Charlene McCord, PhD

EDUCATION

PhD *University of Chicago* December 2014
Organismal Biology and Anatomy
Advisor: Mark Westneat, PhD
Committee: Melina Hale, Michael LaBarbera, Callum Ross
Thesis: Evolution and functional morphology of partitioned adductor mandibulae muscles and a novel jaw mechanism in triggerfishes (Teletostei: Balistidae)

BS *University of California, Los Angeles* December 2006
Ecology, Behavior, and Evolutionary Biology

POSITIONS HELD

Post-doctoral Fellow July 2017-present
Chapman University

- Developed and implemented evidence-based approaches to empower first and second-year STEM undergraduates with the skills to work collaboratively, communicate clearly, conduct research, think critically, and solve the world's most pressing challenges in collaboration with a cohort of diverse Post-doctoral Fellows
- Prepared and submitted three articles for publication in peer-reviewed journals, two of which feature several undergraduate co-authors
- Mentored numerous undergraduate research students from Chapman University and local community colleges
- Started a Faculty Learning Community (book club) about evidence-based best teaching practices in undergraduate STEM education
- Co-researcher of the Chapman IRB-approved Test of Scientific Literacy Skills (TOSLS); our findings will evaluate the impact the Grand Challenges Initiative program has on STEM undergraduates' abilities to use, and improve over time, scientific methods of inquiry

Post-doctoral Scholar January 2015-June 2017
University of Chicago

- Published two peer-reviewed journal articles
- Presented novel and significant research at yearly Society for Integrative and Comparative Biology, Evolution, and Ichthyology and Herpetology meetings
- Conducted and published interviews about the future of phylogenetics to YouTube on behalf of the biodiversity community for the NSF-funded FuturePhy Project
- Mentored and collaborated with University of Chicago undergraduate and graduate students on various phylogenetics and functional morphology projects

Program Coordinator and Undergraduate Advisor December 2006-September 2008
University of California, Santa Cruz Department of Environmental Studies

- Managed course scheduling, curriculum cohesiveness, articulation agreements, and course enrollment for all undergraduate departmental courses
- Oversaw degree declarations, graduation requirements, and student academic records for over 300 students
- Worked one-on-one with a diverse student body daily to assess academic and career development needs and goals
- Developed research and internship opportunities for UCSC students
- Initiated a peer mentoring program and trained and oversaw peer counselors

UNIVERSITY TEACHING EXPERIENCE

Instructor *FFC-100: Grand Challenges in Science and Technology* Fall 2018
Chapman University
- Developing and employing evidence-based approaches to empowering first semester freshmen (mostly STEM majors) to solve interdisciplinary problems by way of developing the skills necessary to evaluate and synthesize evidence, work effectively as a team, communicate efficiently, and develop a professional network

Co-Instructor *Investigative Marine Biology Laboratory* July 2018
Shoals Marine Laboratory (Cornell University and UNH)
Co-instructors: Douglas Fudge, PhD and Andrew Turko, PhD
- Co-instructed and advised a class of 16 students from a variety of home undergraduate institutions on developing and implementing hypothesis-driven marine biology experiments
- Prepared and delivered lectures about triggerfish evolutionary functional morphology and marine mudflat biodiversity
- Developed and guided students through using *ggplot2* in the RStudio environment to summarize, visualize, and statistically analyze their data

Instructor *SCI-150: Grand Challenges in Science and Technology* Spring 2018
Chapman University
- Provided evidence-based approaches to improve and assess teamwork, critical thinking skills, and communication in a project-based environment
- Facilitated the development and implementation of six interdisciplinary student team projects ranging from preserving global biodiversity to enhancing individualized learning

Instructor *FFC-100: Grand Challenges in Science and Technology* Fall 2017
Chapman University
- See above

Guest Lecturer *Evolution* March 2016
Dominican University *Instructor: Christopher Anderson, PhD*
- Delivered a 90-minute talk about current issues in evolutionary biology
- Developed a small group activity to explore the role of natural history collections in understanding and conserving biodiversity

