorns, an introduction to the ecoregion of southeastern United States, anatomy, taxonomy, natural history, horticulture, and identification of hawthorns. There are four separate sections with detailed keys for the series (section 1) and the taxa (section 2); summaries and species accounts (section 3); and hybrids and putative hybrids (section 4). In addition, there are three superb indices dealing with southeastern *Crataegus* taxonomy (index A), names (index B), and colloquial names (index C); a useful glossary of important botanical terms; and a comprehensive reference section for serious and advanced researchers.

The author has achieved a balance in making this a helpful handbook that includes the necessary technical details, but at the same time, has created an engaging volume with an elegant yet straightforward style. This delicate balance of a serious taxonomic treatment of different species, interspersed with information about the related botanists, biogeography, ecology, economic importance, and horticultural information, makes this volume of interest to both serious researchers and nature enthusiasts. Numerous photographs, line drawings, and images of herbarium sheets are greatly appreciated; the color plates are a valuable addition for the purpose of correct identification. The keys and tables are well organized and extremely helpful as references in the field, and a section dedicated to hybrids also serves as an important resource. One possible improvement to the volume would be the inclusion of color plates of anatomical slides showing transverse and longitudinal sections of important diagnostic characters, as well as some additional scanning electron micrographs of key characters. Because such resources are not easily available on hawthorns, it would greatly benefit researchers working on this taxonomic group.

Overall, this is an excellent and comprehensive volume presenting valuable information on the hawthorns of the southeastern United States. The volume will be useful for researchers and students in the disciplines of botany, taxonomy and systematics, phytogeography, biogeography, economic botany, horticulture, and forestry. The volume will cater to the interests of both serious academic researchers on hawthorns as well as amateur naturalists who are passionate about plant life.

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

The Genus *Erythronium*

Chris Clennett

2014. ISBN-13: 978-1-84246-492-2

Hardcover, US\$85.00. 158 pp.

Royal Botanic Gardens, Kew. Distributed by The University of Chicago Press.

This volume is another in a series of Botanical Magazine Monographs being produced by Kew. This series has covered *Lavandula* (Lamiaceae), *Betula* (Betulaceae), and *Epimedium* (Berberidaceae), among others. It appears that this work is part of (and contains) the author's PhD work on the phylogenetics of *Erythronium* (Liliaceae), recently published in the *Botanical Journal of the Linnean Society* (Clennett et al., 2012). The book is authoritative and exhaustively researched throughout. It is apparent that the author has a passion for the biology and cultivation of these plants and covers them in great detail.

Erythronium is a small genus of geophytes found in North America and Eurasia. It is most diverse in the western United States where many narrow endemics occur. It should be well known to botanists and hikers alike as early-blooming wildflowers that brighten otherwise drab spring woodlands. The species have many common names including trout-lily, fawn-lily, and dogtooth violet. The often mottled, somewhat leathery leaves have inspired some of the evocative common names. Topics covered include history of the genus, phytogeography, morphology, phylogenetics, ecology, cultivation, hybrids and cultivars, and a full taxonomic treatment. The text is nicely illustrated with photographs of every species, many from cultivated plants but others in their natural habitats. There are also 14 watercolor paintings (one of which adorns the cover) spread throughout the text. These are of the same style as those presented in *Curtis's Botanical Magazine*. They were produced by five artists and are of varying degrees of quality. Some appear blurry, which could be an artifact of printing.

The taxonomic treatment is well done for the most part. There is a key to the genus, which worked well with the two species we have here in Wisconsin. My biggest complaint with this chapter, and the book in general, is the distribution maps. The maps appear to show vegetation types in a style seen on satellite maps; i.e., the eastern United States is green, the western United States is primarily brown or red. Why this is done is not explained. There are no state

or provincial borders in the respective U.S. and Canadian parts of the maps. I find this particularly awkward because it is hard to tell which states a species actually occupies from the map alone. As all but four of the species in the genus occur in North America, it would be beneficial to have this depicted.

Species distributions within the maps are displayed with large white dots, but what the dots represent is not explained either. Clennett lists specimens he examined, but they do not necessarily match the locations of the dots. In many cases, the dots are piled atop one another, making their meaning completely obscured; e.g., the state of Michigan is completely covered with 20+ dots for *E. albidum*. Worst of all, the distributions are wrong. Looking at the two species that occur in Wisconsin (*E. americanum* and *E. albidum*), one would be led to believe that both are rare in the state, with *E. americanum* known from only one locality. A quick search of our state herbarium's webpage shows that it is recorded from 50 of our 72 counties with well over 200 specimens. It probably occupies many of the unmapped counties but perhaps has not been collected due to its ubiquity in most places across the state. The maps also lack dots for entire states where species are known to occur, e.g., no dots for *E. americanum* in Maine, despite it occurring in every county. Both the treatment of *Erythronium* in *Flora of North America* and the maps compiled by the Biota of North America Program (BONAP) should have been consulted for this work. If the maps in this work had the aforementioned borders with even simple shading to show distributions, they would be much better. The author does give sometimes-verbose explanations of the distributions; i.e., describing the range of *E. mesochoreum* and inexplicably listing the 32 counties that it occupies in Missouri. However, these do not make up for the poor quality of the maps themselves.

