



Emergent Mechanisms in Biology of
Robustness, Integration & Organization

Emergence: A biweekly newsletter of discovery, education, and outreach from the EMBRIO Institute

Issue 15: March 22, 2023

DIRECTORS' NOTE

Today is National World Water Day, Bavarian Crepes Day, and National Goof Off Day. Take your pick, or potentially combine all three (send pics). This month is Women's History Month (see the Notable Quote below for the second in this series in the Nobel Prize Women Who Changed Science). Last week was spring break for many in EMBRIO...and we were all met with the dreaded "spring ahead" of clocks. But on Monday, as we rolled out an extra hour early, we were greeted with the arrival of the spring equinox promising warmer weather ahead. May it be so!

Our **upcoming Weekly Update on Monday the 27th** **Nilay Kumar, Ph.D. Candidate in the Zartman Lab at Notre Dame, will present his dissertation research** with a focus on application of quantitative experimentation, image processing, machine learning and computational modeling in systems biology. Please plan to join us.

The **member spotlight this issue highlights Dr. Weiwei Zhang**, Senior Research Scholar in the Staiger Lab at Purdue. Dr. Zhang is lead instructor for the **Spinning Disk Confocal Microscopy and Photomanipulation Workshop** to be held April 5th 9 AM - 5 PM on the Purdue campus (morning session has a Zoom option, so everyone can participate in this session). Learn more about Weiwei in the Spotlight and the workshop details below.

Get involved in the continuing Journal Club activity along with several seminars of interest (Director Umulis and Deputy Director Staiger each present invited seminars on the 24th) and upcoming important dates to check out in this issue, including a reminder for our **Investigators: progress reports are due by next Friday, March 31**. Our timeline for reporting and budget submissions to NSF is much earlier this year, pushing our internal reporting earlier as well. [Access the report instructions](#).

The newly formed Student Leadership Council has organized an online event via Zoom for Friday, March 31, 1-2pm ET titled "**Get to Know You Elevator Pitch**" [Please sign up!](#) All are welcome. This is a nice opportunity to informally introduce yourself and get to know more of the nearly 90 people in the Institute.

We end this note with a much-deserved congratulations to EMBRIO faculty members Deva Chan, Elsje Pienaar, and Joy Wang on their tremendous achievement in each being selected for Early Career awards from DARPA and NSF!!

We want to hear about your news and announcements. Send them to Brent (laddb@purdue.edu) by March 31st for inclusion in the next issue of *Emergence*.

David, Chris, Stephanie, Anjali, and Brent

Notable Quote

“The world cannot afford the loss of the talents of half of its people if we are to solve the many problems which beset us.” ~ Rosalyn Yalow. Explore Dr. Yalow’s journey from a hard-knock Bronx neighborhood into science and the story of her work that gained her the Nobel Prize in Physiology or Medicine in 1977 at her [Nobel Prize Women Who Changed Science page](#).

QUICK LINKS

EMBRIO WORKSHOP: [Spinning Disk Confocal Microscopy and Photomanipulation Registration](#)

Journal Club – Calcium Imaging Techniques: [Monday’s 11am Zoom](#), [papers to be discussed](#)

Get to Know You ‘Elevator Pitch’, March 31st 1-2pm : [Sign up](#), [Zoom link](#)

[ABIDES Open Office Mondays 2:30 - 3 pm Zoom link](#) (resumes April 3)

ABIDES Monthly Informal Trainee Lunch Group with DEI Director in DLR 228c, Purdue campus. Noon – 1pm, March 30th . [Zoom link for those off campus](#).

[Schedule Your One-on-One Interview with Soumi](#)

[Weekly Update Meeting Recordings](#)

MEMBERSHIP SPOTLIGHT: Weiwei Zhang



Dr. Weiwei Zhang

Weiwei Zhang is a Senior Research Scholar, Department of Botany and Plant Pathology, Purdue University, in the Chris Staiger Lab.

EMBRIO project: Decoding how mechanical and chemical signaling are coordinated and integrated by Ca²⁺ and/or actin dynamics during plant defense.

What's your hometown, State, Country (and one thing you love, miss, remember, or want to tell others about it)?

I was born in Luoyang, a city in the central region of China. My hometown is surrounded by beautiful mountains and rivers and I miss the days I spent in nature since I was a child.

What are your hobbies?

