

Boris Marcos Tezak

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CURRENT POSITION

Postdoctoral Associate, Capel Lab

2019 – present

Department of Cell Biology, Duke University Medical Center, USA

450 Nanaline Duke building, Duke University Medical Center, Durham NC 27710

EDUCATION

Doctor of philosophy in Integrative Biology, Florida Atlantic University

2019

Advisor: Dr. Jeanette Wyneken

Dissertation title: Understanding the phenotype- a study on how the incubation environment influences embryo growth, sex, and sex ratios in turtles with temperature dependent sex determination

Masters of Science in Biological Sciences, Florida Atlantic University

2016

Bachelor of Science in Biological Sciences, Florida Atlantic University

2011

Associate of Arts, Palm Beach State College

2008

ADDITIONAL COURSEWORK, TRAINING, AND EXPERIENCE

Embryology: Concepts & Techniques in Modern Developmental Biology

2018

- Immersive 6 week course at Woods Hole Marine Biological Laboratory

Contract Field Biologist, Inwater Research Group Inc., Jensen Beach, FL

2018

- Conducted overnight surveys, captured sea turtles, collected and recorded standard measurements and performed health assessments.

Sea Turtle Care and Husbandry Specialist, Florida Atlantic University, Boca Raton, FL

2014 – 2019

- Oversaw students and instructed them how to properly manage sea turtle husbandry, collect growth data, and perform health assessments.

Gene Regulatory Networks in Development Course

2016

- Immersive 2 week course at Woods Hole Marine Biological Laboratory

Research Assistant, University of Pittsburgh, Pittsburgh, PA

2012 – 2013

- Promoter of health for the undocumented Hispanic community in Pittsburgh, PA

PUBLICATIONS

Tezak, Boris, Barbora Straková, Dhanawn J. Fullard, Shannon Dupont, Jennifer McKey, Ceri Weber, and Blanche Capel. "Higher temperatures directly increase germ cell number, promoting feminization of red-eared slider turtles." *Current Biology* (2023).

Tezak, Boris, Blair Bentley, Mikaela Arena, Samantha Mueller, Taylor Snyder, and Itzel Sifuentes-Romero. "Incubation environment and parental identity affect sea turtle development and hatchling phenotype." *Oecologia* 192, no. 4 (2020): 939-951.

Tezak, Boris, Itzel Sifuentes-Romero, Sarah Milton, and Jeanette Wyneken. "Identifying sex of neonate turtles with temperature-dependent sex determination via small blood samples." *Scientific reports* 10, no. 1 (2020): 1-8.

Tezak, Boris M., Itzel Sifuentes-Romero, and Jeanette Wyneken. "A new approach for measuring temperature inside turtle eggs." *Journal of Experimental Biology* 221, no. 20 (2018): jeb188698.

Sifuentes-Romero, Itzel, **Boris M. Tezak**, Sarah L. Milton, and Jeanette Wyneken. "Hydric environmental effects on turtle development and sex ratio." *Zoology* 126 (2018): 89-97.

Tezak, Boris M., Kathleen Guthrie, and Jeanette Wyneken. "An immunohistochemical approach to identify the sex of young marine turtles." *The Anatomical Record* 300, no. 8 (2017): 1512-1518.

MANUSCRIPTS IN PREPARATION

Tezak, Boris, Ceri Weber, and Blanche Capel. "Turtle testis morphogenesis is defined by invaginations of the gonadal cortex and germ cell ingression". *In preparation for submission to Special Research Topics in Frontiers in Cell and Developmental Biology*.

Tezak, Boris, Talia Hatkevich, Rafael Dominguez-Acemel, Dario Lupianez, and Blanche Capel. "Gonadal sex and temperature independently influence germ cell differentiation and meiotic progression in *Trachemys scripta*". *In preparation for submission to PNAS*.

Tezak, Boris and Blanche Capel. Temperature-dependent mechanisms of sex determination in a changing climate. (Review Article). In preparation for submission to special issue in *Development- Uncovering Developmental Diversity*. April 2024.

Rafael Dominguez-Acemel, **Boris Tezak**, Blanche Capel, Dario Lupianez. "Single-cell RNA-seq and ATAC-seq analysis reveal novel insights into gonad formation and sex determination in the red-eared slider turtle". *In preparation*.

