

## Michelle J. Herrera, PhD

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### EDUCATION

- Sept 2023 **PhD Biological Sciences**, Department of Ecology and Evolutionary Biology, School of Biological Sciences, University of California, Irvine, CA  
Advisor: Dr. Donovan P. German  
**Research:** Molecular, Biochemical, and Physiological Responses to Dietary Shifts in prickleback fishes (family Stichaeidae); cumulative GPA: 4.0
- 2020 **M.S. Biological Sciences** University of California, Irvine, CA  
Advisor: Dr. Donovan P. German
- 2017 **B.S. Biological Sciences**, University of California, Irvine, CA  
Advisor: Dr. Donovan P. German  
**Research topics:** The molecular underpinnings of digestive specialization in prickleback fishes and potential for plasticity; Phylogenetics of prickleback fishes in the family Stichaeidae.

### RESEARCH INTERESTS

- Using evolutionary physiology as a tool for animal conservation
- Understanding how factors such as diet, environment, and genetics influence overall physiology, the gut microbiome, and patterns of gene expression
- I aspire to become a professor so that I may continue to dismantle barriers that impede underrepresented students in STEM education and develop my own physiological ecology research program with a focus on conservation and animal contributions to ecosystem functions.

### EXPERTISE

- Bioinformatic skills including: RNAseq data analysis, 16S short and long read data analysis (QIIME2, R and Rstudio, High Performance Cluster, and UCSD Cloud Computing Cluster)
- DNA and RNA extraction, library preparation, sequence data analysis (16S MiSeq and Long read nanopore sequencing), Metabolomics data analysis (GNPS and Mzmine), microbial culturing and antibiotic resistance phenotypic tests, stable isotope techniques and analysis, digestive enzyme assays and analysis
- Field work: Intertidal fish collections, fish dissections and sample processing
- Program management, grant writing, science communication and outreach

### PUBLICATIONS & MANUSCRIPTS IN ADVANCED PREP (Available upon request)

- **Herrera, M.J.**, Heras, J. & German, D.P. Comparative transcriptomics reveal tissue level specialization towards diet in prickleback fishes. *J Comp Physiol B* (2022). 192: 275-295  
<https://doi.org/10.1007/s00360-021-01426-1>
- Rankins, D.R., **M.J. Herrera**, M.P. Christensen, A. Chen, N.Z. Hood, J. Heras, D.P. German. When digestive physiology doesn't match "diet": *Lumpenus sagitta* (Stichaeidae) is an "omnivore" with a carnivorous gut. *Comparative Biochemistry and Physiology, Part A* (2023) 285:111508  
<https://doi.org/10.1016/j.cbpa.2023.111508>

- Le, N., J. Heras, M.J. Herrera, D.P. German, L.T. Crummet. The genome of *Anoplarchus purpurescens* (Stichaeidae) reflects its carnivorous diet. *Mol Genet Genomics* (2023) <https://doi.org/10.1007/s00438-023-02067-5>
- **Herrera, M.J.**, J. Heras, C. Catabay, J.D. Bastian-Salgado, M. Turken, K.M. Connor, D.P. German. Dietary-induced shifts in the hindgut microbiome of a marine herbivorous fish leads to subtle changes in gut and liver function. (In prep) to be submitted to *Molecular Ecology* in October 2023.
- **Herrera, M.J.**, J. Heras, N.N. Smith Christman, N.Z. Hood, D.P. German. Digestive physiology and individual variation impact the hindgut microbiome of prickleback fishes (Stichaeidae) with different diets. (In prep) to be submitted in October 2023
- **Herrera, M.J.**, J. Buckner, N.N. Smith Christman, M. Hilleman, J. Heras, D.P. German. Gastric enzyme activities and stomach transcriptomics correlate with diet in prickleback fishes (Stichaeidae). In prep) to be submitted in October 2023
- Lee, A.M., **M.J. Herrera**, D.P. German, A.R. Frederick. Digestive biochemistry from opposite ends of the Pacific: red abalone and pāua show differences in digestive enzyme activities, microbial diversity, and gastrointestinal fermentation. In Prep- to be submitted to *Marine Biology*
- **Herrera, M.J.** and German, D.P., 2016. Digestive specialization in prickleback fishes (Family Stichaeidae). Friday Harbor Laboratories, University of Washington.
- **Herrera, M.J.** and German, D.P., 2017. Digestive specialization in prickleback fishes (Family Stichaeidae): molecular underpinnings and potential for plasticity. UCI Journal of Undergraduate Research in Biological Sciences.

