

Ben T. Larson

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EDUCATION AND TRAINING

University of California, San Francisco <i>Postdoc, Biophysics, Laboratory of Cell Geometry</i> Mentor: Wallace Marshall	San Francisco, CA 2019-present
Marine Biological Laboratory <i>Physiology Course</i>	Woods Hole, MA 2016
University of California, Berkeley <i>PhD, Biophysics with Designated Emphasis in Computational Biology, Animal Origins Lab</i> Mentor: Nicole King	Berkeley, CA 2014-2019
National Institutes of Health, NHLBI <i>Postbac, Biophysics, Laboratory of Molecular and Cellular Imaging</i> Mentor: Justin Taraska	Bethesda, MD 2012-2014
Reed College <i>BA, Physics</i>	Portland, OR 2008-2012

FELLOWSHIPS, HONORS, AND AWARDS

Merck Postdoctoral Fellowship <i>Jane Coffin Childs Memorial Fund for Medical Research</i>	2020-2023
Porter Prize for Research Excellence <i>American Society for Cell Biology</i>	2022
Best Talk <i>Gordon Research Seminar, Plant and Microbial Cytoskeleton</i>	2022
Summer Program <i>Aspen Center for Physics, Learning Dynamical Models from Biophysical Data</i>	2022
Graduate Research Fellowship <i>National Science Foundation</i>	2016-2019
Post-course Research Award <i>Marine Biological Laboratory, Physiology Course</i>	2016
Society of General Physiology Scholar <i>Society of General Physiology</i>	2016
Orloff Science Award <i>National Institutes of Health</i>	2013
Post-baccalaureate Intramural Research Training Award <i>National Institutes of Health</i>	2012-2014
Phi Beta Kappa <i>Reed College</i>	2012
Commendation for Academic Excellence <i>Reed College</i>	2008-2012
Ruby-Lankford Grant for Faculty-Student Collaborative Research <i>Reed College</i>	2010

1. [BT Larson](#)
Perspectives on principles of cellular behavior from the biophysics of protists
Integr. Comp. Biol. in press 2023
2. L Fung, A Konkol, T Ishikawa, [BT Larson](#), T Brunet, RE Goldstein
Swimming, feeding and inversion of multicellular choanoflagellate sheets
Phys. Rev. Lett. in press 2023
3. [BT Larson](#), J Garbus, JB Pollack, WF Marshall
A unicellular walker controlled by a microtubule-based finite-state machine
Curr. Biol. 32 (17) 2022
 Using theory and experiments, we found that the ciliate *Euplotes* walks across surfaces with an unusual, complex gait involving elements of stereotypy and variability according to a computational process and coordinated by a system of bundled microtubules. This work sheds light on how cells control complex behaviors and embody computational processes. Highlighted in popular press outlet New Scientist.
4. NT Chartier*, A Mukherjee*, J Pfanzelter*, S Fürthauer, [BT Larson](#), M Kreysing, F Jülicher, SW Grill
A hydraulic instability drives the cell death decision in the nematode germline
Nat. Phys. 17 doi: 10.1038/s41567-021-01235-x 2021
5. [BT Larson](#), T Ruiz-Herrero, S Li, S Kumar, L Mahadevan, N King
Biophysical principles of choanoflagellate self-organization
Proc. Natl. Acad. Sci. 117 (3) 2020
 Focusing on the biophysical principles underlying colony morphogenesis in choanoflagellates (the closest living relatives of animals), this work reveals the crucial role of the extracellular matrix (ECM) in shaping the colonies and leads to a phase diagram that delineates the range of morphologies as a function of the biophysical mechanisms at play. This work provides new evidence for the importance of ECM and of the interplay between cell biology and biophysical mechanisms in the evolutionary origins of animals and in morphogenesis.
6. T Brunet*, [BT Larson](#)*, TA Linden*, MJA Vermeij, KL McDonald, N King
Light-regulated collective contractility in a multicellular choanoflagellate
Science 366 (6463) 2019
 This paper reports a previously undescribed species of choanoflagellate that forms cup-shaped colonies capable of rapidly and reversibly inverting their curvature in response to changes in light. Inversion requires apical acto-myosin contractility and mediates a transition between feeding and swimming behavior. These findings inform reconstructions of hypothesized animal ancestors that existed before the evolution of specialized sensory and contractile cells. Highlighted in journals Science, eLife, and Current Biology and popular press outlets Scientific American, Science News, and Science Daily.
7. D Laundon, [BT Larson](#), KL McDonald, N King, P Burkhardt
The architecture of cell differentiation in choanoflagellates and sponge choanocytes
PLOS Biol. 17 (4) 2019
8. [BT Larson](#), KA Sochacki, JM Kindem, JW Taraska
Systematic spatial mapping of proteins at exocytic and endocytic structures
Mol. Biol. Cell 25 (13) 2014
9. MA Bedau and [BT Larson](#)
Lessons from environmental ethics about the intrinsic value of synthetic life
 GA Kaebnick and TH Murray (Ed.)
Synthetic biology and morality: artificial life and the bounds of nature, MIT Press 2013
10. KA Sochacki, [BT Larson](#), DC Sengupta, MP Daniels, G Shtengel, HF Hess, JW Taraska
Imaging the post-fusion release and capture of a vesicle membrane protein
Nat. Comm. 3 (1) 2012

