

Justin T. Schaefer

Curriculum Vitae

Dept. of Ecology and Evolutionary Biology
Brown University
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Research focus: Mechanical behavior and bio-inspired engineering of repeated-element arrays, mainly focusing on the pectoral fin skeleton and vertebral columns of batoid elasmobranchs.

Current position: Post-doctoral researcher (with Elizabeth Brainerd) and Co-Instructor of the Gross Anatomy course at the Warren Alpert School of Medicine at Brown University.

Education

Ph.D. Department of Ecology and Evolutionary Biology, University of California, Irvine; Irvine, CA -- 2007

Dissertation: Morphology and Function of Pectoral Fin Actuators in Fishes

M.S. Department of Ecology and Evolutionary Biology, University of Connecticut, Storrs, CT -- 2001

Thesis: Fall fattening in the fathead minnow (*Pimephales promelas*): allometry of growth, age and fat storage in an annual temperate fish.

B.S. Department of Ecology, Evolution, and Marine Biology, University of California, Santa Barbara -- 1997

Professional Memberships

American Society for the Advancement of Science (2003)

Sigma Xi (2002)

Society for Integrative and Comparative Biologists (2002)

American Society of Ichthyologists and Herpetologists (2001)

American Elasmobranch Society (2002)

Publications

Mason N. Dean, Jason B. Ramsay and Justin T. Schaefer. (in press) Tooth reorientation affects tooth function during prey processing and tooth ontogeny in the lesser electric ray (*Narcine brasiliensis*, Ölfers, 1831). *Zoology*

M. Cannas, J. Schaefer, P. Domenici, J. F. Steffensen. (2006) Gait transition and oxygen consumption in swimming striped surfperch (*Embiotoca lateralis Agassiz*). *Journal of Fish Biology*. 69: 1612-1625.

Schaefer, J. T., and A. P. Summers. (2005) Batoid wing skeletal structure: novel morphologies, mechanical implications, and phylogenetic patterns. *Journal of Morphology*. 264: 298-313.

Work in progress

Schaefer, J.T. and A. P. Summers. (draft available). Mechanical implications of joint location in batoid pectoral fins. *Journal of Experimental Biology*

Published Abstracts

Schaefer, J.T., Long Jr., J. H., Koob, T. J. (2006). Biomimetic vertebral columns of variable structure and mechanical properties. *Integrative and Comparative Biology*. 45: 1068. – John Long first author on manuscript. Submission expected 2007.

Schaefer, J.T., Koob, T. J., Long, Jr., J. H. (2006) Bending mechanics of elasmobranch vertebral columns. *Integrative and Comparative Biology* 45: 1068.

Dean, M.N. & Schaefer, J.T. (2005) Patterns of growth and mineralization in elasmobranch cartilage. *FASEB Journal*. 19: A247.

Schaefer, J. T. Batoid wing skeletons: a comparison of oscillatory and undulatory swimmers. (2004). *Integrative Comp. Bio.* 43: 905.

Schaefer, J. T.; Cannas, M.; Steffensen, J. F. (2002). Respirometry across the gait transition in a labriform swimmer (*Embiotoca lateralis*). *Integrative Comp. Bio.* 42: 1307.

Schaefer, J. T.; Schultz, E. T. (2001). Scaling allometry of energy allocation to growth and storage in temperate populations of an annual fish, *Pimephales promelas*. *American Zoologist*. 41: 1577.

Honors and Awards

Holcomb Biological Sciences Fellowship, UC Irvine. 2005.

American Elasmobranch Society Carrier Award – best student poster presentation – *Modeling Physical Properties of Joint Arrays in Batoid Wing Skeletons*. 2007.

Grants received

Sigma Xi Grant-in-Aid of Research. 2004. Title: Contribution to stiffness of variable calcification patterns in batoid wing skeletons. Award: \$500

Teledyne Technologies Inc. Research Assistance Grant. 2004. Title: Stiffening mechanisms in a flexible force platform. Award: \$2,000

UCI Biology Departmental travel award. For 2003 ASIH/AES meeting. Award: \$350

American Elasmobranch Society Travel Award. For 2003 meeting. Award: \$400.