TEACHING EXPERIENCE

Direct Mentor, Duke University, NC and Florida Atlantic University, FL 2015 – present

- Directly mentored two PhD students, 5 undergraduate students, and one Highschool student, during the course of my doctoral and postdoctoral training

Guest Lecturer, Germ Cells and Sex Determination, Duke University Medical Center, NC 2023

- Prepared and delivered lecture on germ cell specification and temperature dependent sex determination to graduate students.

Instructor, Hands-on Development Bootcamp, Duke Developmental & Stem Cell Biology, NC 2021-2022

- Led hand-on activity sessions on mouse and turtle dissections and confocal imaging for graduate students.

Instructor of Record, Anatomy and Physiology Lab Florida Atlantic University, FL 2018

- Oversaw a team of 10 graduate teaching assistants and their respective classes, prepared lectures, and organized laboratory modules.

Graduate Teaching Assistant, Florida Atlantic University, FL 2013 – 2019

- Prepared and delivered lectures on undergraduate and graduate subjects listed below. Created and delivered quizzes and examinations (practical and written) and designed “hands-on” laboratory modules. Purchased equipment, materials, and specimens required for the respective courses.
- Subjects: Human Anatomy & Physiology labs (I & II), Vertebrate Structure Development and Evolution, Comparative Vertebrate Morphogenesis (undergraduate and graduate levels), Comparative Animal Physiology (undergraduate and graduate levels), Microbiology, Biodiversity

ACTIVE COLLABORATIONS

Dario Lupianez, Professor, Centro Andaluz de Biología del Desarrollo (CABD) 2020-Present
Seville, Spain.

Topic: A time course analysis of gonad development and sex determination in the *T.scripta* using Single-cell RNA-seq and ATAC-seq.

Outcome: there are 2 manuscripts in preparation that utilize these data. Additionally, the entire curated and raw data set will be made available with our publications.

Loren Looger, Professor, University of California San Diego, USA 2022-Present

Topic: New *Trachemys scripta elegans* genome.

Outcome: Preliminary annotations have been completed. We plan to publish the improved *T.scripta* genome by fall 2024.

Benjamin Parrott, Associate Professor, University of Georgia, GA, U.S. 2023-Present

Topic: Assessing the effects of Temperature on germ cells in the American alligator (*Alligator mississippiensis*).

Outcome: Alligator eggs were collected and incubated at a range of temperatures this summer. Sample analysis will begin in Fall 2023.

Lukas Kratochvil, Professor, Charles University, Prague, Czech Republic 2022- Present

Topic: Assessing the effects of temperature on gonad development and germ cell biology in multiple lizard species with different modes of sex determination.

Outcome: a Ph.D. student from the Kratochvil Lab is undergoing data analysis using tools she learned under my mentoring at the Capel Lab. This work will be submitted for publication by Summer 2024.

GRANTS AND FUNDING

NSF- Division of Integrative Organismal Systems (IOS); \$1,540,235 2023

Title: *Defining the Role of Germ Cells in Temperature-dependent Sex Determination*

Role: Co-PI; Submitted: 10/02/23; Status: *Under Review*

Life Science Research Foundation Postdoctoral Fellowship; finalist 2021

Title: *Metabolic influences on early mammalian testis development and their impact on male reproductive fitness*

Marine Biological Laboratories Financial Aid Award; \$7,106	2018
National Save the Sea Turtle Foundation Scholarship; \$2,500 annually	2014, 2016 – 2018
Florida Sea Turtle License Plate Grant; \$10,000	2017
Gordon J. Gilbert Foundation Scholarship; \$5,000.	2014, 2016
Graduate Diversity Fellowship; \$2,500	2016
American Society for Cell Biology Scholarship; \$1,000	2018
<i>For attendance to the Gene Regulatory Networks course at the Marine Biological Laboratory Woods Hole, MA</i>	
Howard Hughes Medical Institute Scholarship; \$1,783	2016
<i>For attendance to the Gene Regulatory Networks course at the Marine Biological Laboratory Woods Hole, MA</i>	

