

MICHAEL J. ABRAMS

University of California, Berkeley
Department of Molecular & Cell Biology
Weill Hall #3200
Berkeley, CA 94720-3200

Postdoctoral Fellow, Harland Lab
michaelabrams88@gmail.com
484-574-0648

Education

Doctor of Philosophy. Biology, California Institute of Technology, Pasadena, California. 2012-2018

Bachelor of Arts. Biology, Williams College, Williamstown, Massachusetts. 2007-2011

Research and Training

Assistant Project Scientist. Department of Molecular and Cell Biology, in the Division of Genetics, Genomics, Evolution and Development, University of California, Berkeley. Advisor: Dr. Richard Harland. 2024-

Project 1: **Uncovering the regulation and function of sleep in the jellyfish *Cassiopea*.** Status: Two papers in revision in high impact journals, the first: “*Wake Up(side-Down) Jellyfish: A new sleep-regulating protein whose knockdown induces daytime sleep in the medusa Cassiopea*” is finishing second round of revisions, the other, “*Sleep Supports Homeostasis and Plasticity in the Central Pattern Generator Network of the Jellyfish Cassiopea*” still in the first round of revisions.
Project 2: **Spatiotemporal expression and function of GTPase regulators in *Xenopus* developmental.** Status: Manuscript in preparation: *The RhoGEF Plekhg3 is selectively required for involution movements during Xenopus gastrulation*. Image acquisition and data analysis ongoing.

Postdoctoral Fellow. Department of Molecular and Cell Biology, in the Division of Genetics, Genomics, Evolution and Development, University of California, Berkeley. Advisor: Dr. Richard Harland. 2021-2024

Project 1: **Uncovering the regulation and function of sleep in the jellyfish *Cassiopea*.** Status: primarily focused on two findings from the Miller Fellowship. 1) Analyzed neural activity data and found network homeostasis and state specialization in *Cassiopea*, and 2) developed and used molecular tools to reveal cholinergic regulation of *Cassiopea* sleep.
Project 2: **Spatiotemporal expression and function of GTPase regulators in *Xenopus* developmental.** Status: Advancing techniques in the Harland Lab’s live imaging and phenotype characterization pipeline, used in a screen of small GTPase-regulators.

Miller Postdoctoral Fellow. Miller Institute, University of California, Berkeley. Host: Dr. Richard Harland & Dr. Nicole King. 2018-2021

Project: Investigated the function and regulation of sleep in the jellyfish *Cassiopea* by developing methods of neurological activity tracking, and molecular tools to characterize genes related to sleep regulation detected using RNAseq.

Graduate Student. Division of Biology, California Institute of Technology. Advisor: Dr. Lea Goentoro. 2012-218

Abrams CV

Project 1: Investigated the self-repair processes of jellyfish. Discovered a processes we called symmetrization, whereby jellyfish recover radial symmetry and pulsing function without regenerating lost parts.

Project 2: Discovered ways to induce regeneration in animals, primarily through metabolic activation, first by testing them in the jellyfish *Aurelia*, and then applying those methods to flies and mice.

Project 3: Characterized sleep for the first time in an animal, *Cassiopea*, without a centralized nervous system.

Biotech Research Technician. Superbrewed Food Inc., (Formerly White Dog Labs, formerly Elcriton), New Castle, Delaware. Supervisors: Dr. Bryan Tracy, and Dr. Scott Plummer. 2007-2008.

Project: Generated an epPCR mutant library of bacterial and algal hydrogenases and screened it for oxygen tolerance using FACS.

Departmental Honors Thesis. Williams College, Williamstown, Massachusetts. Advisor: Dr. William DeWitt. 2010-2011.

Project: Incorporated several plant genes that act to sequester oxygen into the cyanobacteria *Synechocystis* to stimulate hydrogen production during oxygenic photosynthesis.

Summer Internship. Rutgers University, Piscataway, New Jersey. Advisor: Dr. G. Charles Dismukes. 2010.

Project: Designed PCR amplification of hydrogenase using degenerate primers; and in parallel, using a hydrogen detecting GC, scanned twenty different cyanobacterial strains for presence of fermentative hydrogen.

