



Emergent Mechanisms in Biology of
Robustness, Integration & Organization

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

Issue 19: May 31, 2023

DIRECTORS' NOTE

Thank you to Nissa Larson (Umulis lab) for presenting her Ph.D. research project during our last meeting: *Multiscale Modeling of BMP Signaling Pathway during Zebrafish Embryogenesis*. If you missed the presentation, you may access the recording on Box > Weekly Meeting Recordings ([recording Larson N.](#))

Following a break in our Weekly Meeting next week, on June 12th David Gazzo and Mayesha Mim (Zartman Lab) will lead an introduction to scientific figure creation employing BioRender (details below). In advance of the workshop, sign-up and create a BioRender account for free at www.biorender.com so that you can follow along.

We are working on finalizing the schedule and registration for the EMBRIO summer workshop hosted by the Zartman Lab at Notre Dame July 10-12, followed by our Annual All-Hands Retreat at Purdue July 13-14. Please see the entry in this issue for the draft schedule of the workshop and link to an [RSVP poll](#) so that we can better plan the events, get your input and ideas for additional training, and get your size preference on a new EMBRIO t-shirt – a shout out to Shelly Tan in the Deng Lab for her deft design and illustration skills!

Check out the training opportunity later this summer with the Glazier Lab & Biocomplexity Institute at IU are offering a two week online live course in basic and advanced CompuCell3D July 31 - August 13. Details to participate are below.

Thanks to all who completed the updated demographics survey that NSF asks us to collect and report. If you haven't yet completed anonymous survey, it takes about one minute. You can access it here: [EMBRIO Demographics Survey 2023](#).

As we prepare for presentations and posters at conferences, and manuscripts for publication **please remember to acknowledge our NSF award**: "This work is based upon efforts supported by EMBRIO Institute, contract #2120200, a National Science Foundation (NSF) Biology Integration Institute." Find recommended poster and PowerPoint templates, along with EMBRIO and NSF logos on our Box account in the "Poster and Presentation Templates & Logos" folder. [Direct Link](#).

We want to hear about your news and announcements. Send them to Brent (laddb@purdue.edu) by June 16th for inclusion in the next issue of *Emergence*.

David, Chris, Stephanie, Anjali, and Brent

Notable Quote

"Since all models are wrong, it is very important to know what to worry about; or, to put it in another

way, what models are likely to produce procedures that work in practice (where exact assumptions are never true)." ~ George Box (1919 – 2013), Statistician (see ["All models are wrong"](#))

QUICK LINKS

Please complete the EMBRIO Events RSVP and Training poll: [online survey](#)

[CompuCell3D School and Hackathon July 31 – August 13](#)

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

[Weekly Update Meeting Recordings](#)

BioRender Mini-Workshop

During regular EMBRIO Weekly on June 12th. Led by David Gazzo and Mayesha Mim (Zartman Lab), with support from EMBRIO Student Leadership Council. ALL EMBRIO MEMBERS WELCOME!!

Are you exhausted spending hours, days, and countless meetings pouring over PowerPoint, Illustrator, or Inkscape figure designs? Well, we're here to help you change that!

Join our BioRender-ing workshop for a crash course on how to create professional, beautiful scientific images in a fraction of the time. But what is BioRender . . . ?

[BioRender](#) is the easy friendly-to-use illustration platform geared for scientific use that is quickly taking over research and academic institutions around the world! We will be showing you the tips, tricks, and amazing aspects that we have learned through our own use of BioRender. Mainly focusing on figure design and creation, but also covering BioRender's slide/presentation and poster design aspects as well. You can sign-up and create a BioRender account for free at www.biorender.com and follow along with us as we show you a new world.

JOURNAL CLUBS

CALCIUM IMAGING TECHNIQUES Meets Monday's 11am ET [via Zoom \(use this link through June 26th\)](#)

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 has been leading the effort with this journal club, please contact her about participating in 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 SUMMER WORKSHOP – Notre Dame, July 10-12. Registration opening soon.

Please complete our events RSVP poll: [online survey](#)

2nd Annual EMBRIO Workshop **DRAFT schedule**

Theme: Image Acquisition, Processing, Analysis

Dates: July 10-12, 2023 (options to stay overnight on the 9th)

Location: University of Notre Dame, South Bend, Indiana

Organizer and contact: Prof. Jeremiah Zartman, Department of Chemical and Biomolecular Engineering, University of Notre Dame

7/10 Monday morning. Start time

9:00-9:30 Jeremiah Zartman. Introductions and announcements.

9:30-12:00 (with break) Dr. Sara Cole

Unit 1: Microscopy basics, sample preparation, and data acquisition

Two sessions 9:30 am -12:00 pm and 1:00 pm -2 pm

1. Fixation
2. Sectioning? or not.
3. Labeling
 - 3a. intrinsic (fluorescence proteins)
 - 3b. immunocytochemistry/immunohistochemistry
 - 3c. genetic probes
 - 3d. fluorogenic/photoconvertible probes
 - 3e. others?

