

ASPB MIDWESTERN SECTION NEWSLETTER

States included: IA, IL, IN, KS, KY, MI, MN, MO, ND, NE, OH, OK, SD, WV, WI Canada - MB, ON



Midwest Section News!

Once again COVID interfered with our plans for the annual meeting in 2021. However, planning is well underway for the **2022 Midwest Section Meeting** at University of Illinois in Urbana-Champaign, IL. The meeting is currently scheduled for March 12-13. The planning committee would like to hear your thoughts on the meeting format. Please take a few minutes to fill out the following survey to share your thoughts with us:

<https://surveys.illinois.edu/sec/292749096>

Nominations are now open for Midwest Section Committee Positions! We are seeking nominations for:

1. Secretary/Treasurer
2. Executive Committee Representative
3. Early Career Representative

Serving on the committee is a rewarding experience that builds leadership skills and provides networking and professional development. The duties of each of the open positions are listed below.

To nominate yourself, or someone else, please send an email to Mike Mickelbart mmickelb@purdue.edu. Nominations are due by July 30. Information about the candidates will be shared with the membership in early August and voting will run from August 15 – September 15. The newly elected officers will begin their term on October 1.

Duties of Midwest Section Committee open positions:

Secretary/Treasurer

The secretary/treasurer (S/T) is responsible for coordination of all payments and oversight of the finances of the section. The S/T is responsible for review and awarding of the travel grants for the annual meeting and for on-site registration. Finally, the S/T will run all elections for open offices in the section. This is a **4-year commitment**, 2 served as S/T, 1 as Vice-Chair, and 1 as Chair.

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Executive Committee Representative

The Representative to ExCom is responsible for facilitating and maintaining communication between the section and national society. The Representative should attend the formal meetings of the Executive Committee (spring and summer) to represent the section at those meetings. The representative also serves as a member of the Membership Committee for ASPB and should participate fully in the meetings and activities of that committee. The representative should communicate important information from these committees back to the section officers. This is a **3-year commitment**.

Early Career Representative

The Early Career Representative (ECR) will provide guidance to the Vice-Chair and the Meeting Organizer to enhance early career access and inclusion in the section. This is a **2-year commitment**.

Five Questions with Midwest Section member...

Bruna Montes Luz: Brunna is a PhD student and ASPB Ambassador at the University of Missouri. She is also a reporter for the Midwest Newsletter team, her first "Behind the Science" article is featured on page 3.

1) What is your favorite thing about living and working in the Midwest? Being from Brazil, I love how different the seasons are here, especially now in the spring, seeing all the plants come back to life and having a closer contact with nature than I had back home. My dog loves the parks, and my husband and I enjoy the scenery. Missouri is so beautiful, and Columbia is a calm, yet vibrant town.

Working at Mizzou is just great. It has an excellent infrastructure, and we have access to excellent researchers, especially in the agriculture field. It also has a huge international community and a very inclusive environment. I've been blessed with a very supportive advisor and great lab members that make graduate school much more enjoyable.

2) What has been the benefit to you of belonging to the Midwest section of ASPB? I like to call myself a baby scientist because I'm still growing as a researcher. I became a member of ASPB just at the beginning of this year and joined the Midwest section of ASPB. Other than getting to hear from other plant biologists in the Midwest, I'm now a reporter for the Midwest section newsletter and get to talk to different scientists, learn about their research and get to know them. It's a great opportunity to meet new people and hear about their very interesting research. I also look forward to going to the Midwest meeting not only to present my work, but to also meet new people.

3) What projects are you excited about working on in the future? I'm excited about progressing in my research project that has just started to pick up some steam. I'm interested in understanding the molecular mechanisms of the rhizobium-soybean interaction in greater detail. First, because this interaction allows for efficient nitrogen fixation in plant nodules, which reduces the need for nitrogen fertilizers in agriculture. There's a great effort in the scientific community to transfer nitrogen-fixing capabilities to cereal crops, so I want to contribute to the progression of this major project. We already understand a lot of the initial signaling between the plant and the bacteria, but the intermediate steps that occur before nodule formation



"Don't be afraid of recalculating your route if it means you'll be happier."

are not well described. That's why we are using tissue-specific analyses to uncover localized plant responses to rhizobial infection.

4) What advice do you have for budding scientists? My advice is to follow your passion. Never do something because it is just convenient or it pays well, but look for something that stimulates you and makes you feel excited about the future. Also, don't be afraid of changing directions in your life, be it related to your personal or professional life. My first year at university was as an Engineering major, and I found out fast enough that my life had no meaning without a whole lot of Biology in it. Don't be afraid of recalculating your route if it means you'll be happier.