Presentations

Invited seminars

Department of Ecology and Evolutionary Biology, University of Connecticut. Title: Skeletal morphology and wing biomechanics in batoid elasmobranchs: stiffening squishy structures sans Cialis. 2008

Department of Biological Sciences, Florida Atlantic University. Title: A sum greater than the parts: Cross-scale effects of morphological changes in a serially repeating pattern. 2005

Department of Biological Sciences, Florida Atlantic University. Title: How the better sharks move: Locomotion in batoid fishes. 2005

Talks

Justin T. Schaefer. Society for Integrative and Comparative Biologists, National Meeting, Phoenix, AZ. Jan. 7, 2006. Title: Modeling a passive force channelization mechanism in batoid wing skeletons.

Justin T. Schaefer. Graduate Student Symposium. Department of Ecology and Evolutionary Biology, University of California, Irvine. Feb 5, 2005. Structural implications of varying morphologies in batoid skeletons.

Justin T. Schaefer. Graduate Student Symposium. Department of Ecology and Evolutionary Biology, University of California, Irvine. Feb. 28, 2004. Title: Variation in morphology of batoid elasmobranch wing skeletons.

Justin T. Schaefer. Society for Integrative and Comparative Biologists, National Meeting, New Orleans, LA. Jan. 7, 2004. Title: Batoid wing skeletons: a comparison of oscillatory and undulatory swimmers.

M. Cannas (IMC Oristano), J. Schaefer (Irvine University) and J. Steffensen (Aarhus University). Society for Experimental Biology, Annual Meeting, Southampton, England. April 4, 2003. GAIT TRANSITION AND OXYGEN CONSUMPTION IN THE STRIPED SURF PERCH (EMBIOTOCA LATERALIS).

Justin T. Schaefer and Adam P. Summers. American Elasmobranch Society/American Society of Ichthyologists and Herpetologists, National Meeting, Manaus, Brazil. June 30, 2003. Title: VARIATION IN WING SKELETAL MORPHOLOGY OF BATOIDS.

Justin T. Schaefer, Marcella Cannas, and John F. Steffensen. Society for Integrative and Comparative Biologists, National Meeting, Toronto, Canada. Jan 5, 2003. Title: RESPIROMETRY ACROSS THE GAIT TRANSITION IN A LABRIFORM SWIMMER (EMBIOTOCA LATERALIS).

Justin T. Schaefer. Society for Integrative and Comparative Biologists, National Meeting, Anaheim, CA. Jan 5, 2002. Title: SCALING ALLOMETRY OF ENERGY ALLOCATION TO GROWTH AND STORAGE IN TEMPERATE POPULATIONS OF AN ANNUAL FISH, PIMEPHALES PROMELAS.

Justin T. Schaefer. Graduate Student Symposium, Department of Ecology and Evolutionary Biology, University of Connecticut, March 10, 2001. Title: ALLOMETRY OF AGE AND SOMATIC ENERGY STORAGE IN THE FATHEAD MINNOW, PIMEPHALES PROMELAS.

Posters

Justin T. Schaefer. American Elasmobranch Society/American Society of Ichthyologists and Herpetologists, National Meeting, St. Louis, MO. July 15, 2007. Title: Modeling Physical Properties of Joint Arrays in Batoid Wing Skeletons.

Justin T. Schaefer and Adam P. Summers. International Union of Physiological Sciences, Satellite Meeting: Biophysical and Biomechanical Adaptation and Bioinspired Engineering. March 27, 2005. Title: Structural properties of calcification patterns in elasmobranch cartilage.

Justin Schaefer and Mason N. Dean. American Elasmobranch Society/American Society of Ichthyologists and Herpetologists, National Meeting, Norman, OK. May 25, 2004. Title: Brick by brick: Propagation of tissue mineralization in elasmobranchs.

R. Rivas Diaz, M. Cannas, Z. Dalla Valle, R. Levine, M. MacNutt, G. Martinez, A. Paglianti, M. Peterson, J. Schaefer, E. Standen, N. Zorich, P. Domenici, G. Claireaux (CREMA, CNRS) and J. F. Steffensen (Copenhagen). Society for Experimental Biology, Annual Meeting, Southampton, England. April 2, 2003. Influence of Temperature on Swimming Performance of the European Sea Bass.

Research Experience

Research assistant, Centro Interdisciplinario de Ciencias del Mar/Elasmobranch physiology group, La Paz, Mexico. Collected samples in conjunction with artisanal fishermen for one week. PI: Adam Summers, Jose Castro, Felipe Galvan.