4. Controls and why are they important?

12:00 -1:00 Lunch break (boxed lunches)

1:00 - 2:30 Dr. Sara Cole

5. Microscopy

5a. brightfield, fluorescence

5b. contrast imaging

5c. reflectance/polarized

5d. large sample imaging (2photon, lightsheet, oct, tissue clearing prep)

5e. quantitative imaging (photon counting)

5f. enhanced/super resolution

5g. fluorescence lifetime imaging

2:30-3:00 Break

3:00 - 4:30 TBD. Possibilities: Bruker / Imaris presentations

7/10 Evening - EMBRIO student council - evening activities

7/11 Tuesday

9:00-9:30 Krishna Jayant (kjayant@purdue.edu)

Tuesday July 11 Unit 2: Fundamentals of image processing module

9:00-9:30 Overview by Professor Krishna Jayant (kjayant@purdue.edu) (Via zoom)

9:30-10:45 Part 1

9:30-10:45 Shulan Xiao - Building image processing pipelines, tools and techniques

11:00 - 12:00 Hamad Khan - Walking through a specific Ca²⁺ imaging Pipeline

1:00 - 2:00 Part 2

1:00-2:00 Saumitra Yadav - Point spread functions

Unit 3: RICS workshop. Prof. Gregory Reeves, TAMU

2:30-4:30

RICS is a tool for measuring absolute concentrations and mobilities (which includes determining the fraction of fluorescent molecules bound to immobile structures). In addition, we could use cross-correlation RICS to measure the fraction of GFP-tagged molecules bound to an RFP-tagged molecule.

Specific learning objectives:

1. Describe the relationship between fluctuations in intensity and molecule number in a confocal voxel
2. Describe the background of how an autocorrelation function is calculated from fluctuations in intensity
3. Describe the relationship between the shape of the autocorrelation function, the decay in correlations in fluctuations with increasing time shifts, and the diffusivity of the molecule
4. Choose appropriate microscope parameters to acquire high quality RICS images
5. Practice acquisition of RICS images

7/12 Wednesday Morning (in process)

9:00-10:30 Dr. Elsje Pienaar Unit 4: Data driven model calibration

10:30 -12:00 Group modeling exercise

Afternoon: Depart for Purdue University, West Lafayette

July 13-14 EMBRIO Annual Retreat, Hosted with Weldon School of Biomedical Engineering, Purdue University, West Lafayette Campus. (Schedule TBD)

Thursday July 13 9am – 5pm

Friday July 14 9am – 12pm (potential afternoon workshop or activity).

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

Dr. Anjali Iyer-Pascuzzi, EMBRIO ABIDES Director and Associate Professor at Purdue, leads activities for Institute members. Stay tuned for ABIDES activities for this summer and Fall semester.

UPCOMING DEADLINES, IMPORTANT DATES, & INFO

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

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

Spring & Summer [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 – Manager Meets
- April 17 – Project Discussions
- April 24 – Project Discussions
- May 1 – No meeting. Integrated and Enabling Project Proposals Due.
- May 8 – No Meeting
- May 15 – Leopold Green, Assist. Prof. BME, Purdue
- May 22 – Nissa Larson, Ph.D. Student, Umulis Lab, BME, Purdue
- May 29 – No meeting, Memorial Day
- June 5 – TBD
- June 12 – BioRender mini-workshop (organized by David Gazzo, Mayesha Mim, and EMBRIO Student Leadership Council).

June 1, 2023. NSF Annual Report Due.

June 8, 2023. Quantitative Biology Symposium, Hosted by the Department of Cell and Developmental Biology, Northwestern University, 8am – 6pm CT. <https://planitpurple.northwestern.edu/event/590383>

June 12, 2023. BioRender Mini-Workshop. During regular EMBRIO Weekly, 3-4pm ET.

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

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

July 31 - August 13, 2023. 2023 Multicell Virtual-Tissue Modeling Online Summer School and Hackathon
Learn to model your biological system of interest with one-on-one help. Week 1 will cover CC3D basics. Week 2 will cover advanced topics in CC3D, followed by a 2-day model-building hackathon. Physicists, biologists, computer scientists, and modelers team up to build research-grade models of biological systems. All experience levels are welcome. For more information, email compucell3d.iu@gmail.com or visit www.compucell3d.org/Workshop23. Register at: www.tinyurl.com/CC3D2023.

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."

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

Congratulations to Priyanka Baloni, Asst. Prof., Health & Human Sciences; her proposal entitled, "*Identifying metabolic signatures associated with PFAS exposure and their role in neurotoxicity*" was selected by the external Showalter Trust Selection Committee to receive a 2023 Showalter Trust Research Award.

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)

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 **June 16th** to Brent (laddb@purdue.edu)