

Ben T. Larson

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EDUCATION AND TRAINING

University of California, San Francisco

Postdoc, Biophysics, Laboratory of Cell Geometry

San Francisco, CA

2019-present

Mentor: Wallace Marshall

Marine Biological Laboratory

Physiology Course

Woods Hole, MA

2016

University of California, Berkeley

PhD, Biophysics with Designated Emphasis in Computational Biology, Animal Origins Lab

Berkeley, CA

2014-2019

Mentor: Nicole King

National Institutes of Health, NHLBI

Postbac, Biophysics, Laboratory of Molecular and Cellular Imaging

Bethesda, MD

2012-2014

Mentor: Justin Taraska

Reed College

BA, Physics

Portland, OR

2008-2012

FELLOWSHIPS, HONORS, AND AWARDS

Merck Postdoctoral Fellowship

Jane Coffin Childs Memorial Fund for Medical Research

2020-2023

Porter Prize for Research Excellence

American Society for Cell Biology

2022

Best Talk

Gordon Research Seminar, Plant and Microbial Cytoskeleton

2022

Summer Program

Aspen Center for Physics, Learning Dynamical Models from Biophysical Data

2022

Graduate Research Fellowship

National Science Foundation

2016-2019

Post-course Research Award

Marine Biological Laboratory, Physiology Course

2016

Society of General Physiology Scholar

Society of General Physiology

2016

Orloff Science Award

National Institutes of Health

2013

Post-baccalaureate Intramural Research Training Award

National Institutes of Health

2012-2014

Phi Beta Kappa

Reed College

2012

Commendation for Academic Excellence

Reed College

2008-2012

Ruby-Lankford Grant for Faculty-Student Collaborative Research

Reed College

2010

1. [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.

2. 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. doi: 10.1038/s41567-021-01235-x

2021

3. [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.

4. 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.

5. 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

6. [BT Larson](#), KA Sochacki, JM Kindem, JW Taraska

Systematic spatial mapping of proteins at exocytic and endocytic structures

Mol. Biol. Cell 25 (13)

2014

7. 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

8. 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

*denotes equal contribution

SELECTED PRESENTATIONS

APS March Meeting†

2023

Data-driven Dynamical Systems in Biology and Soft Matter Symposium, American Physical Society, Las Vegas, NV

Quantitative Biosciences Seminar†

2023

Georgia Institute of Technology

Biology Seminar†

2023

Department of Biology, Stanford University

Organismal Biology Seminar† <i>Department of Organismal Biology and Anatomy, University of Chicago</i>	2023
Quantitative Biology and Biophysics Seminar† <i>Departments of Biology, Physics, and Computer Science, Carnegie Mellon University</i>	2023
Molecular and Cellular Biology Seminar† <i>Department of Molecular and Cellular Biology, Harvard University</i>	2023
Eugene Bell Center Seminar† <i>Marine Biological Laboratory</i>	2023
SICB Annual Meeting† <i>Microscale Life Symposium, Society for Integrative and Comparative Biology, Austin, TX</i>	2023
Cell Bio Annual Meeting† <i>ASCB/EMBO, New Organisms; New Directions Symposium, Washington, DC</i>	2022
Genotype to Phenotype: Bridging Comparative Genomics and Cell Biology Workshop* <i>The Company of Biologists, Buxted Park, UK</i>	2022
ASCB/EMBO Annual Meeting* <i>American Society for Cell Biology, European Molecular Biology Organization</i>	2016, 2021
Optical Engineering for the Biological Sciences Course† <i>Department of Biology, San Francisco State University</i>	2022
Cilia Supergroup† <i>University of California, San Francisco</i>	2022
Plant and Microbial Cytoskeleton*,† <i>Gordon Research Seminar and Conference</i>	2022
Summer Coding Immersion Program† <i>San Francisco State University</i>	2022
APS March Meeting* <i>American Physical Society, DBIO</i>	2022
Microbiology Seminar† <i>Department of Microbiology and Molecular Genetics, UC Davis</i>	2022
Established and Emerging Model Organisms Course† <i>Department of Biology, Duke University</i>	2022
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†	2019
<i>Department of Applied Mathematics and Theoretical Physics, Cambridge University</i>	
Size and Shape Workshop*	2018
<i>European Molecular Biology Organization, NCBS/INSTEM</i>	
International Choanoflagellate Workshop*,*	2015, 2017
<i>Station Biologique de Roscoff, UC Berkeley</i>	
Integrated Microbial Biodiversity	2016
<i>Canadian Institute for Advanced Research</i>	
BPS Annual Meeting	2014, 2022
<i>Biophysical Society</i>	
	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 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 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) and Alice Herneisen (MIT).
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
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
 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

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

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

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