5) What is your favorite non-science activity? I really love listening to music, singing, and dancing. Music makes my days brighter and inspires me to go about my day with more enthusiasm. My workday becomes much more exciting if I'm able to have my headphones on and sing along. I connect very deeply to lyrics and love sad songs, though some days call for more upbeat music. As my Twitter bio says, I'm Taylor Swift-obsessed. Another thing I really love is spending time with my dog. We brought her with us from Brazil and she's a very important part of our family.

Follow Brunna on Twitter: @BrunaMontesLuz

Behind the Science Author Spotlight - Sara Izquierdo Zandalinas

By Bruna Montes Luz
PhD student, University of Missouri

Sara (pictured to the right) is a Senior Research Associate at the University of Missouri in Dr. Ron Mittler's laboratory.

Sara's the first author in the recently published article "Vascular and non-vascular transmission of systemic reactive oxygen signals during wounding and heat stress" in *Plant Physiology* (<https://doi.org/10.1093/plphys/kiab157>).

This article comes only a few months after she published "Vascular Bundles Mediate Systemic Reactive Oxygen Signaling during Light Stress" in *The Plant Cell* (<https://doi.org/10.1105/tpc.20.00453>).

Her work describes how plants react to changes in their environment by propagating signals detected at a local tissue to the rest of the plant. In response to heat, light, or wounding stress, different signals reach systemic tissues within minutes. One of these signals includes a wave of reactive oxygen tissues (ROS). In her most recent work, they determined that the ROS wave can propagate not only through the plant's vascular bundles as was previously described, but also through mesophyll cells in response to wounding and heat stress in *Arabidopsis*. This occurs in contrast to the systemic response to high light, which occurs exclusively through the vascular bundles. They also showed that the propagation of the ROS wave through mesophyll cells could contribute to the stronger systemic ROS signal observed in plants subjected to high light and heat stress simultaneously applied to two different leaves. In short, their findings show the importance of mesophyll cells in ROS signal propagation during responses to wounding and heat stress.

Sara moved to the Midwest in 2018, coming from Texas. Missouri is by far the coldest place she's ever lived, but she highlights that the adaptation was easy. "Columbia has a lot of green areas to spend time out, the University is awesome, and the plant scientific community is the best I have ever worked with."

She has progressed from being a Postdoctoral Research Assistant to a Senior Research Associate at MU and hopes to lead her own research group in the future, in the same area she is currently working. "My main career aspiration is to lead a research group to continue investigating the effects of the different climate change-associated factors on plant yield and to help in developing tolerant plants to these environmental conditions."



Her most recent publication expands on the knowledge published on *The Plant Cell* last year, giving her the necessary tools and questions to ask next. The longest part of her research was developing different plant lines. "Once this part was ready, we had a clear aim, and the experiments were easy to conduct because we already had all protocols and techniques optimized for this kind of analysis."

The most challenging part was "compiling the results and discussing them in a publication in a way they can reach a wide audience of experts and non-experts". Sara highlights the importance of having a good experimental design to prevent any unexpected problems and being open-minded to a change in strategy if necessary.

"Setting logical goals, a good plan, and excellent guidance from your supervisor are key to be successful in any research", Sara says.

Editor's Note: If you would like to be featured in Behind the Science reach out to Bruna at bmontesluz@mail.missouri.edu or Jennifer at JDRobison@manchester.edu.

Biologically Meaningful Transcriptomes Being Built at UNL

By Marc Libault

Associate Professor, University of Nebraska-Lincoln

A thorough understanding of crop biology is needed before implementing effective biotechnological solutions to enhance crop performance. For instance, a deeper understanding of the crop gene activity will allow researchers to better characterize gene functions and gene regulatory networks associated with specific biological processes. Now, researchers have an opportunity to access such knowledge by applying the powerful plant single-cell transcriptomic technology [1-8].

At the University of Nebraska-Lincoln (UNL), building on the development and validation of the use of isolated plant nuclei to establish biologically meaningful transcriptomic information [8-10], Drs. Vikas Belamkar, Stephen Baenziger, Katherine Frels, and Marc Libault are working on characterizing the underlying molecular mechanisms to explain wheat (*Triticum* spp.) heterosis.