### **INVITED SEMINARS**

- How does diet and environment influence an animal? University of California, San Diego Microbiome Consortium Invited Seminar (Dorrestein/Raffatellu labs)
- Are you what you eat? Herbivorous fish can digest more than plants. Scripps Institution of Oceanography Marine Biology Department Invited Seminar. April 2023
- What does it mean to be specialized for a certain diet? CSU San Bernardino Biology Department Invited Seminar. April 2023
- How diet influences animal physiology and health. CSU San Bernardino Ichthyology Class Invited Seminar. March 2023
- Unraveling the relationship between genetics, diet, environment and animal health: My journey through science. CSU Dominguez Hills Invited Seminar. September 2022.

### **PUBLIC COMMUNICATIONS PUBLICATIONS**

- **Herrera, M.** (2019) “Extending night hours at zoos: How are animals affected?” *Society for Integrative and Comparative Biology Student Journalism*. ([link to story](#))
- Cat, L.A., A. Frederick, **M. Herrera**, E. Valdez-Ward (2018) “Diverse ecosystems require diverse ecologists” *Rapid Ecology*. ([link to story](#))

### **SELECTED RESEARCH GRANTS (Total Awarded: \$7,650)**

2021	Society for Integrative and Comparative Biology (SICB) Grant-in-Aid of Research: \$1000
2020	UC Natural Reserve System Mildred E. Mathias Graduate Student Research Grant: \$1,000
2020	American Society of Ichthyologists and Herpetologists Raney Fund Award: \$1,000
2017	UCI Microbiome Initiative Pilot Project Award

2017 Sigma Xi Grant-in-Aid of Research: \$1,000  
2016-17 Undergraduate Research Opportunities Program (UROP) Grant: \$350  
2015-16 Undergraduate Research Opportunities Program (UROP) Grant: \$300

**SELECTED SCHOLARSHIPS, AWARDS, & HONORS (total scholarship awarded: \$215,659)**

2023 American Physiological Society Comparative & Evolutionary Physiology Section  
Steven M. Horvath Professional Opportunity Award: \$500  
2023 American Physiological Society Martin Frank Diversity Travel Award: \$1,500  
2022 UC Irvine Rose Hills Foundation Science and Engineering Fellowship: \$10,000  
2022-23 UC Irvine President's Dissertation Year Fellowship: \$46,000  
2021 Summer Inclusive Excellence Award  
2020, 2021 American Physiological Society (APS) Porter Physiology Development Fellowship:  
\$46,000  
2020 UC Irvine Inclusive Excellence Ambassador Fellowship Award  
2020 Grover C. Stephens Memorial Fellowship Award  
2019 Society for the Advancement of Chicanos/Hispanics and Native Americans in Science  
(SACNAS) Best Graduate Oral Presentation Award  
2019 UCI Winter Ecology and Evolutionary Biology Graduate Student Symposium Best Oral  
Presentation Award  
2019 UCI Latino Excellence and Achievement Dinner (LEAD) School of Biological Sciences  
Excellence in Research Award  
2019 Ford Foundation Predoctoral Fellowship Alternate/Honorable Mention  
2017&19 National Science Foundation: Graduate Research Fellowship Program Honorable  
Mention  
2019 National Science Foundation: Ridge to Reef Fellowship: \$52,000  
2019 UCI School of Biological Sciences Graduate Fellowship Award  
2019 Society for Integrative and Comparative Biology (SICB) Student Journalism Internship  
2018,19,22 Diverse Educational Community and Doctoral Experience (DECADE) Student Travel  
Award: \$1000  
2018-22 Ridge 2 Reef Training Program (UCI)  
2017&18 SICB Broadening Participation Travel Award: \$500  
2017&18 SICB Charlotte Magnum Student Support Program: \$109  
2017 Voth Family Trust Fellow  
2017 Associated Graduate Student Travel Grant: \$400  
2017 ASIH Graduate Student Travel Grant: \$400  
2017 NSF Bio REU Travel Grant: \$1,000  
2017 Competitive Edge Summer Research Fellowship Award: \$5,000  
2017 Diversity Recruitment Fellowship Award: \$5,000  
2017 UC Irvine Excellence in Research in Biological Sciences  
2016 Friday Harbor Laboratories NSF REU BEACON Summer Fellowship  
2015&17 Deans Honor List  
2015 ABRCMS Best Poster Presentation Award: \$250  
2014-16 Minority Biomedical Research Support (MSBRS-IMSD) funded by the National  
Institutes of Health (NIH)

