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Education

- Present **Ph.D., Harvard University, Cambridge, MA**
Organismic and Evolutionary Biology
- 2017 **M.A., Harvard University, Cambridge, MA**
Organismic and Evolutionary Biology
- 2012 **B.S., Roger Williams University, Bristol, RI**
Biology; Minor: Mathematics
Summa cum laude

Research Experience

- 2013-
Present **PhD Candidate, Peter Girguis and Eric Tytell Laboratories**
Previously George Lauder Laboratory
Harvard University, Cambridge, MA
- Pressure fields & forces generated by:
-Swimming fishes
-Jellyfish, with Sean Colin and Jack Costello (Marine Biological Laboratory)
Deriving forces using empirical pressure fields
Role of body stiffness bodies in fish-like locomotion (George Lauder Laboratory)
- 2013 **Visiting Researcher, John Dabiri Laboratory**
California Institute of Technology, Pasadena, CA
- Understanding the neural control of locomotion in jellyfish
- 2010-2013 **Undergraduate Researcher, Sean Colin and John Costello Laboratory**
Roger Williams University, Bristol, RI
Marine Biological Laboratory, Woods Hole, MA
- Convergent bending kinematics in swimming and flying animals

Effects of environmental conditions on the feeding of ctenophores
Mechanics of stealth predation in hydromedusae

2009-2012 **Laboratory Technician, Andrew Rhyne Laboratory**
Roger Williams University, Bristol, RI

Aquaculture of copepods and microalgae

2007-2008 **Marine Scholar**
University of Connecticut, Avery Point, Groton, CT

Poquonnock River hydrography

2007-2008 **Student Research Assistant**
Project Oceanology, Groton, CT

Routine field surveys in local water systems

Teaching Experience

2013-present **Various Biology & Evolution lessons**, Harvard Museum of Natural History, informal educator/gallery guide

2016-2018 **Marine Biology**, Harvard Museum of Natural History, Instructor

2018 **Communicating Science**, Bok Center for Teaching & Learning, Co-instructor

2017 **Making a Concept Video**, Bok Center for Teaching & Learning, Co-instructor

2017 **Teaching with Objects**, Bok Center for Teaching & Learning, Instructor

2016 **Biology of Fishes**, Harvard University, Teaching Fellow

2015 **MCB80x: Fundamentals of Neuroscience**, HarvardX, Content Developer

2015 **Human Anatomy & Physiology**, Harvard Extension School, Lab Instructor

2015 **Methods in Aquatic Field Ecology**, Harvard Life Sciences Office, Co-instructor

2014 **Evolutionary Human Physiology & Anatomy**, Harvard University, Teaching Fellow

2014 **Marine Invertebrate Zoology**, Harvard Museum of Natural History, Instructor

Communications Experience

- 2017-present **Contributing Writer & Consortium Member**
Massive Science
- Popular coverage of scientific research
Opinion piece on NSF graduate fellowships and diversity
Articles available [here](#).
- 2016-2018 **Learning Lab Graduate Fellow**
Derek Bok Center for Teaching & Learning, Cambridge, MA
- Development & testing of multimedia content for Harvard University classrooms
Design of lesson plans for undergraduate classrooms
Leading seminars/trainings on making & teaching with multimedia
Managed 150 students from multiple classes fulfilling concept video
(microteaching in a YouTube-style video) assignments
Collaboration with [Massive](#) to develop training methods in scientific writing
Organizing/running weeklong science communications workshop
Audio/visual support for professors
Support for student & EdPortal multimedia projects
- 2016 **Guest Writer**
Science in the News (SITN)
- Popular coverage of scientific research. Article is available [here](#).
- 2015 **Content Developer**
HarvardX, Harvard University, Cambridge, MA
Supervisor: Nadja Oertelt
- Development of visual content including graphics, explanatory drawing videos,
and stop animation to supplement online lectures for [MCB80x: Fundamentals of Neuroscience](#)
- 2015 **All the Modes Participant**
Derek Bok Center for Teaching & Learning, Cambridge, MA
- Multimedia training for use in classroom and research lecture
- 2015 **ComSciCon National Workshop Participant**
ComSciCon, Cambridge, MA

Training in science communication, social media, multimedia, and advocacy in a selective workshop. Worked with Boston area teachers to develop a K-12 lesson plan derived from current scientific research. Lesson available on request.

Publications

†Indicates mentored students

Dabiri JO, Colin SP, Gemmell BJ, **Lucas KN**, Leftwich MC, and Costello JH. (Submitted) A conserved body twitch dictates turning dynamics in primitive and modern swimmers

Jaspers C, Costello JH, Sutherland K, Gemmell B, **Lucas KN**, Tackett J, Dodge K, and Colin SP. (2018) Resilience in moving water: Effects of turbulence on the predatory impact of the lobate ctenophore *Mnemiopsis leidyi*. *Limnol Oceanogr.* 63: 445–458 [\[Link\]](#)

Lucas KN, Dabiri JO, and Lauder GV. (2017) A pressure-based force and torque prediction technique for the study of fish-like swimming. *PLoS ONE.* 12(12): e0189225. [\[Link\]](#)