Guest Lecturer *Vertebrate Feeding Systems* February 2013
University of Chicago *Instructor: Callum Ross, PhD*
- Prepared a two-hour lecture and discussion about the evolution of fish skull functional morphology
- Guided graduate students through filefish cranial dissections

Teaching Assistant *Comparative Vertebrate Anatomy* January 2012-March 2013
University of Chicago *Instructor: Mark Westneat, PhD*
- Co-taught bi-weekly lab sections

- Developed weekly lab assessment exercises to enable students to self-gauge course mastery and assess my teaching efficiency
- Delivered two-hour lecture about diversity of fish feeding systems

Teaching Assistant *Biological Diversity* September-December 2010
University of Chicago *Instructor: Michael LaBarbera PhD*

- Prepared weekly lab section discussions and lectures
- Developed student-centered review sessions
- Graded and offered feedback for quizzes, tests, and lab reports

Teaching Assistant *Chordate Evolution* March-June 2010
University of Chicago *Instructor: Michael Coates, PhD*

- Co-taught bi-weekly lab sections
- Prepared weekly assessment exercises and review sessions
- Prepared and delivered two, one-hour lectures about the evolution of vertebrate organ systems

PEER REVIEWED PUBLICATIONS

- **McCord CL**, Whiteley E*, Trejo C*, Caputo R*, Itehua E*, Liang J*, Fudge D. (2019). Efficiency of induction, recovery, and repeat exposure of three anesthetics in the Pacific hagfish (*Eptatretus stoutii*) (*in prep*).
- **McCord CL**, Cooper JW & Westneat MW (2019). Molecular phylogenetics and body size evolution of damselfishes (Teleostei: Pomacentridae). *Molecular Phylogenetics and Evolution* (*in revision*).
- **McCord CL** & Westneat MW. (2016). Evolutionary patterns of shape and functional diversification in the skull and jaw musculature of triggerfishes (Teleostei: Balistidae). *Journal of Morphology* **277:** 737-752.
- **McCord CL** & Westneat MW. (2016). Phylogenetic relationships and evolution of BMP4 in triggerfishes and filefishes (Balistoidea). *Molecular Phylogenetics and Evolution* **94:** 397-409.
- Drew JA, **McCord CL**,** Holmes CC, Mandecki JL, Munkaje AJ, Richardson AC & Westneat MW. (2011). Biodiversity Inventories and Conversation of the Marine Fishes of Bootless Bay, PNG. *BMC Ecology* **12:** 15.
- Grubich JR, Westneat MW & **McCord CL.** (2009). Diversity of lionfishes (Pisces: Scorpaenidae) among remote coral reefs in the Palau Archipelago. *Coral Reefs* **28:** 807-807.

***undergraduate co-author**
****published under name Buxman CL**

PUBLISHED ABSTRACTS

- Nash C, George A, **McCord C** & Westneat M. (2019) Functional Biogeography of the Triggerfishes (Balistidae). *Integrative and Comparative Biology*. 15-minute oral presentation.
- **McCord C**, Kahale-Lua K*, Zuppa S*, Friend L*, Jagnandan K & Fudge D. (2018). The Maze Runner: Hagfish Edition. Diverse locomotoe behavior of Atlantic hagfish (*Myxine glutinosa*). *Southwestern Organismal Biology regional meeting for SICB.* 15-minute oral presentation.
- McCord C, Welles S, Berry ZC, Sonnenschein A, Gonzalez Alonso JR, Goldsmith G & Lyon A. (2018) The Grand Challenges Initiative: Inclusive and innovative inquiry-based STEM education. *Society for the Advancement of Biology Education Research regional meeting*. Poster presentation.