**SELECTED PRESENTATIONS & PUBLISHED ABSTRACTS (12 out of 32 total talks)**

**M. Herrera, J. Heras, C. Catabay, J.D. Bastian-Salgado, M. Turken, K.M. Connor, D.P. German**  
(2023) Dietary-induced shifts in the hindgut microbiome and metabolism. *Invited Student*

*Speaker for The Company of Biologists Workshop: Inside Out: New Frontiers in the Comparative Physiology of the Vertebrate Gut. Oral Presentation.*

- M. Herrera, J. Heras, C. Catabay, J.D. Bastian-Salgado, M. Turken, K.M. Connor, D.P. German** (2023) How does the gut respond to a changing world? Dietary-induced changes in the hindgut microbiome and metabolism of a marine herbivorous fish. *American Physiological Society Summit*. Poster Presentation.
- M. Herrera, J. Heras, C. Catabay, J.D. Bastian-Salgado, M. Turken, K.M. Connor, D.P. German** (2022) How does the gut respond to a changing world? Dietary-induced changes in the hindgut microbiome of a marine herbivorous fish. *Southwest Regional Meeting of Organismal Biologists*. Poster Presentation.
- M. Herrera, J. Heras, C. Catabay, J.D. Bastian-Salgado, M. Turken, K.M. Connor, D.P. German** (2022) How does the gut respond to a changing world? Dietary-induced changes in the hindgut microbiome of a marine herbivorous fish. *Orange County Coastal Marine Research Symposium*. Poster Presentation.
- M. Herrera, J.M. Gauglitz, K. Kerr, K.L. Marshall, K. Weldon, P.C. Dorrestein, C. Singleton, and C.L. Williams** (2022) Examining the potential of fecal microbiota transplants to treat gastrointestinal imbalance in greater one-horned rhinoceros. *International Symposium on Microbial Ecology*. Lausanne, Switzerland. Poster Presentation.
- M. Herrera and D.P. German** (2022) Unraveling the relationship between genetics, diet, environment, and animal health. *UCI Physiology Group Seminar*. Oral Presentation.
- M. Herrera, J.M. Gauglitz, K. Kerr, K.L. Marshall, K. Weldon, P.C. Dorrestein, C. Singleton, and C.L. Williams** (2022) Gut Feelings: How can fecal microbiota transplant impact overall health? *Microbial Ecology and Conservation Symposium*. Oral presentation.
- M. Herrera, J.M. Gauglitz, K. Kerr, K.L. Marshall, K. Weldon, P.C. Dorrestein, C. Singleton, and C.L. Williams** (2021) Fecal microbiota transplants and their potential to treat chronic gastrointestinal disease in greater one-horned rhinoceros. *World Microbe Forum*. Oral/Poster Presentation.
- M. Herrera and D.P. German** (2020) What Chooses our gut friends? Host identity and proximate diet influence enteric microbiome community and function in prickleback fishes. *Comparative Nutrition Society*. Oral/Poster Presentation.
- M. Herrera and D.P. German** (2019) Gut Microbes and Diet: Testing Phylosymbiosis in Closely-Related Prickleback Fishes with Different Diets. *Society for the Advancement of Chicanos/Hispanics and Native Americans in Science*. Oral Presentation.
- Awarded Best Graduate Student Oral Presentation**
- M. Herrera** (2019) From oceans to guts. *SACNAS at UCI Outreach Event: Lightning Talk to Godinez High School*. Oral Presentation.
- M. Herrera and D.P. German** (2019) Changes in the microbiome in response to dietary shifts in prickleback fishes. *Winter Ecology and Evolutionary Biology Graduate Student Symposium*. Oral Presentation.
- Awarded Best Graduate Student Oral Presentation**