Reading, hiking, and other outdoor activities spent with my two daughters.

What drew you into becoming a scientist or engineer (or both)?

My curiosity about the natural world. Being a scientist allows me to uncover the hidden mechanisms behind natural phenomena, and I enjoy designing new tools that help solve problems and make new findings.

Tell us the main point of your research as it relates to EMBRIO:

My research is to understand the plant defense related early signaling mechanisms including signal initiation, propagation, crosstalk and differential responses to chemical versus mechanical stimuli. I am charactering the spatiotemporal dynamics of calcium, ROS and actin cytoskeleton with state-of-the-art live-cell imaging tools combined with genetic and pharmacological perturbations to address the above questions.

You find yourself alone on an elevator with the president of your university – who knows very little about your field: They ask you to tell them about your research (15 seconds - go!):

I study how immunity works in plants so that they are resistant to various fungal and bacterial pathogens. I am investigating how plants detect the presence of potential pathogens, and how this recognition triggers a complex network of signaling pathways inside the plant cell.

What's on the horizon for you (research, career, personal, whatever you want to share)?

Learning advanced imaging and image analysis related techniques.

What's your various URL/social media handles that others can follow (prof. website, twitter, LinkedIn, blog, etc)?

LinkedIn: <https://www.linkedin.com/in/weiwei-cai-zhang/>

EMBRIO WORKSHOP: Spinning Disk Confocal Microscopy and Photomanipulation

April 5th 9 AM - 5 PM. Purdue campus. [Registration](#) deadline **March 27th**.

There is a morning technical backgrounding session that all can join via Zoom regardless of your location (<https://purdue-edu.zoom.us/j/98337764051?pwd=aDMwNW5haU9mYzdnMW40Q3ZPb1NLQT09>), and an afternoon hands-on session. This mini microscopy workshop will be hosted by Dr. Weiwei Zhang in the lab of Professor Chris Staiger using their Andor Revolution XD SDC microscope equipped with a Mosaic photomanipulation unit. This is an excellent opportunity to gain background knowledge of these techniques followed by hands-on sessions. *Note: EMBRIO trainees who desire to travel to Purdue for this workshop, please contact Brent ASAP to apply for travel funds.*

JOURNAL CLUBS

NEW CLUB: CALCIUM IMAGING TECHNIQUES Meets Monday's 11am ET [via Zoom](#)

Due to the need within our EMBRIO community to process and analyze Ca²⁺ Images, Director Umulis has proposed to discuss papers regarding methods and tools for analyzing calcium imaging as part of a new journal club. **The goal, beyond integrating these techniques, is to write a review paper.**

Norma Perez (nperezro@purdue.edu), EMBRIO Postdoc with the Buganza-Tepole and Umulis Labs, is leading the effort to organize this journal club, please contact her about joining the club.

The club is currently discussing the following papers:

https://docs.google.com/document/d/1uESi45Zv_kGL369NW8sPW60GByOAXme7-vr1XKBM18U/edit?usp=sharing

ONGOING CLUB: Multimodal Functions of Calcium in Tuning and Regulating Cytoskeleton Networks

Please contact Dr. Linlin Li (li2212@purdue.edu) for information. The club is currently entering the writing stage for organizing and publishing a review paper on the topic. It isn't too late to join.

Here is the link to the current working documents:

https://docs.google.com/document/d/1Cpg77ytioWiluRmiDMCcAiAd4jNNX_J7s64RQk8xOU/edit?usp=sharing

EMBRIO ABIDES (Access, Belonging, Inclusion, Diversity, Equity, Support)

DEI in EMBRIO has transitioned to ABIDES (Access, Belonging, Inclusion, Diversity, Equity, Support). Dr. Anjali Iyer-Pascuzzi, EMBRIO ABIDES Director and Associate Professor at Purdue, is leading activities for Institute members. Planned ABIDES activities for this semester (Zoom links are also shared in the [ABIDES folder in the EMBRIO BOX](#) account):

- Weekly open office 'hour' 2:30 – 3 pm (Eastern) **Resumes April 3**, Monday before research update, Zoom link: <https://purdue-edu.zoom.us/j/91942543564>
- Trainee lunch hour meeting **March 30, 12 – 1 pm** (Eastern) in DLR 228c and by Zoom: <https://purdue-edu.zoom.us/j/95281263014>