While heterosis or hybrid vigor has been exploited for increased yield in multiple crops (most notably maize [*Zea mays*]), wheat breeding largely relies on classical breeding methods to increase genetic gain (~1% per year). This annual increase is not sufficient to meet the growing global demands for wheat production. There is no single unifying theory that can entirely explain heterosis. To date, several mechanisms are proposed including the conceptual quantitative genetic models of dominance, overdominance, and epistasis. These models do not describe the underlying genetic mechanisms. Therefore, the causal molecular mechanisms of heterosis remain elusive and must be characterized. Revealing the differential use of the genomic and transcriptomic information of wheat leaf between heterotic and non-heterotic F1 progeny and their corresponding parents will lead to a better understanding of the establishment, maintenance, and dynamics of cell-type gene expression in plants and their impact on heterosis. This will have direct impact for scientists working on hybrid crops and deliver increased rates of genetic gain supporting global food security.

Dr. Katherine Frels is the new small grains breeder and geneticist at UNL and will work to continue the advancements in wheat breeding and genetics started by Dr. Stephen Baenziger, emeritus small grains breeder and geneticist. The hybrid wheat breeding program is an opportunity to explore the dynamics of plant growth and development as well



Advancing our understanding of wheat heterosis through the use of unique heterotic and non-heterotic progeny and their parents will contribute to the development of new breeding methods and hybrid cultivars.

1. Ryu, K.H., et al., Single-Cell RNA Sequencing Resolves Molecular Relationships Among Individual Plant Cells. *Plant Physiol*, 2019. 179(4): p. 1444-1456.
2. Jean-Baptiste, K., et al., Dynamics of gene expression in single root cells of *A. thaliana*. *Plant Cell*, 2019.
3. Denyer, T., et al., Spatiotemporal Developmental Trajectories in the Arabidopsis Root Revealed Using High-Throughput Single-Cell RNA Sequencing. *Dev Cell*, 2019. 48(6): p. 840-852.e5.
4. Zhang, T.Q., et al., A Single-Cell RNA Sequencing Profiles the Developmental Landscape of Arabidopsis Root. *Mol Plant*, 2019. 12(5): p. 648-660.
5. Liu, Z., et al., Global Dynamic Molecular Profiling of Stomatal Lineage Cell Development by Single-Cell RNA Sequencing. *Mol Plant*, 2020. 13(8): p. 1178-1193.
6. Shahan, R., et al., A single cell Arabidopsis root atlas reveals developmental trajectories in wild type and cell identity mutants. *bioRxiv*, 2020: p. 2020.06.29.178863.
7. Shulse, C.N., et al., High-Throughput Single-Cell Transcriptome Profiling of Plant Cell Types. *Cell Rep*, 2019. 27(7): p. 2241-2247.e4.
8. Farmer, A., et al., Single-nucleus RNA and ATAC sequencing reveals the impact of chromatin accessibility on gene expression in Arabidopsis roots at the single-cell level. *Mol Plant*, 2021. 14(3): p. 372-383.
9. Thibivilliers, S., D. Anderson, and M. Libault, Isolation of Plant Root Nuclei for Single Cell RNA Sequencing. *Curr Protoc Plant Biol*, 2020. 5(4): p. e20120.
10. Thibivilliers, S. and M. Libault, Plant Single-Cell Multiomics: Cracking the Molecular Profiles of Plant Cells. *Trends Plant Sci*, 2021.

Announcements

ASPB Plant Biology 21 Worldwide Summit

Registration is now open for the upcoming Plant Biology meeting on July 19 - 23. This virtual conference will bring you research from around the world, professional development, and networking opportunities. Early bird registration ends on June 19. There are also special group rates! To register visit: <https://plantbiology.aspb.org/>



Larry Griffing Composes Hooke Article

Larry wrote a story in *The Conversation* about a candidate for a portrait of Robert Hooke. Robert Hooke has no known portrait, even though he "appears" in all sorts of presentations in introductory biology and plant biology courses.

<https://theconversation.com/the-mystery-of-the-missing-portrait-of-robert-hooke-17th-century-scientist-extraordinaire-141681>

The research, cited by The Conversation piece, includes a reference to his original article in the *Journal of Microscopy*.

The story ran on the front page of the London Times last summer.

<https://www.thetimes.co.uk/article/sir-isaac-newton-kept-rival-robert-hooke-out-of-the-picture-vrgrs8tkq> And the London Times also had an opinion piece on Hooke in the same issue.

<https://www.thetimes.co.uk/article/the-times-view-on-isaac-newton-and-robert-hookes-portrait-hooked-r0n8cnlfp>

It is now in Wikipedia, so it must be true!

https://en.wikipedia.org/wiki/Robert_Hooke.

Want to advertise a position or grant, share some exciting news, be featured in our next newsletter, or have an article that would be helpful to other Midwest plant scientists? Please send items to Jennifer Robison no later than August 30, 2021: JDRobison@manchester.edu