

BiNews

Commencement Edition

May 2023

CONGRATULATIONS BIOLOGY GRADUATES!



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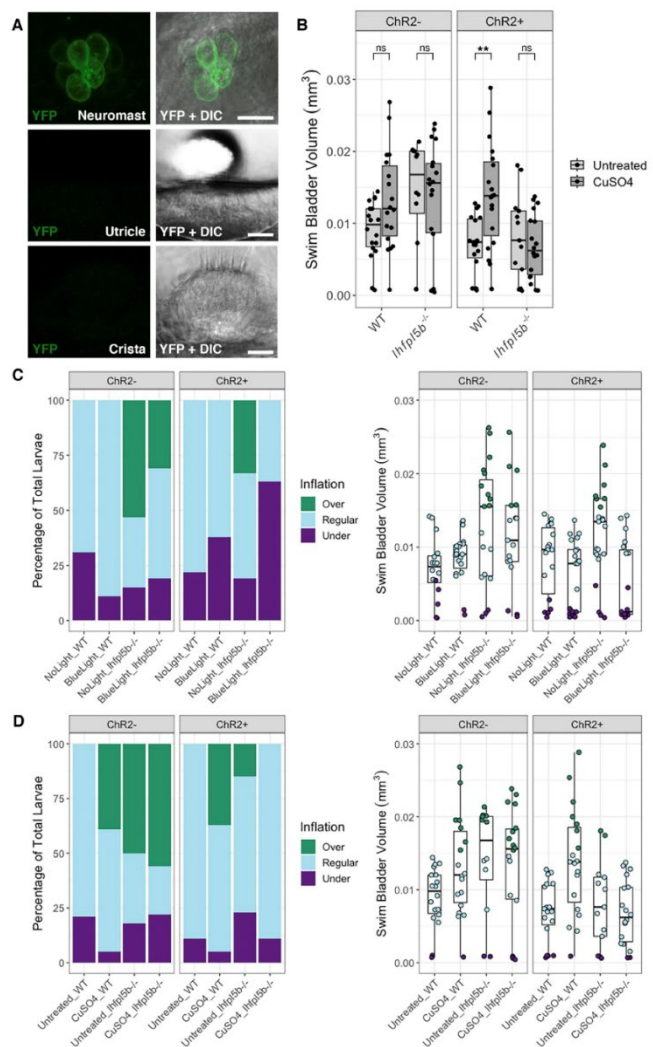
We look forward to participating in the 2023 Commencement Ceremony on May 28th and celebrating the many accomplishments of our majors in the Class of 2023!

News from the Trapani Lab

Together with Prof Schmalzbauer (Sociology; American Studies), Prof Jaswal (Chemistry; Biochemistry & Biophysics), Prof Corañez-Bolton (Spanish; Latinx and Latin American Studies), and Dr. Bunnell (Center for Teaching and Learning), Professor Trapani is co-author of *Critical Empathy in the Liberal Arts: The Sociological Imagination as a Mechanism for Re-envisioning Interdisciplinary STEM Education* that will soon be published in Roadmap for Humanities and Social Sciences in STEM Higher Education (Springer). The Amherst team describes a co-taught, interdisciplinary course, Being Human in STEM (HSTEM), which provides a model to deepen student, staff, and faculty understandings of inequality and identity in STEM, while inspiring student-led actions to enhance equity and inclusion in a liberal arts setting. The work describes how the HSTEM course encourages students expand and revise their Being Human in STEM stories based on new understandings they develop about themselves as emerging scientists, the structures and systems that have impacted their individual journeys, and their aspirations to contribute to greater equity and inclusion in STEM locally, nationally, and globally now and in the future.