†Rosic MLN, Thornycroft PJM, Feilich KL, **Lucas KN**, and Lauder GV. (2017) Performance variation due to stiffness in a tuna-inspired flexible foil model. *Bioinspir Biomimetics.* 12: 016011 [\[Link\]](#)

Lucas KN, Thornycroft PJM, Gemmell BJ, Colin SP, Costello JH, and Lauder GV. (2015) Effects of non-uniform stiffness on swimming performance of a passively-flexing, fish-like foil model. *Bioinspir Biomimetics.* 10: 056019 [\[Link\]](#)

Lucas KN, Johnson N, Beaulieu WT, Cathcart E, Tirrell G, Colin SP, Gemmell BJ, Dabiri JO, and Costello JH. (2014) Bending rules for animal propulsion. *Nat Commun.* 5:3293 [\[Link\]](#)

Lucas K, Colin SP, Costello JH, Katija K, and Klos E. (2013) Fluid interactions that enable stealth predation by the upstream foraging hydromedusae *Craspedacusta sowerbyi*. *Biol Bull.* 225: 60-70 [\[Link\]](#)

Contributed Presentations

*Presenting author (if not KNL)

Lucas KN, Lauder GV, and Tytell ED. (2019) Low and high pressure both contribute to force production in fish body-caudal-fin locomotion. Society for Integrative and Comparative Biology (SICB), Tampa, FL

- *Leftwich MC, Dabiri JO, Colin SP, Gemmell BJ, **Lucas KN**, and Costello JH. (2018) The relationship between torque and body shape of maneuvering swimmers. American Physical Society Division of Fluid Dynamics (APS DFD), Atlanta, GA
- Lucas KN**, Tytell ED, and Lauder GV. (2018) Quantifying the propulsive forces on steadily-swimming fishes. Ocean Sciences Meeting, Portland, OR
- *Colin SP, Costello JH, **Lucas KN**, and Gemmell BJ. (2018) Turning on a dime: Kinematics and hydrodynamics of maneuvering in medusae. Ocean Sciences Meeting, Portland, OR
- Lucas KN**, Tytell ED, and Lauder GV. (2018) The distribution of thrust and drag on a bluegill sunfish during steady swimming. SICB, San Francisco, CA
- Lucas KN**, Tytell ED, and Lauder GV. (2017) Pressure-based measurement of instantaneous swimming forces produced by bluegill sunfish (*Lepomis macrochirus*). SICB, New Orleans, LA
- Lucas KN**, Dabiri JO, and Lauder GV. (2016) Pressure field measurements in the study of fish-like swimming. SICB, Portland, OR
- Lucas K**, Dabiri J, and Lauder G. (2015) Application of PIV-based pressure measurements to the study of aquatic propulsion. APS DFD, Boston, MA
- Lucas KN**, Thornycroft PJM, Gemmell BJ, Colin SP, Costello JH, and Lauder GV. (2015) Effects non-uniform stiffness on the swimming performance of a passively-flexing flapping foil model. SICB, West Palm Beach, FL
- *Dabiri J, **Lucas K**, Thornycroft P, and Lauder G. (2014) PIV-based pressure, force, and torque measurements of a robotic model swimmer. APS DFD, San Francisco, CA
- Lucas KN**, Johnson N, Costello JH, and Colin SP. (2013) Convergent inflexion patterns of flexible margins of oscillating animal propulsors during swimming and flight. SICB, San Francisco, CA
- Lucas K**, Colin SP, Costello JH, Katija K, and Klos E. (2012) Fluid interactions that enable stealth predation by the upstream foraging hydromedusae *Craspedacusta sowerbyi*. Marine Biological Laboratory Undergraduate Research Symposium, Woods Hole, MA
- Lucas K**, Colin SP, Costello JH, Katija K, and Klos E. (2012) Fluid interactions that enable stealth predation by the upstream foraging hydromedusae *Craspedacusta sowerbyi*. Summer Undergraduate Research Fellows Conference, Kingston, RI
- Lucas K**, Colin SP, Costello JH, Katija K, and Klos E. (2012) Fluid interactions that enable stealth predation by the upstream foraging hydromedusae *Craspedacusta sowerbyi*. Ocean Sciences Meeting, Salt Lake City, UT
- *Johnson N, **Lucas K**, Costello JH, and Colin SP. (2012) Quantitative analysis of flexible margins in animal propulsions. Ocean Sciences Meeting, Salt Lake City, UT
- Lucas K**, Colin SP, Costello JH, Katija K, and Klos E. (2011) Fluid interactions that enable stealth predation by the upstream foraging hydromedusae *Craspedacusta sowerbyi*. Undergraduate Symposium on Sustainability and the Environment, Bridgewater, MA

Invited Presentations

Cross-disciplinary tools for understanding how forces are generated by swimming fishes. (2017)
School of Biology Seminar, Georgia Tech, Atlanta, GA

Marine life in motion: How do animals employ the flow of water, and what can this tell us about their life history and evolution? (2017) Marine & Natural Sciences Departmental Seminar,
Roger Williams University, Bristol, RI

Grants and Fellowships

2014-2019 **NSF Graduate Research Fellowship**

2016-2018 **Learning Lab Graduate Fellowship**, Derek Bok Center for Teaching & Learning
Fellowship awarded to support graduate students in lieu of traditional classroom teaching. Fellows receive training in multimedia production, create and test content for Harvard University classrooms, and support educational multimedia projects.

