RACHEL M. KEEFFE
Curriculum Vitae

Department of Biological Sciences
Mount Holyoke College
50 College Street
South Hadley, MA 01075

(978)-906-3386
rkeeffe@mtholyoke.edu
https://rmkeeffe.github.io

Education

University of Florida (Gainesville, FL) 2017 – 2022
PhD, Zoology – Advisor: David C. Blackburn

University of Massachusetts Amherst (Amherst, MA) 2013 – 2017
BS, Biology – *Summa Cum Laude*
Minor, Studio Art
Gained 7 semesters of live animal experience in the Herpetology Teaching Collections

Work Experience

Postdoctoral Fellow: **Mount Holyoke College** (South Hadley, MA) 2022 – Present
Co-instructor for Vertebrate Anatomy lab and lecture course with Patricia Brennan
Conducted research for PI's NSF CAREER grant studying genital coevolution in snakes

Teaching Assistant: **University of Florida** (Gainesville, FL) 2018 – 2021
Created, organized, and executed lab lessons for Herpetology & Vertebrate Biodiversity
Taught material via hands-on dissections, digital models, museum specimens, oral lecture

Intern: **Clemson University REU** (Clemson, SC) 2016
Interned full-time at the Blob Biomechanics Lab for 10 weeks studying goby kinematics
Digitized over 180 fish swim cycles in MATLAB and analyzed resulting data in Excel

Intern: **Oregon State University REU** (Corvallis, OR) 2015
Interned full-time at the Sidlauskas Ichthyology Lab investigating fish morphology
Dissected and analyzed the pharyngeal teeth of over 60 specimens of Anostomoid fishes

Intern: **Department of Conservation and Recreation** (West Boylston, MA) 2015
Gained experience collecting and analyzing algae samples from Wachusett Reservoir
Surveyed Stillwater Basin for any aquatic invasives and took steps to prevent their spread

Intern: **Audubon Society** (Princeton, MA) 2014
Performed camp counselor duties for Wachusett Meadow's Audubon society
Promoted love and respect for New England wildlife and ecology to campers of all ages

Substitute Teaching: **Houghton Elementary School** (Sterling MA) 2013 – 2016
Carried out teaching duties for grades K through 4 when needed on school breaks

Intern: **Museum of Science** (Boston, MA) 2011
Created and developed new interpretations to add to the museum's repertoire
Mentored new interns and coordinated with interns and staff to design new activities

Honors & Awards

Charlotte Mangum Student Support Program ($150) 2021
FLMNH Fall 2021 Travel Award ($1,000) 2021
Carl Gans Travel Award ($1,780) 2019
Department of Biology Brian Riewald Memorial Fund Research Grant ($300) 2019

Carl Gans Travel Award ($1,380)	2018
Graduate Research Fellowship at the University of Florida	2017
NSF GRFP ($102,000)	2017
Outstanding Student in Biology Award: UMass Amherst	2017
Rocky Mountain Biological Laboratory Travel Grant ($1,000)	2016
Dean's List Honors at UMass Amherst	2014 – 2017
John and Abigail Adams Scholarship ($1,714)	2014 – 2017

Publications

Keeffe, R. M., Blob, R. W., Blackburn, D. C., Mayerl, C. J. (2022) XROMM analysis of feeding mechanics in toads: interactions of the tongue, hyoid, and pectoral girdle. *Integrative Organismal Biology*, obac045.

Keeffe, R. M., & Blackburn, D. C. (2022) Diversity and function of the fused anuran radioulna. *Journal of Anatomy*, 241(4), 1026-1038.

Paluh, D. J., Riddell, K., Early, C. M., Hantak, M. M., Jongsma, G. F., **Keeffe, R. M.**, Silva, F. M., Nielsen, S.V., Vallejo-Pareja, M. C., Stanley, E. L., Blackburn, D. C. (2021) Rampant tooth loss across 200 million years of frog evolution. *eLife*, 10:e66926.

Keeffe, R. M. & Blackburn, D. C. (2020) Comparative morphology of the humerus in forward-burrowing frogs. *Biological Journal of the Linnean Society*, 131(2), 291-303.

Blackburn, D. C., **Keeffe, R. M**., Vallejo-Pareja, M. C., & Vélez-Juarbe, J. (2020) The earliest record of Caribbean frogs: a fossil coquí from Puerto Rico. *Biology Letters*, 16(4), 20190947.

Bemis, K. & **Keeffe, R. M.** (2019) *Pantherophis alleghaniensis* (Eastern Ratsnake) hunting *Archilochus colubris* (Ruby-throated Hummingbird) at a hummingbird feeder in James City County, Virginia, USA. *Herpetological Review*.

