

Dave Matthews

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EDUCATION

PH.D. IN ORGANISMIC AND EVOLUTIONARY BIOLOGY | HARVARD UNIVERSITY

Department of Organismic and Evolutionary Biology | Cambridge, MA

2017- 2023

Advisor: Dr. George Lauder

BS IN BIOLOGY, CERTIFICATE IN MARINE SCIENCE | UNIVERSITY OF MASSACHUSETTS, AMHERST

College of Natural Sciences | Amherst, MA

2011-2015

Summa cum laude • Commonwealth Honors College, greatest distinction

Departmental honors • GPA: 3.99/4.0

RESEARCH

GENETIC CONTROL OF FEEDING FUNCTION IN AFRICAN CICHLID FISHES | POSTDOCTORAL RESEARCHER

University of Massachusetts, Amherst | Dr. Craig Albertson

2023 - Present

Using a hybrid cross between two ecologically divergent cichlid species to build an integrative understanding of the evolution of feeding behaviors. Specifically, using genomics, morphometrics, and performance analysis to mechanistically link genetics to complex adaptive traits.

HYDRODYNAMIC AND EVOLUTION OF FISH FEEDING AND SWIMMING | GRADUATE RESEARCHER

Harvard University | Dr. George Lauder

2017 - 2023

Combining biomimetic robotics, live fish, flow visualization, developmental manipulation, and geometric morphometrics to understand the base principles of swimming as well as the function and evolution of feeding systems in bony fishes.

PLASTICITY IN ZEBRAFISH BONE DEVELOPMENT | RESEARCH ASSISTANT

University of Massachusetts, Amherst | Dr. Craig Albertson and Dr. Maureen Lynch

January - April 2016

Worked to develop a method of inducing a plastic osteoblast response in larval zebrafish.

EFFECT OF CRANIOFACIAL GENOTYPE ON THE RELATIONSHIP BETWEEN MORPHOLOGY AND SUCTION

FEEDING PERFORMANCE | UNDERGRADUATE RESEARCH ASSISTANT

University of Massachusetts, Amherst | Dr. Craig Albertson

2013-2015

Used high speed video to quantify suction feeding performance in hybrid African cichlids, then genotype each individual at several craniofacial loci. We found that genotype at one *sox9b* SNP affects the relationship between morphology and suction feeding performance.

INTERSPECIFIC INTERACTIONS IN CHESAPEAKE BAY SALT MARSHES | NSF REU RESEARCH ASSISTANT

Virginia Institute of Marine Science | Dr. Rom Lipcius

June - Aug. 2014

Correlated the shape of marsh edge to the stabilizing presence of mussels in the marsh substrate.

REPRODUCTIVE HISTOLOGY OF INVASIVE LIONFISH | FIVE COLLEGE MARINE SCIENCE RESEARCH INTERN

NOAA | Dr. James Morris

June - Aug. 2013

Found and characterized a reproductive abnormality in invasive Atlantic lionfish using histological sections.

HYDRODYNAMICS OF MANTIS SHRIMP RAPTORIAL APPENDAGES | UNDERGRADUATE RESEARCH ASSISTANT

University of Massachusetts, Amherst | Dr. Sheila Patek

2011 - 2013

Used high speed videography and a custom MATLAB script to characterize the kinematics of mantis shrimp appendages during feeding strikes.

INVASIVE SPECIES MONITORING IN THE BOSTON HARBOR ISLANDS | RESEARCH ASSISTANT

MIT | Sea Grant

June - Aug. 2011

Measured the species composition of intertidal zones on the Boston Harbor Islands, focusing on cohabitation of endemic species and invasive crabs.

Fellowships and Grants

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| NSF GRADUATE RESEARCH FELLOWSHIP PROGRAM (GRFP) | 2019 - 2022 |
| PUTNAM EXPEDITION GRANT, HARVARD MUSEUM OF COMPARATIVE ZOOLOGY | 2022 |
| CHAPMAN FELLOWSHIP, HARVARD UNIVERSITY | 2019, 2020 |

TEACHING EXPERIENCE

TEACHING ASSISTANT

Marine biology, Prof. Aaron Hartmann
Spring 2022

Biology of Fishes, Prof. George lauder
Spring 2021

Evolution, Prof. Andrew Berry
Spring 2020

Human anatomy and physiology,
Profs. Andy Biewener, Ian Wallace
Fall 2018

GUEST LECTURE

Fish as evolutionary model systems
Biology of Fishes
Spring 2021, 2023

PUBLICATIONS

Matthews DG, Reznick DN, Dial TR. (**In review**) Local adaptation of craniofacial shape in Trinidadian guppies.

Matthews DG, Maciejewski MF, Wong GA, Lauder GV, Bolnick DI. (2023) Locomotor effects of a fibrosis-based immune response in stickleback fish. *Journal of Experimental Biology*.

Matthews DG, Lauder GV, Dial TR. (2023) Genes, morphology, performance, and fitness: quantifying organismal performance to understand adaptive evolution. *Integrative and Comparative Biology*, icad096

Matthews DG*, Zhu R*, Wang J, Dong H, Bart-Smith H, Lauder GV. (2022) Role of the caudal peduncle in a fish-inspired robotic model: how changing stiffness and angle of attack affects swimming performance. *Bioinspiration and Biomimetics*, 17(6), 066017.