SELECTED PRESENTATIONS

Agents of Motion Across the Tree of Life †	2024
<i>Theo Murphy Meeting, Royal Society, London</i>	
SICB Annual Meeting *	2024
<i>Invertebrate Swimming Session, Society of Comparative and Integrative Biology Seattle, WA</i>	
Physics Seminar †	2023
<i>Physics Department, Reed College</i>	
Physics of Life Seminar *	2023
<i>Chan Zuckerberg Biohub, San Francisco</i>	
Quantitative Biosciences Seminar †	2023
<i>Departments of Biology and Physics, Georgia Institute of Technology</i>	
Cell Learning Seminar †	2023
<i>Harvard University</i>	
APS March Meeting †	2023
<i>Data-driven Dynamical Systems in Biology and Soft Matter Symposium, American Physical Society, Las Vegas, NV</i>	
Biology Seminar †	2023
<i>Department of Biology, Stanford University</i>	
Organismal Biology Seminar †	2023
<i>Department of Organismal Biology and Anatomy, University of Chicago</i>	
Quantitative Biology and Biophysics Seminar †	2023
<i>Departments of Biology, Physics, and Computer Science, Carnegie Mellon University</i>	
Molecular and Cellular Biology Seminar †	2023
<i>Department of Molecular and Cellular Biology, Harvard University</i>	
Eugene Bell Center Seminar †	2023
<i>Marine Biological Laboratory</i>	
SICB Annual Meeting †	2023
<i>Microscale Life Symposium, Society for Integrative and Comparative Biology, Austin, TX</i>	
Cell Bio Annual Meeting †	2022
<i>ASCB/EMBO, New Organisms; New Directions Symposium, Washington, DC</i>	
Genotype to Phenotype: Bridging Comparative Genomics and Cell Biology Workshop *	2022
<i>The Company of Biologists, Buxted Park, UK</i>	
Optical Engineering for the Biological Sciences Course †	2022
<i>Department of Biology, San Francisco State University</i>	
Cilia Supergroup †	2022
<i>University of California, San Francisco</i>	
Plant and Microbial Cytoskeleton *.†	2022
<i>Gordon Research Seminar and Conference</i>	
Summer Coding Immersion Program †	2022
<i>San Francisco State University</i>	
APS March Meeting *	2022
<i>American Physical Society, DBIO</i>	
Microbiology Seminar †	2022
<i>Department of Microbiology and Molecular Genetics, UC Davis</i>	
Established and Emerging Model Organisms Course †	2022
<i>Department of Biology, Duke University</i>	
ASCB/EMBO Annual Meeting *	2016, 2021
<i>American Society for Cell Biology, European Molecular Biology Organization</i>	

