



Emergent Mechanisms in Biology of  
Robustness, Integration & Organization

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

Issue 7: November 2, 2022

## **DIRECTORS' NOTE**

As we're all running full stride at the mid-semester point, we are hard at work to position the Institute for growth and progress at the nexus of integration. We'll be sharing more details soon. We invite the entire EMBRIO community to always connect on Mondays at our Weekly Update. This coming Monday, Nov. 7, will feature the Evans Lab, with Dhulika Ravinuthala presenting her project on how calcium signaling in mammalian eggs influences the actomyosin cytoskeleton in the cortex and its role in the prevention of polyspermy.

As experimental biologists, Dhulika and the Evans Lab are working toward learning to mathematically and computationally model complex biological systems. This will provide an ideal time for open discussion on cross-disciplinary training and skill building following the talk. Dhulika is featured in the Membership Spotlight this issue, along with Liz Teran and Daniel Rocha from the Cabrera – Isaza Lab who will both present the following week on Nov. 14 about integration of the calcium signaling system across different scales and through different kingdoms while developing a comprehensive architecture of empirical models representing multimodal experimental and simulated data. You can find the remaining Weekly Update meeting semester schedule in this issue under the section: "Important Dates, Upcoming Deadlines, & Info".

Please check out the one-day virtual Notre Dame - Mexico Symposium 2022 co-organized by Jeremy Zartman, "*Reverse Engineering Cellular Systems: Patterning and Morphogenesis*" happening on December 9, 2022. [Registration and call for abstracts](#) open now.

We encourage those mentoring trainees to check out the new series that NIH is offering to promote mental health and well-being of the academic research community titled [RAISING A RESILIENT SCIENTIST](#). The series of five sessions begins Nov. 9<sup>th</sup>.

We want to hear about your news and announcements. Send them to Brent ([laddb@purdue.edu](mailto:laddb@purdue.edu)) by 11/11 for inclusion in the next issue of *Emergence*.

David, Chris, Stephanie, and Brent

## QUICK LINKS

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

[Reverse Engineering Cellular Systems Workshop](#)

Propose Breakout Room Topics during Weekly Updates (Email Brent: [Laddb@purdue.edu](mailto:Laddb@purdue.edu) )

[RAISING A RESILIENT SCIENTIST](#) NIH series

## EMBRIO RELATED 1-Day WORKSHOP: Reverse Engineering Cellular Systems: Patterning and Morphogenesis

Virtual Notre Dame - Mexico Symposium 2022: **Reverse Engineering Cellular Systems: Patterning and Morphogenesis**

December 9, 2022

Co-organized by EMBRIO faculty Jeremy Zartman at Notre Dame, this is a virtual 1-day symposium of potential interest to members of the EMBRIO community. Registration and call for abstracts: <https://forms.gle/KZurTw5rwxycdYxE9>

Registration is free and abstracts are being accepted for short talks on topics related to patterning and morphogenesis. The symposium highlights several researchers from across Mexico and includes a talk from Bomyi Lim, who works on gene regulation at our partner U Penn.

## MEMBER SPOTLIGHT: DHULIKA RAVINUTHALA



Dhulika is a Ph.D. student in the Evans Lab of the Biological Sciences Department at Purdue University.

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

I'm from Chennai, also called "Madras Patman," in India. If there is anything that I miss from my State, it's the food, the beach, and me zooming around in my access 125 scooter. If anyone visits Chennai, Tamil Nadu, it is a must to visit some well-known temples that define the State's cultural heritage.

**What are your hobbies?**

I like to sketch, cook new dishes or read books during my spare time.

**What drew you to become a scientist or engineer (or both)?**

I like the entire process that leads to the final result. Very often, when trying to learn something new, it is scary and daunting, but once you get the hang of it, it's like reaching the mountaintop; the view is excellent. I realized a Ph.D. is similar to hiking; granted, along the way, I will be scared of falling or failing, but the arduous journey makes the end worth it.

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

I come under the Thrust 1 research group. EMBRIO focuses on determining how living systems integrate chemical and mechanical stimuli for survival. My research mainly looks into how calcium signaling in mammalian eggs (Chemical signal) influences the actomyosin cytoskeleton in the cortex (possibly mechanical stimuli) and its role in the prevention of polyspermy (more than one sperm entering the oocyte during fertilization).