If one is extremely interested in this genus from a horticultural or evolutionary standpoint, this is a good book. But, you will need to look elsewhere to understand its phylogeography.

–John G. Zaborsky, Botany Department, University of Wisconsin–Madison, Madison, Wisconsin, USA; jzaborsky@wisc.edu

LITERATURE CITED

Clennett, J. C. B., M. W. Chase, F. Forest, O. Maurin, and P. Wilkin. 2012. Phylogenetic systematics of *Erythronium* (Liliaceae): Morphological and molecular analyses. *Botanical Journal of the Linnean Society* 170: 504–528.

Plant Systematics: The Origin, Interpretation, and Ordering of Plant Biodiversity (Regnum Vegetabile 156)

Tod F. Stuessy, Daniel J. Crawford, Douglas E. Soltis, and Pamela S. Soltis

2014. ISBN-13: 978-3-87429-452-2

Hardcover, US\$147.50. 425 pp.

Koeltz Scientific Books, Königstein, Germany

This book is focused on process, and its viewpoint is very modern. Its core is dedicated to methodology of phylogenetic reconstruction, analysis of support, character evolution, and calibration of evolutionary rates. There is also substantial coverage of major themes in plant population and reproductive biology, including speciation, hybridization, and related topics essential to an understanding of evolution in plants. While the authors are careful to be inclusive, their emphasis, as is current in the field they are summarizing, is very much on the genetic and genomic.

Neither the title nor the short preface sufficiently appraises the prospective reader of what to expect or, more to the point, what *not* to expect of this authoritative work. The authors make clear that they wish to provide an advanced-level textbook that covers the multiple dimensions of the evolutionary process and the systematization of its products. Many readers, however, will not anticipate that this treatise, focused on the theory and practice of plant systematics, gives no attention at all to the results of that theory and practice. It presents no current classification scheme, no overview of broad evolutionary trends or discussion of relationships among the major groups of angiosperms or embryophytes, and certainly no outline of the major plant families. Presumably the reader will obtain this information from other sources. One would therefore much more easily imagine this work used a reference source for those engaged in plant systematics research than as a primary textbook for classroom-based teaching.

Indeed, the limited attention to pedagogy in the organization and presentation of this book suggests that students are not really the target audience. After two very brief introductions outlining the importance of biodiversity and classification, the authors proceed to several chapters on “systematic data.” These describe in turn the structural, genetic, molecular, phytochemical, and reproductive-system characters that have been utilized in plant biosystematic studies. A plant systematist beginning a new project may find that perusal of these chapters provides a useful overview of the range of traits that might be considered for analysis. Ample references are supplied, with numerous figures from contemporary works. But the text here is often devoid of conceptual background, and a less specialized reader not searching for characters to analyze may find this catalog of traits to be an unenlightening and off-putting entry into the subject matter of plant systematics. The most persistent readers will eventually discover that this book does, in fact, provide a very good introduction to the field, in its chapter entitled “Approaches to Systematics.” Astonishingly, the authors have chosen to place it near the end of the volume (Chapter 18). There one finds a thoughtful history of classification approaches, which, otherwise placed, might provide a rationale for reading the rest of the book. This chapter helpfully clarifies important concepts potentially confusing to non-systematists,

such as the difference between a phenogram and a cladogram. Included are definitions of such basic terms as *plesiomorphic*, *apomorphic*, *synapomorphy*, *homoplasy*, *convergence*, and *cladogram* (!), which were abundantly used without clarification in many of the preceding chapters. One can only surmise that the authors—distinguished professors as well as researchers—simply did not conceive of this work pedagogically. Their targeted reader would appear to have abundant genetics but little botany under the belt. Thus, the informative chapter on genetic diversity in plant populations includes a schematic flower with sepals, petals, anthers, ovary, stigma, style, etc., all dutifully labeled for the unenlightened, while elsewhere terms such as *homoploid*, *bivalent*, *multivalent*, and *homoeologous* are used without any accompanying clarification.

No glossary is provided. The literature list, on the other hand, is almost ninety pages long and includes over 4000 cited works, an impressive show of scholarship by any measure. This volume seems destined to become a significant reference for those actively involved in plant systematics research, but may be less likely to figure prominently on the shopping list of other botanists.

–William B. Sanders, *Department of Biological Sciences, Florida Gulf Coast University, Fort Myers, Florida, USA*

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PLANT SCIENCE BULLETIN
FEATURED IMAGE



Cover image courtesy of Catherine Rushworth.

Cathy's research focuses on apomictic hybrids in the genus *Boechera*. Hybrids in her study area can represent up to 14 different species, including the mat-forming *B. microphylla* (shown here). Learn more about Catherine and her research on page 15.



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