

Rebecca McGillivray

Curriculum Vitae

Education

University of California, San Francisco 2015 - 2021
Ph.D. in Cell Biology
Tetrad Graduate Program

University of California, Los Angeles 2011 - 2015
Molecular, Cell, and Developmental Biology, BS
Minor in Biomedical Research

Research Experience

Hartwell Postdoctoral Fellow 2021 - Present
University of California, Davis
Department of Molecular and Cellular Biology
Advisors: Dr. Daniel Starr and Dr. GW Gant Luxton

- Utilized particle-tracking microrheology to discover which LINC complex proteins maintain mechanical properties of the cytoplasm in human airway smooth muscle cells
- Purified LINC complex proteins, developed mass photometry assays, and utilized differential scanning fluorimetry assays to study LINC complex assembly
- Identified LINC binding protein candidates using pooled yeast two hybrid screens

Graduate Student 2015 - 2021
University of California, San Francisco
Department of Biochemistry and Biophysics
Advisor: Dr. Wallace Marshall

- Identified the nuclear transport factor, CSE1, as the first molecular driver of the macronuclear shape change cycle during *Stentor coeruleus* regeneration
- Established *Stentor coeruleus* as a model organism for nuclear cell biology by developing multiple new methods to image and analyze the morphology of live *Stentor* nuclei during regeneration

Industry Research Collaboration 2017 – 2020
University of California, San Francisco and IBM

- Initiated collaboration with colleagues at IBM to develop a novel image analysis method
- Presented project at an NSF site visit for the Center for Cellular Construction
- Co-inventor on patent resulting from this project (Zimmerman et. al., 2020)

Undergraduate Student Researcher 2012 - 2015
University of California, Los Angeles
Department of Chemistry and Biochemistry
Advisor: Dr. Margot Quinlan

- Discovered metavinculin-mediated destabilization of actin filaments
- Performed actin binding, bundling, and severing experiments using differential centrifugation and total internal reflection fluorescence microscopy

Publications

McGillivray, R.M., Starr, D.A., and Luxton, G.W.G. (2023). Building and breaking mechanical bridges between the nucleus and cytoskeleton: Regulation of LINC complex assembly and disassembly. *Curr. Opin. Cell Biol.* 85, 102260.

McGillivray, R.M., Sood, P., Hammar, K., and Marshall, W.F. (2023). The nuclear transport factor CSE1 drives macronuclear volume increase and macronuclear node coalescence in *Stentor coeruleus*. *iScience*, 107318.

Sood, P., Lin, A., Yan, C., **McGillivray, R.M.**, Diaz, U., Makushok, T., Nadkarni, A.V., Tang, S.K.Y., and Marshall, W.F. (2022). Modular, cascade-like transcriptional program of regeneration in *Stentor*. *Elife* 11. 10.7554/eLife.80778.

Wan, K.Y., Hürlimann, S.K., Fenix, A.M., **McGillivray, R.M.**, Makushok, T., Burns, E., Sheung, J.Y., and Marshall, W.F. (2020). Reorganization of complex ciliary flows around regenerating *Stentor coeruleus*. *Philos. Trans. R. Soc. Lond. B Biol. Sci.* 375, 20190167.

Oztug Durer, Z.A., **McGillivray, R.M.**, Kang, H., Elam, W.A., Vizcarra, C.L., Hanein, D., De La Cruz, E.M., Reisler, E., and Quinlan, M.E. (2015). Metavinculin Tunes the Flexibility and the Architecture of Vinculin-Induced Bundles of Actin Filaments. *J. Mol. Biol.* 427, 2782–2798.

Patents

Zimmerman, T.G., Bianco, S., **McGillivray, R.M.**, Marshall, W.F. “Generating Three Dimensional Models of a Microscopic Subject from a Sequence of Images”
US Patent 10,810,759. Issued October 20, 2020.

Funded Research Proposals

Hartwell Biomedical Research Fellowship 2023

Title: *TorsinA-mediated regulation of LINC complex assembly and cellular mechanics*

Funding source: Hartwell Foundation

Role: Postdoctoral Fellow

Award amount: \$100,000

Accepted Proposal for the Advanced Imaging Center at Janelia 2020

Title: *Cellular Structure Dynamics During Single-Cell Regeneration in Stentor coeruleus*

Funding Source: Howard Hughes Medical Institute, Gordon and Betty Moore Foundation

Role: Visiting Scientist

Visit scheduled for April 2020 was cancelled due to the COVID-19 pandemic

Accepted Proposal for the Advanced Imaging Center at Janelia 2018

Title: *Imaging mitochondria in Stentor coeruleus*.