EMBRIO STUDENT LEADERSHIP COUNCIL

President: **Feyisayo Akande**

Vice President: **Jazzmin Owens**

Treasurer: **Saumya Mehta**

Secretary: **Peter Brumm**

Executive Advisory Char: **Everyone** will participate

Marketing & Public Relations Chair: **Peter Brumm & Liz Teren** (Jazzmin Owens will assist)

Student Advisory & Outreach Chair: **Liz Teran**

Professional Development Chair: **David Gazzo**

Undergraduate Representative Chair: **Jonathan Banks**

The Student Leadership Council has organized an online event via Zoom for Friday, March 31, 1-2pm ET titled "**Get to Know You Elevator Pitch**" **Please sign up!** All are welcome. This is an informal event where you will introduce yourself with some fun facts about you and how your work ties into EMBRIO.

[Sign up](#)

Zoom link: <https://notredame.zoom.us/j/97617980011>

UPCOMING DEADLINES, IMPORTANT DATES, & INFO

Weekly Research & Education Zoom Meetings Spring Semester, Monday's 3 – 4 pm.

Recordings: EMBRIO Box account > Weekly Update Meeting. [Direct URL.](#)

Spring Semester [Zoom link](#):

- January 9 – Krishna Jayant, Asst. Prof., BME, Purdue
- January 16 – Martin Luther King, Jr. Day – No Meeting, please volunteer locally
- January 23 – Trainee Professional Development, Grants Series Session #2

- January 30 – Anjali Iyer-Pascuzzi, Assoc. Prof., BPP, Purdue, DEI Director, EMBRIO
- February 6 – Thrust & Site Leads Update Meeting
- February 13 – Priyanka Baloni, Asst. Prof, HHS, Purdue
- February 20 – Trainee Professional Development, Grants Series Session #3
- February 27 – Bakary Samasa, Mary Mullins Lab
- March 6 – Thrust & Site Leads Update Meeting – NSF site visit debrief, next steps
- March 13 – Spring break, no meeting
- March 20 – NSF site visit debrief and trainee orientation to the Institute
- March 27 – Nilay Kumar, Ph.D. Candidate, Zartman Lab, Notre Dame
- April 3 – Thrust & Site Leads Update Meeting
- April 10 – Nissa Jo Larson, Umulis Lab
- April 17 – Leopold Green, Asst. Prof., Biomedical Engineering, Purdue
- April 24 – Calcium Signaling Journal Club presents findings
- May 1 – Thrust & Site Leads Update Meeting
- May 8 – Javier Munoz, Brubaker Lab

March 23, 2023. 12:30 ET. Special Seminar: Dr. Michael Levin, "ENDOGENOUS BIOELECTRIC NETWORKS AS PATTERN MEMORIES: FROM THE SCALING OF COGNITION TO ELECTROCEUTICALS FOR REGENERATIVE MEDICINE". Zoom: <https://purdue-edu.zoom.us/j/6308671867>

March 24, 2023. Columbia University BME Seminar: Dr. David Umulis, EMBRIO Director, presents "Delineating mechanisms of BMP-mediated patterning in embryo and cochlear development." [Abstract and event URL.](#)

March 24, 2023. Chicago Cytoskeleton Society Meeting, Northwestern University. Dr. Chris Staiger, EMBRIO Deputy Director, and Distinguished Professor at Purdue University, will present "Cooperative actin filament nucleation in the homeostatic cortical array of plant cells" during the March 24, 2023 meeting of the [Chicago Cytoskeleton Society](#).

March 31, 2023. **Deadline for Investigator Progress Reports.** Our timeline for reporting and budget submission to NSF is much earlier this year. [Access the report instructions.](#)

March 31, 2023. The newly formed Student Leadership Council has organized an online event via Zoom for Friday, March 31, 1-2pm ET titled "**Get to Know You Elevator Pitch**" [Please sign up!](#) All are welcome. This is a nice opportunity to informally introduce yourself. [Zoom link](#)

April 5, 2023. 9 AM - 5 PM. Purdue campus. Spinning Disk Confocal Microscopy and Photomanipulation Workshop. [Registration deadline March 27th.](#)

April 5, 2023. [Frontiers in Biophysics Seminar Series](#), 1:30 p.m. in MJIS 1001. Joe Howard, the Eugene Higgins Professor of Molecular Biophysics and Biochemistry, Department of Molecular Biophysics and Biochemistry, Yale University, will present "Mechanical Stability of Microtubules."