### **SELECTED OUTREACH AND LEADERSHIP ACTIVITIES**

2015-present	Targeted Instruction Generating Excitement about Research and Science
April 2021-April 2022	Stanford University: Diversity in Environmental Careers Panelist and Mentor
June 2020-June 2021	UCI Inclusive Excellence Ambassador
July 2018-July 2019	UCI Associated Graduate Students President
2019	Inclusive Excellence Forum Co-facilitator

2019	NSF Research Traineeship Meeting Participant
2019	Ridge to Reef Summer Institute
2019	“What can I do with my PhD” Symposium (UCI Ecology and Evolutionary Biology)
June 2018-September 2018	Competitive Edge Summer Research Program Peer Mentor
June 2018-September 2018	Mentoring Excellence Program and Certificate (UCI)
2018-2020	<a href="#">“Turn of the Tide” Podcast</a> , Co-host (2018-present)
2018-2019	UCI Public Policy Prep (P3) Program
Feb 2018-July 2018	UCI Associated Graduate Students Council Member
2018	Irvine Unified School District Science Fair Santa Ana Unified School District MacArthur Science Fair
2017-2022	Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS) – UC Irvine Chapter
2017	How to Find a STEM related Summer Research Opportunity: NSF REU Workshop Panelist
2017-2022	Diverse Educational Community and Doctoral Experience (DECADE at UCI)

## **TEACHING EXPERIENCE**

### ***Guest Lecturer, UCI Ecology and Evolutionary Biology Department***

- Human Nutrition, Topic: Lipid Synthesis and Metabolism (Winter 2019)
- Human Nutrition, Topic: Vitamins: Their roles in metabolism (Winter 2023)

### ***Transcriptomics/Bioinformatics Workshop, UCI Ecology and Evolutionary Biology Department Physiology Group (2023)***

- I designed and led weekly workshops on transcriptome concepts and analysis
- I individually helped participants outside of workshop hours, with the goal of understanding steps in transcriptome analysis and conducting analysis.

### ***Microbiome Workshop, UCI Ecology and Evolutionary Biology Department Physiology Group (2021)***

- I designed and led weekly workshops on microbiome concepts and analysis
- I individually helped participants outside of workshop hours, with the goal of understanding steps in microbiome analysis and conducting analysis.

### ***Graduate Teaching Assistant, UCI Ecology and Evolutionary Biology Department***

- Biology: From Organisms to Ecosystems (Winter 2018)  
Responsible for designing and leading weekly discussion sections to review concepts from lecture. I incorporated creative presentation into discussion activities.
- Human Physiology Laboratory (Spring 2018, Fall 2018, Spring 2019)  
Responsible for leading laboratory lecture, functions, quizzes, lab reports, and grades
- Human Nutrition (Summer 2018, Winter 2019, Summer 2023)  
Responsible for functions, exams, and grades (evaluated performance and provided feedback for up to 30 students per quarter)

## **ADDITIONAL RESEARCH EXPERIENCE**

***San Diego Wildlife Alliance Research Fellowship, Dr. Pieter Dorrestein, Dr. Chris Tubbs and Dr. Candace Williams***

Title: Visiting Scholar/Research Fellow (March 2020-present)

Projects:

- 1) Examine how fecal microbiota transplants can help ameliorate gastrointestinal states in greater one-horned rhinoceros
- 2) Examine the effects of captivity over time on the gut microbiome of rhinoceros

***University of California, Irvine: Dr. Luis Mota-Bravo Laboratory***

Title: Undergraduate Intern (March 2014-April 2015)

Projects:

- 2) Assessed the presence and range of beta-lactam antibiotic resistance in *Aeromonas* species from aquatic environments
- 1) Characterized the occurrence of extended-spectrum beta-lactamases (ESBLs) in *Aeromonas* species.

**SUPERVISION OF UNDERGRADUATE RESEARCHERS**

**Mentored UCI undergraduates:** Caitlyn Catabay, Ariana Lee (Currently a masters student at CSULB), Michael Sherwood, Nikhita Hari, Asmita Pande (currently a Masters Student)

**PEER REVIEW SERVICE**

**Peer review:** Acta Ichthyologica et Piscatoria; Zoo Biology