Matthews, T., **Keeffe, R.M.**, & Blackburn, D. C. (2019) An identification guide to fossil frog assemblages of southern Africa based on ilia of extant taxa. *Zoologischer Anzeiger*, 283, 46-57.

Blob, R., Lagarde, R., Diamond, K., **Keeffe, R. M.**, Bertram, R., Ponton, D., Shoenfuss, H. (2019) Functional diversity of evolutionary novelties: Insights from waterfall-climbing kinematics and performance of juvenile gobiid fishes. *Integrative Organismal Biology*, 1(1), obz029.

Spoelhof, J., **Keeffe, R. M.**, McDaniel, S. (2019) Does reproductive assurance explain the incidence of polyploidy in plants and animals? *New Phytologist*, 227(1), 14-21.

Keeffe, R. M., Hilton, E. J Thome-Souza, M. J. F., & Fernandes, C. C. (2019) Cranial morphology and osteology of the sexually dimorphic electric fish, *Compsaraia samueli* Albert Crampton (Apteronotidae, Gymnotiformes), with comparisons to *C. compsa* (Mago-Leccia). *Zootaxa*, 4555(1), 101-112.

Books

Forward, J. S., **Keeffe, R. M**., & McLaurin, V. (2019) *The Anthropology of Dragons: A Global Perspective*. Austin, TX: Sentia Publishing.

Art Commissions

Smith-Vaniz, William (2019-present) Jawfish cranial and infraorbital inkings; Jawfish monograph (*Zootaxa*, in prep.)

Lillywhite, Harvey (2019) Anatomical figures; *How Snakes Work: Structure Function and Behavior of the World's Snakes*, 2014

Ziegler, Michael (2019) Montbrook fossil site landscape illustration; 2019 Thesis University of Florida

Presentations

Society for Integrative and Comparative Biology (Phoenix, AZ) 2023
Rachel Keeffe, Dylan Maag, Brandon Hedrick, Rulon Clark, Patricia Brennan; Shape Differences in the Hemipenes of Rattlesnakes in a Hybrid Zone

Department of Organismal & Evolutionary Biology Seminar (Amherst, MA) 2022
Rachel Keeffe, Richard Blob, David Blackburn, Christopher Mayerl: XROMM Analysis of Feeding Mechanics in Anurans: Interactions of the Tongue, Hyoid Apparatus, and Pectoral Girdle

Society for Integrative and Comparative Biology (Phoenix, AZ) 2022
Rachel Keeffe, Richard Blob, David Blackburn, Christopher Mayerl: XROMM Analysis of Feeding Mechanics in Anurans: Interactions of the Tongue, Hyoid Apparatus, and Pectoral Girdle

Joint Meeting of Ichthyologists and Herpetologists (Spokane, WA) 2022
Rachel Keeffe, David C. Blackburn: Finite Element Modelling of Limb Bone Fusion in Anurans

Joint Meeting of Ichthyologists and Herpetologists (Phoenix, AZ) 2021
Rachel Keeffe, Richard Blob, David Blackburn, Christopher Mayerl: XROMM Analysis of Feeding Mechanics in Anurans: Interactions of the Tongue, Hyoid Apparatus, and Pectoral Girdle

oVert Teacher's Workshop (Gainesville, FL) 2021
Rachel Keeffe: Working with Live Animals: An XROMM Example

UF ZOO 6927 PopBio Seminar Series 2019
Jonathan Spoelhof, Rachel Keeffe, Stuart McDaniel: Does Reproductive Assurance Explain the Incidence of Polyploidy in Plants and Animals?

International Congress of Vertebrate Morphology (Prague, Czech Republic) 2019
Rachel Keeffe, David Blackburn: Characterizing Forward-Burrowing Frogs with Pectoral Girdle and Humerus Morphology
Amber Singh, Rachel Keeffe, David Blackburn: Tips and Fits: Tricks to 3D Puzzle-Making

oVert Teacher's Workshop (Gainesville, FL) 2019
Rachel Keeffe: Using CT Data in the Classroom

Society for Integrative and Comparative Biology (Tampa, FL) 2019
Rachel Keeffe, David Blackburn: Characterizing Forward-Burrowing Frogs with Pectoral Girdle and Humerus Morphology
Amber Singh, Rachel Keeffe, David Blackburn: Tips and Fits: Tricks to 3D Puzzle-Making

Joint Meeting of Ichthyologists and Herpetologists (Rochester, NY) 2018
Rachel Keeffe, David Blackburn: Characterizing Forward-Burrowing Frogs with Pectoral Girdle and Humerus Morphology