US Protistology Network† <i>Independently organized, various institutions</i>	2021
Biological Physics and Physical Biology Seminar† <i>Independently organized, various institutions</i>	2021
Stochastic Physics in Biology* <i>Gordon Research Conference and Seminar</i>	2021
Cellular Dynamics and Models* <i>Cold Spring Harbor Laboratory</i>	2021
BioWeb Conference† <i>Department of Biological Sciences, Smith College</i>	2021
Build-a-Cell Seminar† <i>NSF Build-a-Cell Network</i>	2020
Electronic Symposium on Protistology† <i>Independently organized, various institutions</i>	2020
Biophysics Seminar† <i>Life Sciences Institute, Exeter University</i>	2019
Bio Lunch† <i>Department of Applied Mathematics and Theoretical Physics, Cambridge University</i>	2019
Size and Shape Workshop* <i>European Molecular Biology Organization, NCBS/INSTEM</i>	2018
International Choanoflagellate Workshop*.,*,* <i>Station Biologique de Roscoff, UC Berkeley</i>	2015, 2017, 2023
Integrated Microbial Biodiversity <i>Canadian Institute for Advanced Research</i>	2016
BPS Annual Meeting <i>Biophysical Society</i>	2014, 2022
	Upcoming
	†Invited talk
	*Talk selected from abstract

TEACHING AND MENTORSHIP

Lecturer

Department of Biology, San Francisco State University, San Francisco, CA 2022
Biol 861: Advances in Cell and Molecular Biology. Seminar-based course for graduate and advanced undergraduate students emphasizing recent progress in understanding how diverse cells control shape and movement.

Lead Instructor

Center for Cellular Construction, CCC Summer Course, San Francisco, CA 2021, 2022
 Guided intensive research experience with a total of 10 students (undergrad-PhD) from SFSU and UCSF emphasizing quantitative image analysis.

Undergraduate and PhD Student Mentor

Laboratory of Wallace Marshall, University of California, San Francisco 2019-present
 Bioengineering undergrad Ching Ting Roy Ng (UC Merced), Biophysics PhD student Greyson Lewis (UCSF), Computer Science PhD student Jack Garbus (Brandeis), and MBL Physiology post-course research students Veronica Farmer (Vanderbilt), Alice Herneisen (MIT), Zoë Lange (FIAS), Yahor Savich (MPI-PKS/CBG), and Lakshmi Balasubramaniam (Cambridge).

Laboratory of Nicole King, University of California, Berkeley 2017-2019
 Physics undergrad Kevin Marroquin, MCB undergrads Sheel Chandra and Jake Hira, MCB PhD student Max Ferrin, and Biophysics PhD students Mike Levy and Ben McInroe (all UCB).

Teaching Assistant

Marine Biological Laboratory, Physiology Course, Woods Hole, MA 2018, 2021, 2022, 2023
 Guided intensive research experience with a total of 16 students from varied disciplinary backgrounds (PhD-postdoc).

Evolution of Genomes, Cells, and Development, University of California, Berkeley 2016

SERVICE AND OUTREACH

Special Interest Subgroup Co-organizer

ASCB Annual Meeting, Cells in the wild: environmental influences on cell morphology and behavior 2021,2023
With Guillermina Ramirez-San Juan and David Booth.

Protist Editor

International Microbiology Literacy Initiative 2021-present
Aims to foster understanding and appreciation of microbes through open-access school curriculum development

Reviewer

Various journals 2019-present
Nature Communications, eLife, Philosophical Transactions of the Royal Society B, Protist, Current Biology

Data Science Mentor

Gaza Sky Geeks 2018-present
Included delivering lectures to Gaza's first tech hub covering topics in exploratory data analysis, basic approaches to quantitative analysis of data, and effective communication of results.

Cell Biology and Microscopy Outreach

2014-present
Venues such as Exploratorium, California Academy of Sciences, Maker Faire, Chabot Space & Science Center, and Oakland schools

Cellular Basis of Patterns Working Group Co-founder and Co-organizer

University of California, Berkeley 2015-2017
Interdepartmental seminar series and collaborative network dedicated to fostering a community of researchers interested in self-organization and pattern formation in biological systems. With Amy Shyer and Mike Levy.

Nuclear Reactor Operator

Reed Research Reactor 2008-2012
Licensed by the Nuclear Regulatory Commission in 2009, responsibilities included training new operators, giving tours to the public, reactor operation, and detector calibration