- Zuppa SL*, Friend LN*, Jagnandan K, **McCord CL** & Fudge DS. (2017) How do hagfishes move in burrows? *Southwestern Organismal Biology regional meeting for SICB.* Poster presentation; Winner: Best undergraduate poster presentation.
- Trejo, C*, Caputo, R*, Itehua, E*, Jagnandan, K, **McCord, C** & Fudge, D. (2017) Anesthetic Induction Rate of Pacific Hagfish (*E. stoutii*) When Exposed to Clove Oil. *Research Experiences for Undergraduates Symposium.* Poster presentation.
- **McCord CL.** (2017) Phylogenetics, morphometrics, and cranial biomechanics of butterflyfishes and angelfishes (Chaetodontoidea). *Integrative and Comparative Biology*. 15-minute oral presentation.
- **McCord CL.** (2016) Phylogenetics and morphological evolution of butterflyfishes and angelfishes. *Evolution*. 15-minute oral presentation.
- **McCord CL.** (2016) Functional morphology and kinematics of the unique triggerfish jaw apparatus (Teleostei: Balistidae). *Joint Meeting of Ichthyologists and Herpetologists*. 15-minute oral presentation.
- **McCord CL** & Westneat MW. (2016) Phylogenetics and biodiversity of cranial functional morphology in triggerfishes (Teleostei: Balistidae). *Integrative and Comparative Biology*. 15-minute oral presentation.
- Westneat MW & **McCord CL.** (2016) FuturePhy: Integration of the Tree of Life with biomechanics data layers. *Integrative and Comparative Biology*. Poster presentation.
- **McCord CL** & Westneat MW. (2015) Phylogenetics and biodiversity of cranial functional morphology in triggerfishes (Teleostei: Balistidae). *Evolution*. 15-minute oral presentation.
- **McCord CL**** & Westneat MW. (2013). How do triggerfishes eat? Evolution of variable feeding behavior in balistid fishes. *Integrative and Comparative Biology*. 15-minute oral presentation.
- **McCord C**. (2012). Diversity of cranial morphology and jaw biomechanics in tetraodontiform fishes. *Integrative and Comparative Biology* **52:** E117. 15-minute oral presentation.
- Westneat MW & **McCord CL**. (2012). Phylogenetics, morphometrics and biomechanics of reef fishes. *Integrative and Comparative Biology* **52:** E348. Poster presentation.
- **McCord C** & Westneat M. (2011). Diversification of triggerfish (Teleostei: Balistidae) cranial shape and jaw biomechanics. *Integrative and Comparative Biology* **51:** E89-E89. 15-minute oral presentation.

* **undergraduate co-author**
****published under the name Buxman CL.**

PROFESSIONAL DEVELOPMENT

Schmid College Faculty Learning Community Autumn 2018

- Currently co-developing a faculty book club with Dr. Jerry LaRue about evidence-based teaching practices in undergraduate STEM education
- Facilitate biweekly discussion of the book “Reaching Students: What the Research Says about Effective Instruction in Undergraduate Science and Engineering” by Nancy Kober)

SABER West Conference January 2018

- Society for the Advancement of Biology Education Research regional meeting, University of California, Irvine
- Lead author of poster presentation about the Grand Challenges Initiative

- Attended several talks and workshops about how to incorporate evidence-based teaching strategies into my instruction

IETL Summer Institute August 2017
- Institute for Excellence in Teaching and Learning summer institute, Chapman University
- Two-day intensive workshop on active learning strategies, team-based learning, inclusivity in higher education, and assessment

Scientific Teaching September 2015
- One-day workshop on using active learning strategies in the classroom, University of Chicago

Elements of Successful Teaching in the Sciences March-April 2015
- 10- week mini-course, University of Chicago

Approaches to Teaching in the Darwinian Sciences September-December 2011
- Full course on effective teaching strategies, University of Chicago

K-12 AND COMMUNITY TEACHING, OUTREACH, AND SPEAKING ENGAGEMENTS

Invited Speaker *Seminar Series* December 2018
California State University, Fullerton
- Will prepare and deliver a 45-minute talk entitled "Triggerfish feeding and hagfish squeezing: Evolutionary biomechanics of fishes"

Faculty Advisor *BEmpowered* November 2018- present
Chapman University
- Faculty sponsor and mentor for the recently-formed BEmpowered group, which focuses on empowering and supporting students from diverse backgrounds and provides professional and educational resources

Faculty Advisor *Global Medical Missions Alliance* August 2018 - present
Chapman University
- Faculty sponsor and mentor for the recently-launched Chapman branch of the North American GMMA program