2013, 2016 **Robert A. Chapman Memorial Scholarship**, Harvard University
Fellowship supporting student research in vertebrate locomotion

2013-2016 **James Mill Peirce Fellowship**, Harvard University
Merit fellowship awarded to support the research of top PhD applicants in the natural sciences, mathematics, and engineering

2013 **NSF Integrative Graduate Education and Research Traineeship (IGERT)** for Tufts University Soft Robotics (declined)

2012 **Provost Fund for Student Research**, Roger Williams University
Grant supporting travel and presentation of undergraduate research. Awarded for Lucas et al. (2014) *Nat. Commun.* project.

2012 **NSF EPSCoR RI Summer Undergraduate Research Fellowship**

2011 **Provost Fund for Student Research**, Roger Williams University
Awarded for Lucas et al. (2013) *Biol. Bull.* project.

Honors and Awards

- 2015 ***BiteScis* Honorarium**
Awarded to five graduate students among over 150 ComSciCon National Workshop attendees for excellence in science communication for K-12 classrooms. See also Outreach section.
- 2013 **Outstanding Senior Award (Biology)**, Roger Williams University
Awarded to the top graduate in each discipline of the Department of Biology, Marine Biology, and Environmental Sciences
- 2009-2012 **Presidential Excellence Scholarship**, Roger Williams University
Merit-based scholarship
- 2011 **BioNES Poster Award**
Awarded to the top speakers at a public showcase of New England research. See also Outreach section.
- 2010 **Outstanding Freshman Chemist**, Roger Williams University
Awarded to the top freshman chemistry student
- 2009 **Commended Student**, National Merit Scholarship

Outreach

- 2017-present ***BiteScis* Graduate Student Lesson Plan Developer**
Partnering with Boston area high school teachers to develop inquiry-based STEM lesson plans themed around research in scientific literature. Lessons meet Next Generation Science Standards. Materials available on request.
- 2016-present **Freelance science writing**
Popular science coverage and opinion pieces with Massive Science and Science in the News
- 2013-present **Harvard Museum of Natural History Gallery Guide**
Designing and presenting activities to enhance visitor experience. Informal educator in galleries and family events. Development of reference material for new volunteers. Taught new volunteer training in 2014, 2016, & 2017.
- 2015-2016 **GradWagon**
Expert & guest speaker for Boston area schools
- 2015 ***BiteScis* Pilot – Graduate Student Representative & Lesson Plan Developer**
Selected from over 150 ComSciCon National Workshop attendees to attend. Worked with a Boston area high school teacher to develop multiple research-

and inquiry-based lessons meeting Next Generation Science Standards. Served as a graduate student representative to make recommendations for the future running of the program. Lessons available upon request.

- 2015 **Engaging Teachers in Ecology-Based Investigations (Concord Field Station)**
Co-instructor for a professional development workshop for Boston area science teachers. Taught methods in aquatic field ecology. Co-authored a sample inquiry-based lesson and reference guide for teachers to apply new skills in their classrooms. Materials available upon request.
- 2015 **Lauder Lab Ambassador**, Harvard University
Hosted lab tours for and discussed the daily life of a scientist with Boston-area high school girls
- 2014 **NSF ESPCoR RI SURF Conference Invited Alumni Speaker**
Delivered an opening address
- 2013 **TEACH program scientist**, Harvard University
Hosted classroom sessions for inner city middle school students to inspire enthusiasm about science and address misconceptions about who a scientist is
- 2013 **Dabiri Lab Ambassador**, Caltech
Hosted lab visits for inner city, female middle school students
- 2011 **Biology New England South (BioNES) speaker**
BioNES, along with parent organization New England Science Public, is a network of New England researchers performing science advocacy. The BioNES conference is a public showcase of local research. Won a Poster Award (see Honors & Awards)
- 2010-2012 **Wet Lab (Rhyne Lab) Ambassador**, Roger Williams University
Hosted lab tours and answered questions about research for school groups, prospective students, and families

Science Writing

[The Graduate Research Fellowship Program favors elite schools – again](#) Apr 2018. *Massive*.

[What fish can teach us about how humans move](#) Feb 2018. *Massive*.

[How this beautiful, invasive jellyfish adapts to dominate foreign ecosystems](#) Oct 2017. *Massive*.

[How stressed-out fish are teaching us about human heart disease](#) Jun 2017. *Massive*.

[Scientists are gluing teeth to power saws to learn how sharks eat](#) Mar 2017. *Massive*.

[Enigmatic Tully monster finds a home on the tree of life](#) Jul 2016. *Science in the News*.

Memberships

Society for Integrative and Comparative Biology (SICB)

Association for the Sciences of Limnology and Oceanography (ASLO)

American Association for the Advancement of Science (AAAS)