Lee KY*, Park SJ*, **Matthews DG**, Kim SL, Marquez CA, Zimmerman JF, Ardoña HAM, Kleber AG, Lauder GV, Parker KK. (2022). An autonomously swimming biohybrid fish designed with human cardiac biophysics. *Science*, 375(6581), 639-647.

Matthews DG, Lauder GV. (2021) Fin-fin interactions during locomotion in a simplified biomimetic fish model. *Bioinspiration and biomimetics*. 16(4), 046023.

Matthews DG, Morris JA. (2019) Intersex in male invasive Atlantic lionfish, *Pterois* spp. *Aquatic Biology*, 28, 13-19.

Matthews DG, Albertson RC. (2017). Effect of craniofacial genotype on the relationship between morphology and feeding performance in cichlid fishes. *Evolution*, 71(8), 2050-2061.

McHenry MJ, Anderson PSL, Van Wassenbergh S, **Matthews DG**, Summers A, Patek SN. (2016). The hydrodynamics of rapid rotation in mantis shrimp raptorial appendages. *Journal of Experimental Biology*, 219(21), 3399-3411.

POSTERS & PRESENTATIONS

Matthews DG, Lauder GV, Dial TR. Wnt signalling and craniofacial development in zebrafish. **Invited symposium talk** presented at: SICB; Jan 4, 2023; Austin, TX.

Matthews DG, Reznick DN, Dial TR. Local adaptation of craniofacial shape in Trinidadian guppies. **Talk** presented at: SICB+; Jan-Feb, 2022; Online conference.

Matthews DG, Dial TR, Reznick DN. Local adaptation of craniofacial shape in Trinidadian guppies. **Talk** presented at: Evolution; June 22, 2021; Online conference.

Matthews DG, Maciejewski M, Wong G, Lauder GV, Bolnick D. Locomotor costs of a fibrosis based immune response in sticklebacks. **Talk** presented at: SICB; Jan-Feb, 2021; Online conference.

Matthews DG, Dial TR, Lauder GV. Upregulated Wnt signaling improves suction feeding in zebrafish. **Talk** presented at: SICB; January 4, 2020; Austin, TX.

Ruijie Zhu, **Matthews DG**, Wang J, Lauder GV, Dong H, Bart-Smith H. Upregulated Wnt signaling improves suction feeding in zebrafish. **Talk** presented at: SICB; January 6, 2020; Austin, TX.

Matthews DG, Dial TR, Lauder GV. Upregulated Wnt signaling improves suction feeding in zebrafish. **Talk** presented at: NE Regional SICB; November 2, 2019; Boston, MA.

Matthews DG, Dial TR, Lauder GV. Upregulated Wnt signaling improves suction feeding in zebrafish. **Poster** presented at: Evolution; June 22, 2019; Providence, RI.

Matthews DG, Lauder GV. Fish median fin function studied using a simple robotic model. **Talk** presented at: SICB; January 5, 2019; Tampa Bay, FL.

Matthews DG, Albertson RC. Effect of craniofacial genotype on the relationship between morphology and feeding performance in cichlid fishes. **Talk** presented at: SICB; January 4, 2018; San Francisco, CA.

Matthews DG, Conith MR, Albertson RC. Facial morphology predicts feeding performance in two trophically diverse cichlids. **Poster** presented at: UMass Undergraduate Life Science Research Symposium; April 14, 2015; Amherst, MA.

Matthews DG, Conith MR, Albertson RC. Facial morphology predicts feeding performance in two trophically diverse cichlids. **Talk** given at: Five College Coastal and Marine Science Research Symposium; Nov. 10, 2014; Amherst, MA.

Matthews DG, Gilliland S, Lipcius R. Facilitation of marsh pattern formation by Ribbed Mussels (*Geukensia demissa*). **Talk** given at: VIMS REU Symposium; July 31, 2014; Gloucester Point, VA.

Matthews DG, Morris JA. The State of Ootestis in Atlantic Lionfish. **Talk** given at: Five College Coastal and Marine Science Research Symposium; Nov. 11, 2013; Amherst, MA.

EDUCATIONAL SERVICE

INVITED MANUSCRIPT REVIEW

Ecology and Evolution, Integrative and Comparative Biology

LAB RESEARCH MENTOR

Harvard | MA 2022 & 2021
Mentored a Harvard undergraduate as well as a summer REU student

PEER MENTOR FOR HARVARD E3 REU PROGRAM

Harvard | MA June - July, 2022 & 2021
Attend and lead two professional development meetings per week for departmental interns

Peer mentor for Harvard OEB qualifying exam preparation

Harvard | MA 2022, 2021
Meet with two mentees to help them prepare for qualifying exams

OEB DIVERSITY, INCLUSION, AND BELONGING COMMITTEE

Harvard | MA 2021 - 2023
Address departmental issues of access to our workspaces and research opportunities for members of the community

E3 REU STEERING COMMITTEE

Harvard | MA Spring 2019-Present
Organize and advertise the new ecology and evolution REU program

STUDENT INVITED SPEAKER COMMITTEE

Harvard | MA 2018 - Present
Invite and coordinate two departmental seminar speakers per year

MUSEUM GALLERY GUIDE AND VOLUNTEER TRAINER

HMNH | MA May 2018 - March 2020
Share shark biology with Harvard Museum of Natural History visitors for two hours per week. Also trained new volunteers for similar duties.

EXTRACURRICULARS/OTHER

2019 - Present | Society for the Study of Evolution Member

2017 - Present | SICB Member

2016 - Present | SSI Scuba Instructor

Nature photography | Sample at
DaveTheScientist.com