Invited Panelist *Women in Science Discussion Panel* August 2018
Chapman University: SURFEES Summer Program
- One of three women scientists on an informal discussion panel about my experience as a woman in science

Co-Director *Inspiring Biology* June 2018
Chapman University and Orange High School
- Developed and led hands-on investigative and experimental functional morphology activities for a week-long bio-inspired design program for 12 high school students
- Developed and implemented an IRB-approved assessment of how the Inspiring Biology outreach program affects scientific identity, confidence, and knowledge

Invited Speaker *AP Statistics Poster Day*
Chapman University

- Developed and carried out a hands-on activity for high school students about the biophysics of hagfish slime

Visiting Scientist *Sisters 4 Science* March 2016
Raevis Elementary Math and Science Specialty School in Chicago, IL
- Developed and led a hands-on outreach session to teach middle school girls about fish anatomy and functional morphology

Visiting Scientist *Sisters 4 Science* January 2016
Raevis Elementary Math and Science Specialty School
- Led a hands-on outreach activity entitled “Introduction to the scientific method: Experimental Design”

Invited Speaker *Associated Colleges of the Chicago Area* November 2015
Benedictine University
- College seminar on “Evolution of feeding ecology in triggerfishes”

Visiting Scientist *Sisters 4 Science* November 2015
Perspectives Charter School in Chicago, IL
- Developed an outreach activity entitled “Evolution, adaptation, and natural selection”

Visiting Scientist *Sisters 4 Science* October 2015
Perspectives Charter School in Chicago, IL
- Developed a novel outreach activity to introduce middle school girls to the scientific method

Invited Panelist *Field Museum Women in Science Panel Discussion* October 2015
Chicago, IL
- Discussed current issues for women in STEM

Invited Speaker *Graduate Women in Science* February 2015
Chicago Chapter
- Developed and led a workshop for “Perfecting the elevator pitch”

Visiting Scientist *Sisters 4 Science* May 2014
Perspectives Math and Science Academy in Chicago, IL
- Guided hands-on outreach activity entitled “How do fishes swim?”

Visiting Scientist *Sisters 4 Science* January 2014
Perspectives Charter School in Chicago, IL
- Led outreach activities on using the scientific method

Visiting Scientist *Sisters 4 Science* March 2013
Perspectives Charter School in Chicago, IL
- Developed and presented novel outreach activities for “What do fishes eat? Bones that talk”

Visiting Scientist *Anatomy in Action* October 2012
Mann Elementary School in Oak Park, IL
- Used preserved human anatomical specimens to explore the anatomy, function, and pathology of human lungs

Visiting Scientist *Project Exploration All Girls Expedition* July 2012
Chicago, IL and Yellowstone National Park

- Developed novel outreach activities for “Astronomy 101”, “Scatology 101” and “Skull Stories”
- Served as wildlife expert, field guide, driver, and chaperone for a week-long fieldtrip to Yellowstone National Park with one other adult and 11 middle school girls from the Southside of Chicago

Visiting Scientist *Sisters 4 Science* February 2012
Perspectives Middle Academy in Chicago, IL
- Developed and led hands-on outreach activity on soil microbiology

Invited Speaker *National Museum of Marine Biology* August 2011
Kenting, Taiwan
- Prepared a talk for colleagues at the National Aquarium and National Museum of Marine Biology in Kenting, Taiwan about my summer research project entitled “Diversity of cranial shape and jaw biomechanics in native Taiwanese tetraodontiform fishes”

Invited Speaker *Academia Sinica Biodiversity Research Centre* July 2011
Taipei, Taiwan
- Invited talk about my preliminary dissertation research findings entitled “Why subdivide? Partitioning of the jaw adductor muscle and evolutionary neuromechanics of feeding in balistid fishes”

Visiting Scientist *MOTO-IGERT and Project Exploration Motorama* April 2011
Chicago, IL and Yellowstone National Park
- Helped develop and employ a two-day outreach symposium to help middle school students understand how animals move