Funding Source: Howard Hughes Medical Institute, Gordon and Betty Moore Foundation

Role: Visiting Scientist

Conference Presentations

LINC complex assembly and its effects on cellular mechanics

Oral Presentation: Allen Distinguished Investigators Cell Nucleus Meeting Boston, MA 2023

Nuclear Shape and Positioning in the Giant Ciliate *Stentor coeruleus*

Oral Presentations:

- ASCB|EMBO Annual Meeting Washington DC 2019
- Cell Dynamics: Organelle-Cytoskeleton Interface Meeting Lisbon, Portugal 2019
- ASCB|EMBO Annual Meeting San Diego, CA 2018
- UCSF Tetrad Graduate Program Retreat Tahoe City, CA 2018
- Ciliate Molecular Biology Conference Washington DC 2018
- Nuclear Organization and Function Meeting Cold Spring Harbor, NY 2018

Poster Presentations:

- Santa Cruz Developmental Biology Meeting Santa Cruz, CA 2018
- Bay Area Cytoskeletal Meeting San Francisco, CA 2018

Honors and Awards

- Hartwell Biomedical Research Fellowship 2023
- UCSF Tetrad Graduate Program Teaching Assistant Award 2017
- NSF Graduate Research Fellowships Program Honorable Mention 2017
- Dean's Prize, UCLA Molecular, Cell, and Developmental Biology Department 2015
- UCLA Molecular, Cell, and Developmental Biology Undergraduate Poster Award 2015
- Kivelson Summer Research Fellowship 2014
- Undergraduate Research Scholars Program at UCLA 2013-2014
- Amgen Scholars Program at UCLA 2013

Teaching Experience

Physiology Course Teaching Assistant

Summer 2018

Marine Biological Laboratory, Woods Hole, MA

- Proposed a project for a team of three students to study ciliary beat coordination during *Stentor coeruleus* regeneration. This project resulted in a publication (Wan et. al, 2020).
- Worked with students to form research questions, troubleshoot experiments, and create research presentations during an intensive 2-week portion of the course

Macromolecules Course Teaching Assistant

Fall 2016

Tetrad Graduate Program, UCSF

- Proposed a lab-based project to study how the rate of *Stentor* and *Chlamydomonas* regeneration is affected by temperature
- Mentored a team of five first-year graduate students to work on this project and present their results in an oral presentation
- Wrote and graded problem sets, and organized review sessions about course material

Mentored Students

- UC Davis undergraduate student** 2023 - present
Project: Expression and purification of human SUN proteins
- Rotation students, Biophysics Ph.D. program at UC Davis** Fall 2022
Project: Passive rheology in the nucleus and cytoplasm of U2OS cells
- SFSU Undergraduate Student and UCSF Junior Specialist** 2017- 2019
Project: Live imaging of *Stentor coeruleus* mitochondria during regeneration
Current Status: Ph.D. student at UC Davis

Outreach Experience

- Microscopy Workshop Planning Committee Member** 2022 - 2023
UC Davis BMCDB Graduate Group + Advanced Imaging Center at Janelia
Workshop title: *2023 Imaging Workshop for Emerging California Scientists*
- Coordinated fundraising efforts among graduate students, faculty, and UC Davis Foundation and Corporate Engagement Office
 - Secured a \$1000 corporate donation to help fund workshop expenses
 - Assisted with event logistics during the workshop
- Exploratorium Intern** 2018 - 2019
The Exploratorium, San Francisco CA
Project title: *Take your own Cell-fie*
- Developed and performed a live demonstration as part of the *Cells to Self* Exhibition
 - Wrote an ImageJ macro to merge images of visitor's cheek cells with an image of their face to illustrate that we are each made of trillions of individual cells
 - Demonstration was featured at the opening night of the *Cells to Self* Exhibition, an After Dark Event, and was regularly performed on the museum floor after my internship ended
- Volunteer at Science Festival Exhibits**
Marshall Lab at UCSF + NSF Center for Cellular Construction
Projects: Variety of outreach demonstrations featuring topics like regeneration, molecular self-assembly, cellular behavior, and DIY microscopy
- Bay Area Maker Faire San Mateo, CA 2016 - 2018
 - Bay Area Science Festival San Francisco, CA 2018
 - Nashville Mini Maker Faire Nashville, TN 2018
 - Rogue Valley Mini Maker Faire Ashland, OR 2017
 - East Bay Mini Maker Faire Oakland, CA 2017
- Art Science Undergraduate Society President and Founding Member** 2012-2014
University of California, Los Angeles
- Organized an art exhibition with work from our members at the California Nanosystems Institute and UCLA Art|Sci Center