**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'm interested in how the egg allows only one sperm to enter, although there are about 200 in its vicinity in healthy fertilization. Sometimes the mechanism is impaired, fertilization with multiple sperms occurs, and the embryo does not develop. It is essential to understand this mechanism to treat infertility due to failure to prevent polyspermy (multiple sperms entering the egg).

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

My goals are for a timeline of 3 years. I want to learn how to mathematically and computationally model complex biological systems. My future goal is to enter the interdisciplinary field, integrating biological and computational knowledge.

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

[www.linkedin.com/in/dhulika](http://www.linkedin.com/in/dhulika)

## MEMBER SPOTLIGHT: LIZ TERAN HERRERA



Liz is a Ph.D. student in the Cabrera – Isaza Lab with the Bioengineering Graduate Program at the University of Puerto Rico at Mayagüez, and is a member of The Applied Optimization Group at UPRM. She is also serving as the UPRM representative on the newly formed EMBRIO Student Leadership Council.

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

I am from Barranquilla, Colombia. My city is mainly known for the Carnival of Barranquilla and its famous artists and athletes. I miss most its typical food and share with my family.

### **What are your hobbies?**

I like jogging and outdoor activities. Recently, I started to develop the habit of reading non-scientific books.

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

I have liked math since high school, so I found my way from a BS in Math. During the process, I was excited about how statistics can help to draw conclusions from samples and solve biological problems. Later in my academic career, I got my MS in Statistics, and here I am pursuing a Ph.D. in Bioengineering.

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

I belong to the Cabrera and Isaza Lab; we are part of Core Thrust. Our group is engaged in developing a comprehensive architecture of empirical models representing multimodal experimental and simulated data.

### **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!):**

We collect experimental and simulated data; in our research, this data comes from different organisms like Arabidopsis plants. After gathering, we started to do all the statistical analyses. The type of data analysis we employed can vary from linear model to more complex model. And the end, the main goal is to highlight helpful information derived from Ca<sup>2+</sup> dynamics.

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

Right now, I want to finish my Ph.D., and I would like to pursue an academic and research career in my area of expertise.

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

<https://www.linkedin.com/in/liz-teran-herrera-b2a79a163/>

**MEMBER SPOTLIGHT: DANIEL ROCHA CLAVIJO**



Daniel is a Ph.D. Student in the Cabrera – Isaza Lab with the Bioengineering Graduate Program at the University of Puerto Rico at Mayagüez and is a member of The Applied Optimization Group at UPRM.

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

I am from Ibagué, Colombia. Ibagué is located at 1200 meters above sea level on the Central Cordillera of the Andes, near the snow-capped Tolima. Also, it is 3 hours from the capital of Colombia (Bogotá). Our typical food is the Tolimense tamale and the suckling pig. In Ibagué, you will find an incredible nature to visit such as the Payande waterfalls, the Tolima orchid nature reserve, the Combeima canyon and of course the Tolima snow-capped mountain.

**What are your hobbies?**

I like to ride a bike, go to the beach, and read statistics books.

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

Ever since I was in high school I have been passionate about science and technology. I always wanted to study a science where I could relate mathematics and biological sciences.

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

My research is a part of Core Thrust in EMBRIO in the of Isaza and Cabrera lab. The goal of project is to Create a comprehensive architecture of empirical models representing multimodal experimental and simulated data from the study of calcium signaling in plants.

**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!):**

My research takes place in the context of the EMBRIO institute whose central theme is the integration of the Calcium signaling system across different scales and through different kingdoms. The objective of our work is to make an inventory of multimodal data through EMBRIO and apply different empirical models that allow us to represent the behavior of calcium in plants.

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

At the University of Puerto Rico, I had the opportunity to teach undergraduate courses for 6 years in mathematics and statistics. where I discovered that I love teaching. Therefore, I would like to continue in the academy as a university professor for teach and continue working on research with the new generations to train professionals with critical and investigative thinking, which can help solve problems in society.

**Weekly Update Zoom Breakout Rooms:**

**Are you looking for a collaborator? Would you like to get conversation started about a specific research topic with other EMBRIO members?** Email me (Brent, [laddb@purdue.edu](mailto:laddb@purdue.edu)) with your breakout room topics for upcoming Weekly Update sessions.