July 10-12, 2023. EMBRIO Trainees Workshop, Notre Dame University. Details forthcoming.

July 13-14, 2023. EMBRIO All-Hands Annual Meeting, Purdue University. More information forthcoming.

INSTITUTE EVALUATION: SIGN UP FOR YOUR ONE-ON-ONE INTERVIEW (hint: it's mandatory)

If you are a member of the EMBRIO institute currently doing a research project, we would like to invite you for participating in this study. Participation in the evaluation process is **MANDATORY** for all the members of the institute.

As a part of the evaluation process, you will take part in an online session (via Zoom), which includes an interview and a brief survey, and the entire process should be completed in less than an hour. Interviews will be conducted annually for the total duration of your participation in the institute and the session would not exceed an hour and would be completed in a day.

Please fill in all the times you may be available for our interviews using the link below with either your name or email address. This information is requested so that we may contact you to set up an online session, but we will use a randomly generated 4-digit code in place of your name to identify all your information for the data collection and analysis.

<https://www.when2meet.com/?18327719-shNWM>

Your participation will not affect any aspect of your association with the EMBRIO institute. If you have any doubts regarding the evaluation process, please reach out to Soumi at mukher42@purdue.edu."

With Regards
Soumi

Hot Off the Press: New EMBRIO Journal and Conference Papers

Let us know about new papers you want to highlight for the EMBRIO community!

REMINDER: EMBRIO Acknowledgement for Scholarly Papers.

For EMBRIO related research publications, NSF requires acknowledgement of EMBRIO NSF funding for our Institute to claim the work in our reporting back to NSF. Please include the following acknowledgement in your journal and conference papers and posters: **"This work is based upon efforts supported by EMBRIO Institute, contract #2120200, a National Science Foundation (NSF) Biology Integration Institute."**

Conference Presentations:

Let us know about your conference presentations.

Awards

Three EMBRIO investigators have received Early Career Awards! Congratulations to Deva Chan (BioEng), Elsje Pienaar (BioEng), and Joy Wang (ECE) on these tremendous achievements.

- Deva Chan, Assistant Professor of Biomedical Engineering, Young Faculty Award, Defense Advanced Research Projects Agency
- Elsje Pienaar, Assistant Professor of Biomedical Engineering, NSF Career Ward

- Xiaoqian Joy Wang, Assistant Professor of Electrical and Computer Engineering, NSF Career Award

[News story](#) celebrating early career award winners (Purdue).

Open Positions

Two Open-Rank Professor Positions in Technology and Research Related to Next-Generation Biomedical Digital Twins

The Department of Intelligent Systems Engineering at Indiana University is pleased to announce a search to fill Two Open-Rank Professor Positions in Technology and Research Related to Next-Generation Biomedical Digital Twins. Appointments can be at Full, Associate or Assistant Professor level and two-person cluster hires are possible. Appointments can begin as early as August 1, 2023. This search is part of a broad collaborative initiative to create key hardware and software components of next-generation digital twins for research, bioengineering and clinical application.

To learn more about Luddy School, ISE, and to apply online, please visit <https://indiana.peopleadmin.com/postings/16811>

For more details see attached full announcement.

Questions, nominations, and confidential inquiries may be sent to Prof. James A. Glazier (jaglazier@gmail.com)

Postdoctoral Fellow Position in Interdisciplinary Biomedical Research and Data Science, Purdue University

A full-time postdoctoral fellow position is available immediately for interdisciplinary research in computational systems biology and collaborative data science at Purdue University. The postdoctoral position is associated with EMBRIO (Emergent Mechanisms in Biology of Robustness, Integration, and Organization), an NSF Biology Integration Institute with six university partners. The postdoctoral fellow will be broadly involved in the EMBRIO Institute, with efforts engaged in computational systems modeling and simulation research, as well as building expertise, guidance, and collaboration support and research in data management and data analysis for EMBRIO teams. The postdoctoral fellow will conduct research under the guidance of Dr. Elsje Pienaar (<https://engineering.purdue.edu/PienaarLab>) and be co-advised by Dr. Adrian Buganza Tepole (<https://engineering.purdue.edu/tepolelab/>).