Publications

Truchado-Garcia, M., Wu, C., Fox, A., **Abrams, M.J.**, Chang, C., Harland, M.H. (2024). RhoGEF Plekhg3 controls blastopore closure during *Xenopus* gastrulation. (Pre-submission).

Abrams, M.J., Ohdera, A.H., Francis, D.A., Donayre, O., Chen, H., Lu, K.Y. and Harland, R.M. (2024). Cholinergic regulation of sleep in the upside-down jellyfish *Cassiopea*. *bioRxiv*, pp.2024-10. (In revision, PNAS)

Abrams, M.J., Zhang, L., Emster, K.V., Lee, B.H., Zeigler, H., Jain, T., Jafri, A., Chen, Z. and Harland, R.M. (2023). Sleep is required for neural network plasticity in the jellyfish *Cassiopea*. *bioRxiv*, pp.2023-05. (In revision, Current Biology)

Francis, D.A. and **Abrams, M.J.**, 2024. Cnidarian Sleep. In *Genetics of Sleep and Sleep Disorders* (pp. 187-206). Cham: Springer International Publishing.

Abrams, M.J.*, Tan, F.H.*, Li, Y., Basinger, T., Heithe, M.L., Sarma, A., Lee, I.T., Condiotte, Z.J., Raffiee, M., Dabiri, J.O., Gold, D.A., and Goentoro, L. (2021). A conserved strategy for inducing appendage regeneration in moon jellyfish, *Drosophila*, and mice. *Elife*, 10, p.e65092.

Truchado, M.G.*, Harland, R.M., **Abrams, M.J.** (2018). 3D-printable tools for developmental biology: Improving embryo injection and screening techniques through 3D-printing technology. *Biorxiv*

Ohdera, A.H., *, **Abrams, M.J.**, Ames, C.L., et al. Upside-Down but Headed in the Right Direction: Review of the Highly Versatile *Cassiopea xamachana* System. *Frontiers in Ecology and Evolution* 6 (2018), p. 35. doi: 10.3389/fevo.2018.00035.

Abrams CV

Nath, R. D.*, Bedbrook, C. N.*, **Abrams, M.J.***, Basinger, T., Bois, J.S., Prober, D.A., Sternberg, P.W., Gradinaru, V., and Goentoro, L. The jellyfish *Cassiopea* exhibits a sleep-like state. *Current Biology*. 27.19 (2017), pp. 2984–2990. doi: 10.1016/j.cub.2017.08. 014.

Abrams, M.J.* and Goentoro, L. (2016). Symmetrization in jellyfish: reorganization to regain function, and not lost parts. *Zoology*. Invited Perspective. Published online ahead of print November 4, 2015. pp. 1–3. doi: 10.1016/j.zool.2015.10.001.

Abrams, M.J.*, Basinger, T., Yuan, W., Guo, C.G. Goentoro, L. (2015). Self-repairing symmetry in jellyfish through mechanically driven reorganization. *PNAS* 112.26 (2015), E3365–E3373. doi: 10.1073/pnas.1502497112.

Abrams, M.J.*, (2011). Molecular Strategies for Augmenting Hydrogen Production in *Synechocystis* PCC 6803. Honors Thesis, Williams College.

Awards and Honors

R21: HD107363-01, CRISPR based screen for small GTPase regulators of morphogenesis in *Xenopus* Miller Postdoctoral Fellowship, University of California, Berkeley, 2018-2021.

The Embryology Course, Marine Biological Laboratory, Woods Hole, Massachusetts, Summer 2016
NSF Graduate Research Fellowship (GFRP), 2012-2015.