41st Annual Herpetology Conference (Gainesville, FL) 2018

Rachel M. Keeffe, David Blackburn: Characterizing Forward-Burrowing Frogs with Pectoral Girdle and Humerus Morphology

Joint Meeting of Ichthyologists and Herpetologists (Austin, TX) 2017
Rachel Keeffe, Eric J. Hilton, Cristina Cox Fernandes: Sexual Dimorphism in the Amazonian Electric Knifefish *Compsaraia samueli*

Society for Integrative and Comparative Biology (New Orleans, LA) 2017
Rachel M. Keeffe, Kelly M. Diamond, Raphaël Lagarde, Dominique Ponton, Riley S. Bertram, Heiko L. Schoenfuss, Richard W. Blob: Comparative Waterfall Climbing Kinematics of Goby Fishes from Hawai'i and Réunion: Are Recently Evolved Behaviors Less Variable?

Volunteer Experience

Florida Museum of Natural History (Gainesville, FL) 2018
Interpreted and taught visitors about Florida natural history
Integrated personal research and classwork into education in the public sphere

Audubon Society (Princeton, MA) 2013
Learned about the diversity of New England wildlife, ecology, and outdoor safety skills
Improved leadership skills and crowd control when working with visitors

Museum of Science Exhibit Hall Interpretation (Boston MA) 2010 – 2013
Interpreted and taught visitors about the museum, science, and technology
Fostered a public interest in science and technology

Public Education and Outreach

Public Education: **Science Video Outreach** (Sterling, MA) 2020 – Present
Invited speaker for Houghton Elementary School in Wachusett Regional School District
Taught three second grade classrooms about the nature of science and experiments

Public Education: **Scientist in Every Florida School** (Naples, FL) 2020 – Present
Invited speaker for Big Cypress Elementary School in Collier County
Invited speaker for Pine Island Elementary in Lee County
Taught elementary-grade classrooms about the nature of science and experiments

Public Education: **Smithsonian Museum of Natural History** (Washington, D.C.) 2020
Invited panelist for Deep Sea Animal Adaptations Summer Explorations summer camp
Guided (~450) campers virtually through how to create a scientific illustration

Outreach Events:
AmphibiCast Podcast Guest Speaker, Episode 125 2023
Battle of the Beasts: Crocs vs. Gators Event at FLMNH (Gaineville, FL) 2019
Sketchfab Science Spotlight: University of Florida Herpetology 2019
Virgin Atlantic Airlines inflight magazine dragon science interview 2019
UF News *Game of Thrones* dragon science interviews 2019
Crocodilian Exhibit Opening Event at FLMNH (Gainesville, FL) 2019
Ask a Scientist: Salamanders at FLMNH (Gainesville, FL) 2019
An Epoch Night at the Museum, FLMNH (Gainesville, FL) 2019
Littlewood Elementary Science Night (Gainesville, FL) 2019
BioBlitz at FLMNH (Gainesville, FL) 2018
Ask a Scientist: Salamanders at FLMNH (Gainesville, FL) 2018

Can you Dig It? At FLMNH (Gainesville, FL)	2018
Littlewood Elementary Science Night (Gainesville, FL)	2018
Drink with the Extinct (Gainesville, FL)	2017
100th Anniversary Event at FLMNH (Gainesville, FL)	2017

Service

ASIH Board of Governors — Class of 2026
Peer reviewer for *Biological Journal of the Linnean Society*
Peer reviewer for *Journal of Morphology*
Peer reviewer for *Integrative Organismal Biology*
Peer reviewer for *Journal of Experimental Biology Part A*

Technical Skills

R and Python languages, HTML
Data analysis software – Excel, ImageJ
Ancestral State Reconstruction – RevBayes
Word processing software such as Microsoft word
µCT Scanning – Nano-CT-GE V|TOME|X M 240 & Bruker Skyscan 1276 uCT
Laser Scanning – Einscan 3D Scanners
3D modelling software – 3D Slicer, VGSTUDIO MAX, Meshlab, Blender
Leveraging online repositories such as MorphoSource, Sketchfab, Github and others
Biomechanics software – MAYA, XMALab, FEBio
Image processing software – Adobe Illustrator, Adobe Photoshop
Envisioning and rendering scientific illustrations in traditional and digital formats
Visualizing, rendering and 3D-printing models of anatomical structures
Conceiving, drafting, and executing IACUC protocols
Experience in providing husbandry for reptiles and amphibians for over 15 years
Conducting aseptic surgery and anesthesia on amphibians
Dissection of vertebrate animals, preparation of specimens for use in museum collections