Visiting Scientist Marist Brothers High School April 2011
Suva, Fiji and Chicago, IL
- Assisted Dr. Josh Drew with cross-cultural conservation and game-based digital learning outreach through the WhyReef portal
- Visited Suva, Fiji with Dr. Drew, assisted with classroom learning initiatives, guided students through conservation-centered projects alongside local villagers, led a fish dissection activity

Visiting Scientist *Sisters 4 Science* January 2011
Perspectives Charter School in Chicago, IL
- Developed a novel outreach activity to teach middle school girls about chemical communication and fluid dynamics

Visiting Scientist *Project Exploration Junior Paleontologists* July 2010
Chicago, IL
- Prepared and delivered outreach activities to teach high school students about Yellowstone’s fishes, insects, and plants

Visiting Scientist *Project Exploration All Girls Outdoor Expedition* February 2010
Chicago, IL
- Chaperoned and served as lead scientist for an overnight all girls camping trip to the Chicago suburbs
- Developed a novel outreach activity to teach middle school-aged girls about the nervous system and intracellular communication

Visiting Scientist *Sisters 4 Science* September 2009
Perspectives Joslin Campus in Chicago, IL

- Prepared and delivered outreach activities to teach middle school girls about the diversity of fish locomotion

Visiting Scientist *Sisters 4 Science* April 2009
Perspectives Joslin Campus in Chicago, IL

- Developed novel outreach resources to instruct middle school girls about fish ecomorphology

OTHER COMMUNITY SERVICE

Field Museum Tour Guide for UCLA alumni group April 2012

- Developed and led a three-hour "behind the scenes" tour through the Field Museum's Collections Resource Center and Evolving Planet Exhibition

Project Exploration Dinner with a Dinosaur XII March 2012

- Assisted Project Exploration program managers with the development and execution of a series of experiments that allowed young children and their families to conduct experiments and learn about earthworm anatomy and behavior

Project Exploration Mentor Several times yearly 2009-2017

- Prepared and delivered a variety of hands-on, active-learning scientific activities for middle school students interested in STEM. See "K-12 and Community Teaching, Outreach, and Speaking Engagements" for details
- Served as a one-on-one mentor for numerous young women interested in STEM

Field Museum Member's Night Once yearly from 2009-2017

- Volunteered my time to assist colleagues with developing and leading an exhibits-based biodiversity scavenger hunt

FIELD RESEARCH EXPERIENCE

Charles Darwin Research Station May 2019
Galápagos Islands, Republic of Ecuador

- Assist in expedition preparations including securing necessary permits, establishing in-country collaborations, and choosing expedition routes
- Will collect, process, fix, and preserve whole hagfish specimens collected via deep sea traps from various locations around Santa Cruz, Fernandina, and Isabela Islands for curation and accession into museums in the United States and Ecuador
- Prepare genetic samples for international shipping and subsequent transcriptomics experiments with collaborators at UNH
- Care for live hagfish specimens and prepare them for safe live transport back to Chapman University
- Evaluate deep sea ecology and hagfish behavior and biodiversity via baited remote underwater video equipment
- Supervise undergraduate research assistant on hagfish trapping, tissue collection, specimen preparations, and deep-sea ecological surveys

Shoals Marine Laboratory July 2018
Appledore Island, ME

- Built experimental burrowing tank and carried out Atlantic hagfish burrowing experiments
- Oversaw, consulted, and advised the collection of tide pool fishes and mudflat invertebrates, project development, data collection, data analysis, and project presentations for 16 undergraduate students in Investigative Marine Biology Laboratory class

- Oversaw the care and ethical use of multiple polychaetes, crabs, mummichogs, and *Myxine glutinosa*

East Asian and South Pacific Summer Institute Fellowship June-September 2011
Academia Sinica Taipei, Taiwan

- Collected, processed, fixed and preserved over 100 fish specimens that I obtained from fish markets and via hook and line fishing along the Taiwanese coastline
- Obtained permits to have all specimens legally transported to the Field Museum
- Curated and accessioned all fishes into the Fishes Collection at the Field Museum