Research assistant, RV Suncoaster, Ft. Lauderdale, FL Oct, 2003. Deep-sea shark sampling cruise. Long lined and trapped for abyssal elasmobranchs for five days. PI: José Castro.

Field Sampling/Ichthyologist, BioBlitz, Danbury, CT. 2001. Collected and identified specimens during intensive 24 hr. public outreach program.

Special Courses Taken

University of Washington, Friday Harbor Laboratories: Fish Swimming (June/July, 2002). Paolo Domenici, John Steffensen, Guy Claireux. Included specialized instruction on kinematics, physiology, and behavior of swimming in fish. Techniques taught included telemetry, high-speed video analysis, respirometry, and data analysis.

UCI School of Medicine: Medical Human Gross Anatomy (Oct - May, 2002). Taken with first year medical students.

Relevant Coursework

University of California at Irvine: core graduate courses (Ecology, Physiology, Evolution, Quantitative Analysis), physiology seminar, biomechanics discussion group; Human Gross Anatomy (UCI Medical School)

University of Connecticut: Vertebrate Social Behavior, Introduction to Applied Statistics, Limnological Methods, Evolution and Ecology of Communities, Conservation Biology, Biodiversity Seminar, Vertebrate Biology Seminar, Marine Biology Seminar

Employment History

2006. *Co-Instructor*, Comparative Vertebrate Anatomy. Summer-session lecture-based course that utilized museum, university, and private collection specimens to introduce the evolution of the organ systems in a phylogenetic and functional framework.

2006, 2007. *Teaching Assistant*, Creationism and Evolution. Discussion-based course for non-science majors that focused on bringing the creationism/evolution/intelligent design debate into better focus for the students.

2005-present. *Associate Instructor*, Medical Human Gross Anatomy. UCI School of Medicine. Planned and assisted first-year medical students in dissections of the human head and neck.

2004-2006. *Teaching assistant*, Physiology Lab. Biological Sciences, University of California, Irvine. Experimentally-based introduction to comparative and human physiology.

2004. *Teaching Fellow*, Fish Biomechanics and Functional Morphology. Friday Harbor Laboratories, San Juan Island, Washington . Assisted in the development of projects, project implementation and technical training of students.

2003. *Teaching assistant*, Patterns and diversity in Ecology and Evolution. University of California, Irvine . Class focused on the basic theory and practice of Ecology and Evolutionary Biology.

2002- 2005. *Webmaster*, Dept. of Ecology and Evolutionary Biology, University of California, Irvine . Responsible for the re-creation and maintenance of the departmental website <http://ecoevo.bio.uci.edu> .

2002, 2006, 2007. *Teaching assistant*, Limnology and Freshwater Biology. Biological Sciences, University of California, Irvine. Class focused on the biological interactions in lentic ecosystems.

2002. *Teaching Assistant*, Experimental Biology Laboratory, Biological Sciences, University of California, Irvine. Taught writing-intensive laboratory section. Topics focused on scientific processes, and improved scientific communication skills.

1999-2001. *Research Assistant*, Department of Ecology and Evolutionary Biology, University of Connecticut. Performed fresh water montane field sampling in Adirondack State Park, New York, USA. Sample preparation included fat analysis, dissection, otolith microstructural analysis. Also responsible for preparation for a large in-house flow-through fish rearing facility.

1999- 2001. *Teaching Assistant*, Principles of Biology, Biological Sciences University of Connecticut. Taught three 3-hour sections of undergraduate biology laboratory for biology majors. Topics included anatomy, physiology, and basic biological theory and practice.

1997-1999. *Laboratory Technician*, Experimental Cosmology Lab (Dr. Philip Lubin), Dept. of Physics, UCSB. Assisted in the design and construction of the Back-Emissions Anisotropy Scanning Telescope (BEAST). Responsible for the design and construction of several components of the telescope, as well as assisting with undergraduate work experience.

Public Service

Ask-A-Scientist Night. Irvine Unified School District. 2004-2007. Held open-forum discussions with high school students about careers in science.

Judge, Irvine Unified School District Science Fair. 2004, 2007. Judged exhibits from high school students at the district-wide science fair.

External funding acquisition, American Elasmobranch Society Student Affairs Committee. Organized and managed design, sale, and distribution of merchandise to help fund student participation at society meetings. 2006, 2007.