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

“My name is Soumi Mukherjee, and I am a Graduate Student at the Department of Biological Sciences at Purdue. Along with my advisor Dr. Stephanie Gardner, I will be conducting an institute wide evaluation study as a part of Thrust 4 initiative. The process will help in capturing your experiences as a member of EMBRIO, which will be utilized to create a formative evaluation report for NSF at the end of each year. Your participation will not only aid in furthering the goals of the institute for providing an interdisciplinary collaborative environment essential for promoting knowledge integration across all the four thrusts, but also enable us to structure activities catered towards your own professional development.

**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/?16968903-R8veS>

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 me at [mukher42@purdue.edu](mailto:mukher42@purdue.edu).”

With Regards  
Soumi

## **NIH Raising a Resilient Scientist Series**

The NIH OITE is pleased to offer the [RAISING A RESILIENT SCIENTIST](#) series for faculty, staff scientists, and administrators who mentor students and postdoctoral fellows in the biomedical, behavioral, and social sciences. A variety of topics will be covered with a specific focus on communication and shared problem-solving to help trainees deal with the inevitable setbacks experienced in high knowledge environments. The goal of the Raising a Resilient Scientist series is to promote the mental health and well-being of the academic research community by supporting faculty and administrators to develop self-management, relationship-management, and mentoring skills. There will be five units in the series and start on November 9<sup>th</sup>, 2022; each unit will consist of a 75-minute lecture followed by a 1-hour facilitated discussion with peers. Previous participants found participation very valuable, and the tools presented practical and actionable. Here is what those who participated in series have to say:

1. *“Informative workshop that I think all faculty should be required to attend. Making this a requirement for mentoring teams for fellowship and training grants would be a great approach! They need to be invested in mentoring and training, as much as training fellows.”*
2. *“Thank you! I've done a lot of mentoring workshops/training but feel like this one is already taking things to another level.”*
3. *“This course needs to be offered again and again, such an important resource in any academic curriculum.”*

There is no charge for participation, but advanced registration is required. For more information, and to register, please visit our [webpage](#). Participation in the entire series is recommended but is not required. Please do not hesitate to email us if you have any questions.

Dr. Sharon L. Milgram  
(she/her/hers)  
Director, NIH Office of Intramural Training & Education  
NIH Office of the Director  
[www.training.nih.gov](http://www.training.nih.gov)

## UPCOMING DEADLINES, IMPORTANT DATES, & INFO

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

Zoom link:

<https://purdue-edu.zoom.us/j/96053485465?pwd=eVnY2owcm9kaFRtVUdPcmFHG1UT09&from=addon>

- November 7 – Dhulika Ravinuthala (Janice Evans Lab), Breakout Rm. Topics
- November 14 – Daniel Rocha and Liz Teran (Mauricio Cabrera Lab), Breakout Topics
- November 21 – Jeffrey Coulter (Taeyoon Kim Lab), Breakout Topics
- November 28 – EMBRIO Aims Page Student Professional Development session 2
- December 5 – Gregory Reeves, Assoc. Prof., Chem. Eng., TAMU
- December 12 – Krishna Jayant
- Winter Break

**Nov. 9, 2022.** NIH [RAISING A RESILIENT SCIENTIST](#) series begins.

**Nov. 9 – Nov. 12:** The [Annual Biomedical Research Conference for Minoritized Scientists \(ABRCMS\)](#) is a go-to conference for underrepresented groups in STEM fields.

**Dec. 9** Virtual Notre Dame - Mexico Symposium 2022: **Reverse Engineering Cellular Systems: Patterning and Morphogenesis.** Registration and call for abstracts: <https://forms.gle/KZurTw5rwxYxY9>

**Jan. 2 – 6, 2023:** The BMES Cellular and Molecular Bioengineering Special Interest Group is seeking abstracts for the [BMES Conference \(CMBE\)](#) in Indian Wells, CA.

### Hot Off the Press: New EMBRIO 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.”**

### Awards

*Let us know about awards that you want to highlight.*

### Open Positions

**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](mailto:jzartman@nd.edu)) or Dr. Brandon Ashfeld ([bashfeld@nd.edu](mailto: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/frd9275xc069gmgmtbe3y10soz1j7ssk7> ), or they have graduated, let Brent know their names and email contacts ([laddb@purdue.edu](mailto:laddb@purdue.edu) )

**Submit your items for the next newsletter by Nov. 11 to Brent** ([laddb@purdue.edu](mailto:laddb@purdue.edu))