As part of the work with the Pienaar lab the fellow would build and calibrate computational models of Calcium signaling in multicellular environments and its diverse downstream effects. Together with the Tepole lab the fellow would work to leverage machine learning (ML) tools to speed up and automate model evaluation, and to complement closed-form models with multi-modality ML metamodels for improved accuracy. The work is highly interdisciplinary and highly integrative across multiple systems. The fellow will work closely with experimental experts in zebrafish, plant and tissue culture biology within the EMBRIO Institute to build and parameterize the models. The fellow will also have opportunities to work closely with other computational faculty, staff and students on innovating new ways to integrate and analyze models and data across biological scales and systems.

As these specific projects progress, the postdoctoral fellow will have the opportunity to collaborate with investigators and interdisciplinary teams to research and deliver secure systems of data collection, storage, sharing, and analysis to produce new and actionable knowledge. This work will research and provide regular guidance and training in data science best practices and serve as a point of contact for all things data related. The postdoctoral fellow will have the opportunity to co-write proposals and to develop research components around the data-rich interdisciplinary modeling and simulation environment of EMBRIO.

A Ph.D. degree in Data Science, Computer Science, Biomedical Engineering, Chemical Engineering, Mechanical Engineering, Mathematics, Physics or related fields is required. Previous experience in computational modeling, systems biology, stochastic modeling, numerical methods, and associated statistical analysis, data science, or research data management is desired. Successful applicants will be detail oriented, eager to learn new methods, and enthusiastic about computationally rigorous modeling, collaborating across disciplines, working with experimental biologists and chemists, and advancing and supporting the research data realm of EMBRIO Institute. Salary to be negotiated.

To apply for this position, please submit to Dr. Pienaar (epienaar@purdue.edu) and Dr. Buganza Tepole (abuganza@purdue.edu): (1) your CV, (2) a cover letter explaining your background, interest and qualifications for the position, and (3) contact information for three references, including your relationship to the reference, their phone number, email address, and mailing address. Please contact Dr. Pienaar (epienaar@purdue.edu) for formal inquiries.

Postdoctoral Fellow Position in Interdisciplinary Biochemical Cancer Research, University of Notre Dame

A full-time postdoctoral fellow position is available immediately for Multidisciplinary Cancer Research at the University of Notre Dame, affiliated with the Harper Cancer Research Institute, the Notre Dame Warren Drug Delivery Center and Notre Dame Institute for Precision Health. The perspective candidate will conduct an interdisciplinary research on projects studying the basic molecular mechanisms of multiple birth defects, cancer progression and neurodegeneration and developing novel therapies to combat them. The postdoctoral fellow will receive crossdisciplinary training in biochemistry, cell biology, synthetic organic chemistry, and drug discovery utilizing a broad range of biochemical assays related to phenotypic screening and protein-protein interactions. The postdoctoral fellow will conduct research under the guidance of a mentoring team, including Dr. Jeremiah Zartman (<http://sites.nd.edu/zartmanlab/>) and Dr. Brandon Ashfeld (<https://ashfeldlab.nd.edu/>).

A Ph.D. or M.D. degree in cell or molecular biology, genetics, biochemistry, chemistry or a related discipline, is required. Previous experience in genetics, screening technologies and associated statistical analysis, synthetic chemistry, imaging or mouse modeling is desired. Successful applicants will be detail oriented, eager to learn new techniques, and enthusiastic about biology, exploring the interface between chemistry and biology, and working in an academic lab environment. Salary is commensurate with experience.

To apply this position, please submit: (1) your CV, (2) a cover letter explaining your background, interest and qualifications for the position, and (3) contact information for three references, including your relationship to the reference, their phone number, email address, and mailing address. Please contact Dr. Jeremiah Zartman (jzartman@nd.edu) or Dr. Brandon Ashfeld (bashfeld@nd.edu) for formal inquiries.

New Lab Members?

Did you recently have new students or staff members join your EMBRIO projects? We want to add them to the listserv, Box account, demographics survey, and Personnel List for ensuring their inclusion in communications and participation. If they are not already on our Personnel spreadsheet (<https://app.box.com/s/frd9275xc069gmgmtbe3y1osoz1j7ssk7>), or they have graduated, let Brent know their names and email contacts (laddb@purdue.edu)

Submit your items for the next newsletter by **March 31st** to Brent (laddb@purdue.edu)