Presentations

- 1) Invited Speaker: The Society for Integrative & Comparative Biology. Jan 3-7, 2025. Atlanta, GA.
- 2) Invited Speaker: 11th Aquatic Models for Human Disease. Oct 5-9th, 2024. San Antonio, TX.
- 3) Keynote Speaker: 7th Annual *Cassiopea* Workshop. May 10-12, 2024. Key Largo, FL.
- 4) Oral: Society for Developmental Biology 82nd Annual Meeting. July 20-23, 2023. Chicago, IL.
- 5) Poster: UC Berkeley Genetics, Genomics, Evolution, & Development Annual Retreat. October 1-23, 2022. Asilomar, California.
- 6) Poster: Santa Cruz Developmental Biology meeting 2022. August 13-17, 2022. UC Santa Cruz, Santa Cruz, CA.
- 7) Oral: 5th Annual *Cassiopea* Workshop. May 18-25, 2022. Key Largo, Florida.
- 8) Poster: UC Berkeley Genetics, Genomics, & Development Annual Retreat. October 15, 2019. Tilden Park, California.
- 9) Virtual Oral: APSS SLEEP Conference. June 10-13, 2021.
- 10) Virtual Oral: 4th Annual *Cassiopea* Workshop. May 20-23, 2021.
- 11) Oral: CZBiohub Sleep Symposium. January 15-16, 2020. San Francisco, California
- 12) Poster: UC Berkeley Genetics, Genomics, & Development Annual Retreat. October 18-20, 2019. Asilomar, California.
- 13) Oral: Miller Institute's 23rd Annual Interdisciplinary Symposium. June 7-9, 2019. Tomales bay, California.
- 14) Oral: 3rd Annual International *Cassiopea* Workshop. May 7-12, 2019. Key Largo, Florida.
- 15) Oral: APSS SLEEP Conference. June 2-4, 2018. Baltimore, Maryland.
- 16) Oral: 1st Annual International *Cassiopea* Workshop. May 13-17, 2017. Key Largo, Florida.
- 17) Oral: Biology Department Seminar – Universidad Autonoma de Madrid. March 31, 2016. Madrid, Spain.
- 18) Oral: Woods Hole Embryology Program. June 6, 2016. Woods Hole, Massachusetts.
- 19) Oral: Harvard Department of Systems Biology Retreat. June 1-3, 2016. Sebasco, Maine.
- 20) Oral: Caltech Biology and Biological Engineering Annual Retreat. September 25-26, 2015. Dana Point, California.

Teaching and Mentoring

Mentorship at UC Berkeley. 50 undergraduate students with diverse background, who all applied through the Undergraduate Research Apprentice Program (URAP). Based on applications I interviewed all of them, and matched their interests to ongoing projects. For their essential roles on projects, Lilian Zhang, Kevin Lu, Owen Donayre, Konnor von Emster, Brandon H. Lee, Tanya Jain, Ali Jafri, Diana A. Francis, Henry Chen, all current or past URAP students, are authors on my manuscripts or book chapters.

Annual guest speaker for Research Preparedness and Laboratory (RPL, formally RPRP). Since its inception in 2020, I have been involved in setting up the classroom and given presentations on my journey in science and my project here at UC Berkeley. I deeply believe in the mission of RPRP, to increase access to research by giving students of all backgrounds their first research experience, and both the technical and emotional tools to succeed.

Postdoctoral Representative MCB Department Wellness Committee. During the height of the pandemic, I joined the Wellness Committee to help express the concerns of postdoctoral fellows, which mostly included work-life-balance and mental health issues, which had been exacerbated by the shelter-in-place order and social distancing.

Mentorship at Caltech. Four undergraduate students with diverse backgrounds. Designed experiments with them that suited their interests (a chemist who became an author on the symmetry paper, a molecular/marine biologist, and two programmers). Two local high school students who took part in a number of experiments and have played a significant role in furthering our goal of developing behavioral assays in multiple jelly species.

Teaching at Caltech. I was a teaching assistant for Biology 101 for non-majors – helping students develop core skills necessary for success in research orientated sciences. We focused on scientific writing: how to write logically, with hypothesis driven questions and approaches, as it is applicable to all fields.

Outreach while at Caltech. We developed a collaboration with Cabrillo Aquarium in Long Beach. We work closely with their marine biologists, discussing and designing experiments for both locations. We have also developed a relationship with a local high school (El Rancho Unified School District). I helped them to develop a biology curriculum, and bring moon jellies into their classroom.

Professional Affiliations

Society for Developmental Biology, 2022

Sleep Research Society, 2020

Sigma Xi, 2011