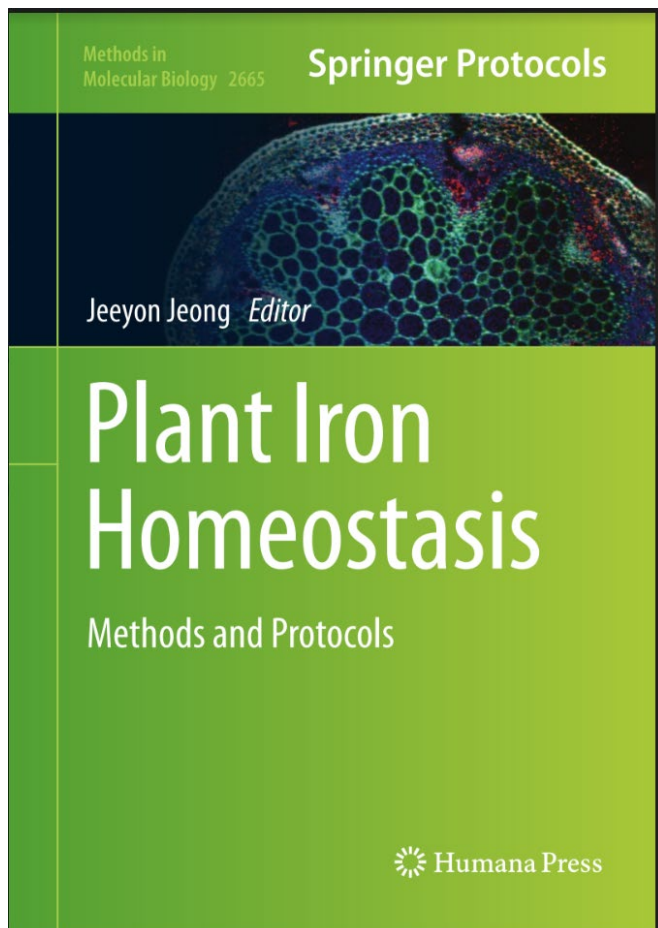
Hot off the presses:

Prof Trapani and research technician Stacey Beganny collaborated with researchers from University of New Brunswick Canada on an article: [A sensation for inflation: initial swim bladder inflation in larval zebrafish is mediated by the mechanosensory lateral line](#), that was just accepted for publication in the *Journal of Experimental Biology*! Larval zebrafish achieve neutral buoyancy by swimming up to the surface and taking in air through their mouths to inflate their swim bladders. Little is known about the sensory basis for this under-appreciated behavior of larval fish and a strong candidate for the sensation is the mechanosensory lateral line. We propose a novel sensory basis for achieving neutral buoyancy where larval zebrafish use their lateral line to sense the air-water interface and regulate initial swim bladder inflation.



New Publications from the Jeong Lab

Prof Jeong was a guest editor of [Methods in Molecular Biology: Plant Iron Homeostasis](#), a protocol book series published by Nature Springer, which just got published! This book includes 16 chapters from 15 groups, including one from the Jeong Lab. **Sara Omer '23, Claire Macero '25, Dayishaa Daga, and Kelly Zheng '22** are co-authors of the chapter from my lab titled "An Adapted Protocol for Quantitative Rhizosphere Acidification Assay".



Chapter 4

An Adapted Protocol for Quantitative Rhizosphere Acidification Assay

Sara Omer, Claire Macero, Dayishaa Daga, Kelly Zheng, and Jeeyon Jeong

Abstract

Acidification of the rhizosphere is a key process in the homeostasis of multiple essential nutrients, including iron. Under iron deficiency, the release of protons from the roots helps solubilize and increase the accessibility of iron in the soil. Rhizosphere acidification has been widely examined in many iron homeostasis studies, generally using a qualitative method based on the color change of bromocresol purple, a pH indicator dye, near the roots. In this chapter, we introduce an adapted version of a rhizosphere acidification assay protocol that allows for the quantitative assessment of small pH changes in the rhizosphere. This colorimetric method also utilizes bromocresol purple, but the ratio of its absorbance at 434 nm and 588 nm is considered to quantify protons released into the assay solution. Furthermore, the assay is compatible with small sample volumes, such as those with young *Arabidopsis* seedlings.

Key words Iron, Rhizosphere acidification, Bromocresol purple, Colorimetric, Proton

1 Introduction

Rhizosphere acidification plays a key role in nutrient homeostasis. Increased proton efflux from the roots has been observed under deficiencies of essential nutrients such as nitrogen, phosphorus, potassium, and iron, and contributes to enhancing the accessibility of the nutrients in the soil solution [1, 2]. Under iron-deficient conditions, dicots use a reduction-based mechanism that involves rhizosphere acidification. This process, referred to as Strategy I, is induced by iron deficiency and consists of the extrusion of protons by proton ATPases on the plasma membrane of root epidermal cells [3], the reduction of ferric chelates to ferrous iron by Ferric Reductase Oxidase 2 (FRO2) [4], secretion of coumarins that bind and mobilize iron [5], and the uptake of ferrous iron by the high-affinity iron transporter, Iron Regulated Transporter 1 (IRT1) [6–8]. The reduced pH around the roots helps solubilize ferric chelates and increases iron availability [3]. While rhizosphere

Jeeyon Jeong (ed.), *Plant Iron Homeostasis: Methods and Protocols*, Methods in Molecular Biology, vol. 2665, https://doi.org/10.1007/978-1-0716-3183-6_4, © The Author(s), under exclusive license to Springer Science+Business Media, LLC, part of Springer Nature 2023

Prof Jeong is also among the 60 co-authors/participants in a new publication in Plant Direct (<https://doi.org/10.1002/pld3.493>). This white paper was the outcome of two Interdisciplinary Plant Science Consortium workshops "convened to address the need for collaboration between scientists engaged in plant physiology, genetics, and genomics and to discuss the approaches that will create the necessary environments to support successful collaboration". The full list of authors and affiliations are listed in the "Supporting Information" section.