Collecting excursion and educational outreach March 2011
Suva, Fiji

- Gathered tissue samples at fish markets
- Developed and delivered lecture a about fish ecomorphology to students at Marist Brothers High School
- Assisted Dr. Josh Drew (Faculty, Columbia University) with interviewing village chiefs about changing baselines in coral reef diversity and health. These interviews were later incorporated into the Abbott Hall of Conservation Restoring Earth exhibit at the Field Museum

Field Museum expedition January-February 2011
Papua New Guinea

- Collected, identified, processed, and preserved fish specimens
- Taught University of Papua New Guinea students and faculty about field collecting and specimen processing techniques

Field Museum expedition September-October 2008
Palauan Archipelago

- Collected, identified, processed, and preserved fish specimens for accession into the Fishes Collection at the Field Museum

TECHNICAL, MOLECULAR, AND COMPUTING EXPERTISE AND CERTIFICATIONS

- **Sanger sequencing** (Qiagen and Puregene DNA extraction, PCR, gel electrophoresis)
- **RAD-Seq** (qPCR, barcode ligation, Qiagen PCR purification, Qubit, Bioanalyzer, library formation)
- **DNA editing and analysis** (Geneious, Mesquite, MacClade, Sequencher)
- **Advanced phylogenetic inference** (PAUP, Garli2, PartitionFinder, BEAST, MrBayes, RAxML, HyPhy)
- **Advanced morphometric and behavioral landmark digitizing** (StereoMorph, ImageJ, IMP, tpsDig, DLTdv3)
- **Advanced geometric morphometrics** (GeoMorph, MorphoJ)
- **Advanced Microsoft Office**
- **Intermediate Adobe Suite**
- **Intermediate R** (data manipulation, data visualization and graphics, phylogenetic comparative methods, statistical methods, rfishbase, custom programming for behavioral analytics and kinematic variable analyses)
- **Intermediate 3D modelling software** (SketchUp, Cura, FreeCAD, Tinkercad)
- **PADI advanced open water certification** (over 250 hours of SCUBA logged)
- **PADI enriched air certification**

- **Advanced fish husbandry** (tank and aquarium design, upkeep, and troubleshooting; expert animal care; advanced anesthesia training; surgical prep, procedures, and post-surgical animal care)
- **Advanced animal collection** (hook and line, seining, dip nets, trapping, spearfishing, rotenone)
- **Materials testing** (Intron Universal Testing Systems)
- **Physiology** (muscle mechanics and physiology, muscle fiber type characterization, EMG data collection and analysis)
- **CITI Social and Behavioral Research Certification**
- **CITI Physical Science Responsible Conduct of Research Certification**
- **Introduction to Mindfulness in Higher Education Certification**

PROFESSIONAL AFFILIATIONS

- **Natural History Museum Los Angeles County** (September 2018-present). Volunteer and research associate
- **Shoals Marine Laboratory** (July 2018-present). Co-instructor and research associate
- **American Society of Ichthyologists and Herpetologists** (March 2016-present)
- **Society for the Study of Evolution** (November 2014-present)
- **Field Museum Women in Science** (January 2013-June 2017). Member of steering committee
- **Graduate Women in Science, Chicago Chapter** (January 2013-June 2017). Chapter Treasurer, Founding Member, Chair of Science Outreach Committee
- **Society of Integrative and Comparative Biologists** (May 2009-present)
- **Field Museum of Natural History** (September 2008-June 2017). Volunteer, graduate student-in-residence, research associate

GRANTS AND AWARDS

- **Moto-IGERT** research funds award, $1750 (March 2010-March 2011)
- **Moto-IGERT** travel funds award, $1000 (January 2011)
- **Field Museum Women in Science Fellowship**, $30,000 stipend (September 2012-September 2013)
- **Hind's Fund award** to C. McCord, $1000 (July 2011-July 2012)
- **EAPSI fellowship to C. McCord**, host: Dr. Kwang-Tsao Shao of the Academia Sinica Biodiversity Research Centre, Taiwan (June-August 2011)
- **Moto-IGERT** travel funds award, $1000 (January 2011)
- **Moto-IGERT** research funds award, $1750 (March 2010-March 2011)
- **NSF GFRP** Honorable Mention (2008)