OUTREACH

Over 1,600 hours of science outreach at local Nature Centers and Museums	2013 – present
Minority-directed presentations for K-12 schools in South Florida and Durham, NC	2014 – present
Served as judge for the division of Evolutionary and Developmental Biology at the Society of Integrative and Comparative Biology Meeting in Seattle, WA	2024
Guest lecture at Durham Center for Senior Life	2024
Served as guest judge for the NC Student Academy of Science	2020 – 2023
Co-organized a symposium at North Carolina Central University to discuss research opportunities and different life trajectories in STEM	2022
Coordinated and participated in Capel Lab outreach event at the North Carolina Museum of Natural History Triangle SciTech Expo	2022
Educational science series ‘Water as a Habitat’ by COSEE Florida https://www.youtube.com/watch?v=XcdpnuUBinA	2015
Broadening the Spectrum community workshop aimed at increasing minority involvement in the geosciences, funded by the National Science Foundation, Port St. Lucie Community College	2013-2014

INVITED PRESENTATIONS

“Temperature effects on germ cell number provides insight into mechanisms governing temperature-dependent sex determination in the red-eared slider turtle”	2024
<ul style="list-style-type: none"> Special Symposium at Society for the Study of Amphibians and Reptiles in Ann Arbor, MI - <i>Endless herps most beautiful: Amphibian and non-avian reptiles as models for evolutionary developmental biology</i> 	
“Investigating the role of germ cells in temperature-dependent sex determination”	2023
<ul style="list-style-type: none"> Case Western Reserve University, Department of Biology Seminar Series, Cleveland, OH 	
“Sea turtles in a changing world”	2022

- NC Museum of Natural Sciences , Natural Sciences Classroom Lecture Series, Raleigh, NC
- “Sea turtle development and sex ratios in a changing climate” 2019
- Society for Advancement of Chicanos and Native Americans in Science (SACNAS), Developmental Biology workshop, Honolulu, HI
- “Identifying sea turtle hatchling sex ratios; how do we do it and why do we care?” 2019
- International Sea Turtle Symposium, Innovative Techniques Workshop, Charleston, SC
 - International Sea Turtle Symposium, TSD Workshop, Charleston, SC
- “Identifying the sex of sea turtle hatchlings via blood samples” 2018
- Florida Atlantic University , Frontiers in Science Lecture Series, Boca Raton, FL
- “Sea turtles in a changing climate” 2018
- Force E Scuba Center, Science Lecture Series, Boca Raton, FL
- “Can sex-specific proteins be used to identify the sex in young marine turtles?” 2017 – 2018
- Florida Atlantic University, Marine Science Seminar, Boca Raton, FL
- “Review of the molecular mechanisms behind sex determination in turtles” 2017
- International Sea Turtle Symposium, TSD Workshop, Las Vegas, NV
- “Sea Turtle Sex Ratios in a Changing Climate” 2017
- Pura Vida Diving Center, Science Seminar Series, Riviera Beach, FL
- “Effect of moisture on the molecular mechanisms underlying TSD” 2016
- International Sea Turtle Symposium, TSD Workshop, Lima, Peru
- “Sea turtle hatchlings: males or females?” 2016
- Manatee Lagoon- An FPL Eco-Discovery Center, Science Seminar Series, West Palm Beach, FL
- “What are turtles experiencing inside of the egg?” 2016
- Gumbo Limbo Nature Center, Eco-Watch Lecture Series, Boca Raton, FL

RECENT ORAL PRESENTATIONS

- “Temperature affects germ cell number which impacts sex determination in the red-eared slider turtle” 2024
- Society of integrative and Comparative Biology, Seattle, WA
- “Direct effect of temperature on germ cell number provides insight into mechanisms governing temperature-dependent sex determination”
- International Symposium of Vertebrate Sex Determination, Kona, HI 2023
 - Triangle Consortium for Reproductive Biology, Greenville, NC 2023
 - Germ Cell Meeting, Cold Spring Harbor Laboratory, NY 2022
- “Germ cell number may explain the adaptive significance of temperature-dependent sex determination (TSD)” 2021
- Duke University Medical Center, In-house Seminar Series, Durham, NC

“Identifying sex of sea turtle hatchlings via blood samples”	2019
<ul style="list-style-type: none"> • International Sea Turtle Symposium, Charleston, SC 	
“Sea turtle sex ratios in a changing climate”	2018
<ul style="list-style-type: none"> • University of Arkansas, Conference of Southern Graduate Schools, 3MT competition, Jonesville, AK 	
“Identifying the sex of sea turtle hatchlings via blood samples”	2018
<ul style="list-style-type: none"> • Southeast Regional Sea Turtle Meeting, Myrtle Beach, SC 	
“Can sex-specific proteins be used to identify sex in young marine turtles?”	
<ul style="list-style-type: none"> • Society of Integrative and Comparative Biology, New Orleans, LA 	2017