Received: 29 December 2022 | Revised: 16 March 2023 | Accepted: 27 March 2023
DOI: 10.1002/pld3.493

WHITE PAPER



Inclusive collaboration across plant physiology and genomics: Now is the time!

Interdisciplinary Plant Science Consortium

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Funding information

National Science Foundation (NSF), Grant/Award Numbers: IOS-1937660; USDA | National Institute of Food and Agriculture (NIFA), Grant/Award Numbers: 2019-08094

Abstract

Within the broad field of plant sciences, what are the most pressing challenges and opportunities to advance? Answers to this question usually include food and nutritional security, climate change mitigation, adaptation of plants to changing climates, preservation of biodiversity and ecosystem services, production of plant-based proteins and products, and growth of the bioeconomy. Genes and the processes their products carry out create differences in how plants grow, develop, and behave, and thus, the key solutions to these challenges lie squarely in the space where plant genomics and physiology intersect. Advancements in genomics, phenomics, and analysis tools have generated massive datasets, but these data are complex and have not always generated scientific insights at the anticipated pace. Further, new tools may need to be created or adapted, and field-relevant applications tested, to advance scientific discovery derived from such datasets. Meaningful, relevant conclusions and connections from genomics and plant physiological and biochemical data require both subject matter expertise and the collaborative skills needed to work together outside of specific disciplines. Bringing the best expertise to bear on complex problems in plant sciences requires enhanced, inclusive, and sustained collaboration across disciplines. However, despite significant efforts to enable and sustain collaborative research, a variety of challenges persist. Here, we present the outcomes and conclusions of two workshops convened to address the need for collaboration between scientists engaged in plant physiology, genetics, and genomics and to discuss the approaches that will create the necessary environments to support successful collaboration. We conclude with approaches to share and reward collaboration and the need to train inclusive scientists that will have the skills to thrive in interdisciplinary contexts.

1 | BACKGROUND

Complex societal challenges typically require collaboration of experts from diverse scientific disciplines. This holds true for the most pressing challenges in the field of plant sciences. It has become increasingly

A list of participants and their affiliations is provided in Supporting Information.

News from Dr. Kristensen's students

Dr. Kristensen's students were in the news recently with an article in the Greenfield Recorder promoting citizen science and scientific literacy. Dr. Kristensen founded MassMammals as a way to track the distribution and population density of foxes, deer, bobcats and other mammals across the state using citizen-reported sightings and trail cameras. Read more about it in the article here: [Local researchers advocate for increased roles for citizen science](#).



Support with Summer Lab Organization

Please reach out to Megan (mwancura@amherst.edu) if you want help with projects centered on lab organization over the upcoming months!



Megan also reports that the color printer in the second floor write-up space is working again. Reach out to Megan if you need help accessing it!

Biology Steering Committee Hosts Tea Time



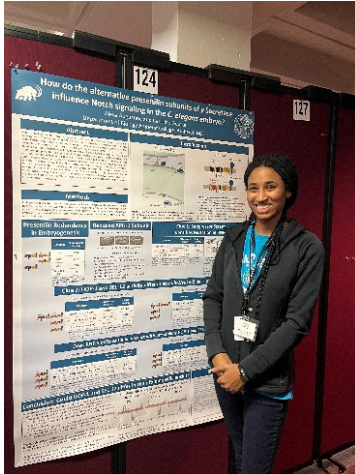
The Biology Steering Committee hosted its final Tea Time of the semester on Monday May 1st. Thank you to everyone who joined and shared in conversation, and a special thanks to the BSC for their work in hosting these events throughout the semester!



News from this year's graduates

Sara Omer '23 (BCBP Thesis Student, Jeong Lab) will be attending graduate school at Rockefeller University this fall.

Biology Senior **Ella Rose** received a Fulbright Research Fellowship to go to Chile for research using whale songs as indicators of ecosystem health.



Alexa Augustine '23 from the Goutte lab presenting her thesis work at the North Eastern Regional Meeting of the Society of Developmental Biology in Woods Hole, MA.



Tavus Atajanova '23 from the Ragkousi Lab won best undergraduate poster at the North Eastern Regional Meeting of the Society of Developmental Biology in the Marine Biological Laboratory in Woods Hole, MA.

If you have any updates for the next issue of BioNews, please send them to Ldavis@amherst.edu.