RECENT POSTER PRESENTATIONS

“Direct effect of temperature on germ cell number provides insight into mechanisms governing temperature-dependent sex determination”	
<ul style="list-style-type: none"> • Duke University Department of Cell Biology Retreat, Ashville, NC 	2022, 2023
<ul style="list-style-type: none"> • Meeting for Society of Developmental Biology Meeting, Vancouver, Canada 	2022
<ul style="list-style-type: none"> • Regional Society of Developmental Biology meeting, Chapel Hill, NC 	2022
“Assessing the role of moisture in turtle sex determination: a gene expression analysis”	2018
<ul style="list-style-type: none"> • International Symposium on Vertebrate Sex Determination, Kona, HI 	
“Molecular mechanisms behind sex determination in turtles: Is moisture playing a role?”	2018
<ul style="list-style-type: none"> • Society of Integrative and Comparative Biology, San Francisco, CA 	
“Temperatures Inside and Outside of Turtle Eggs: Measuring the Embryonic Environment”	2017
<ul style="list-style-type: none"> • Society of Integrative and Comparative Biology, New Orleans, LA 	
“Can sex-specific proteins be used to identify sex in young marine turtles?”	
<ul style="list-style-type: none"> • Florida Atlantic University, Research Day, Boca Raton, FL 	2017
<ul style="list-style-type: none"> • International Sea Turtle Symposium, Lima, Peru 	2016
<ul style="list-style-type: none"> • Society of Integrative and Comparative Biology, Portland, OR 	2016

LEADERSHIP

Chair of Planning Committee , Cell Biology Retreat, Duke University Medical Center	2023
Planning Committee , Cell Biology Postdoc Club, Duke University Medical Center	2019 – present
Organizing Committee , Capel Lab Discussions on Systemic Racism in America	2020-2021
Events Coordinator , Association of Biomedical and Biological Sciences, FAU	2016 – 2017
Vice President , Association of Biomedical and Biological Sciences, FAU	2015 – 2016
Retreat Committee , Integrative Biology Program Retreat Committee, FAU	2014 – 2019

AWARDS AND HONORS

1 st place winner for Best Postdoctoral Poster Presentation at Duke Cell Biology Retreat	2022 & 2023
Winner of Duke Cell Biology Department Trainee Service Award	2023
Archie Carr Student Award for Best Biology Oral Presentation, International Sea Turtle Symposium	2019
Boyd Lyon Award for Best Student Oral Presentation, SE Regional Sea Turtle	2018
1 st place and People's Choice Award at FAU's Three Minute Thesis Competition https://www.youtube.com/watch?v=tWlc-Ze3D-c&t=53s	2017
1 st place winner for Biology Poster Presentation at the College of Science Graduate Association Research Day	2017
2 nd Place for Marine Science Poster Presentation at Graduate and Professional Student Association Research Day	2017
Society of Integrative and Comparative Biology Broadening Participation Award	2017
Archie Carr Student Award for Best Biology Student Poster Presentation, International Sea Turtle Symposium	2016

REFERENCES

Blanche Capel- blanche.capel@duke.edu; (919) 684-6390

- James B. Duke Professor of Cell Biology; Duke University Medical Center, Department of Cell Biology
- Relationship: Current Postdoctoral Mentor

Jeanette Wyneken- jwyneken@fau.edu ; (561) 297-0146

- Professor; Florida Atlantic University, Department of Biological Sciences
- Relationship: Primary Thesis Advisor

Brigid Hogan- brigid.hogan@duke.edu; (919) 684-8139

- Professor of Cell Biology; Duke University Medical Center, Department of Cell Biology
- Relationship: Unofficial secondary mentor during my postdoctoral studies

Richard Behringer- rrb@mdanderson.org; (713) 834-6327

- Professor & Ben F. Love Chair for Cancer Research, The University of Texas MD Anderson Cancer Center, Department of Genetics
- Relationship: Instructor at the Embryology course at Woods Hole Marine Biological Laboratory and colleague/mentor in the field of sex determination and gonad development.

Sarah Milton- smilton@fau.edu; (561) 297-3331

- Chair & Professor, Florida Atlantic University, Department of Biological Sciences
- Relationship: Member of my Thesis Committee