

Rene D. Francolini

Bigelow Laboratory for Ocean Sciences • 60 Bigelow Drive • East Boothbay, Maine 04544
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EDUCATION:

Ph.D., Marine Biology 2020-2025 (Expected)
University of Maine, Darling Marine Center, Walpole, ME
Bigelow Laboratory for Ocean Sciences, Boothbay, ME
Advisors: Dr. Doug Rasher & Dr. Damian Brady

M.S., Computational Biology 2015-2016
Carnegie Mellon University, Pittsburgh, PA
Thesis: *Analysis of ChIP-Seq Data to Determine Functional Uses of Primary and Secondary Tbrain Motifs*
Advisor: Dr. Veronica Hinman

B.S., Biological Sciences 2011-2015
Carnegie Mellon University, Pittsburgh, PA

RESEARCH INTERESTS:

Ecosystem Biology; Molecular Ecology; Biodiversity of Marine Organisms; Metagenomics; Population Dynamics; Bioinformatics; Trophic Cascades; Environmental Impacts; Climate Change Response; Conservation Policy

RESEARCH:

Graduate Research Assistant July 2020 – Current
Bigelow Laboratory for Ocean Sciences
Investigating the impact of climate change on the Gulf of Maine kelp forests, forecasting the future of the kelp forest community, genetic variation and associated biodiversity.
Advisors: Dr. Doug Rasher & Dr. Damian Brady

Research Assistant III: Govindarajan Laboratory December 2018 – June 2020

Research Assistant II: Govindarajan Laboratory June 2018 – December 2018
Woods Hole Oceanographic Institution
Developed protocols to use environmental DNA to identify and build a library of eukaryotic animals inhabiting the mesopelagic zone of the ocean. Participated in research expeditions to collect and process eDNA and zooplankton samples. Collaborated with engineers to design large scale *in situ* eDNA sampling instrument.
Advisor: Dr. Annette Govindarajan

Research Assistant III: Stegeman Laboratory December 2018 – November 2019

Research Assistant II: Stegeman Laboratory February 2017 – December 2018
Woods Hole Oceanographic Institution
Studied the effects of environmental toxicants, particularly PCBs, using zebrafish and killifish as model organisms. Assembled marine animal genomes with Oxford Nanopore Technology. Generated and maintained multiple wildtype and CRISPR zebrafish lines. Analyzed the effects of pharmaceuticals and sewage on oysters.
Advisor: Dr. Jed Goldstone

Master's Thesis Research January 2015 – May 2016

Carnegie Mellon University
Utilized computational methods to analyze raw ChIP-Seq data and identify binding locations of transcription factor Tbrain in *P. miniata* and *S. purpuratus* to determine evolutionary significance of presence of secondary binding site in orthologous genes.
Advisor: Dr. Veronica Hinman

Undergraduate Research Intern Summer 2014
Hawaii Institute of Marine Biology, University of Hawaii - Manoa
Investigated the relationship of *Montipora* coral and algae metabolomics in abnormal temperature zones through NMR analysis of metabolite extractions. Examined spawning patterns and growth of *Montipora* coral in varying carbon dioxide conditions.
Advisor: Dr. Ruth Gates

Andes to Amazon Study Abroad Summer 2013
Ceiba Foundation for Tropical Conservation
Conducted field work in El Pahuma cloud forest, Tiputini Biodiversity Station, and Lalo Loor Dry Forest Ecological Station in Ecuador, focusing on zoology and botany of wet and dry forest ecosystems.
Advisor: Dr. Joe Meisel

Phage Genomics Research 2011-2012
Carnegie Mellon University
Isolated, characterized, and analyzed unique bacteriophages using molecular and computational techniques including an Ion Torrent Personal Genome Machine.
Advisors: Dr. Maggie Braun & Dr. John Jarvik

Summer Research Intern 2007-2012
Wellfleet Bay Wildlife Sanctuary, Massachusetts Audubon Society
Conducted juvenile horseshoe crab surveys, maintained diamondback terrapin nest protection enclosures, and aided in oyster reef spawning and restoration projects.
Advisor: Mark Faherty

TEACHING
EXPERIENCE:

Instructor: 2021 Maine-eDNA Metabarcoding Workshop December 2021
University of Maine – Maine EPSCoR
Taught how to process and visualize metabarcoding sequencing data, from raw sequences to amplicon sequence variants, using a dada2 and phyloseq pipeline.

Instructor: 2021 Bigelow Data Carpentry Workshop April 2021
Bigelow Laboratory for Ocean Sciences
Topics taught include best data management practices, introduction to R, manipulating data in R, plotting in R, and visualizing ocean data

Teaching Assistant:
Experimental Biochemistry Spring 2015
Experimental Techniques in Molecular Biology and Genetics Fall 2014
Carnegie Mellon University
Led review and extension sessions for students to ensure understanding of difficult material and graded problem sets, quizzes, and tests for the class.
Advisor: Dr. Carrie Doonan

Teacher: Research Experience in Marine Sciences Summer 2014
Hawaii Institute of Marine Biology
Taught 20 high school students marine science, experimental design, how to write lab reports, and presentation skills. Guided student group projects on topics including jellyfish zooxanthellae and snapping shrimp regeneration.
Advisor: Dr. Malia Rivera

Day Camp Instructor: Natural History Day Camp 2011-2013
Wellfleet Bay Wildlife Sanctuary, Massachusetts Audubon Society
Arranged and taught lessons on migration, natural habitats, salt marshes, native organisms, and coastal waterways for students age 4-15 years old. Led and managed educational tours for families focused on the environment & conservation of Cape Cod.

PUBLICATIONS:

A.F. Govindarajan, **R.D. Francolini**, J.M. Jech, A.C. Lavery, J.K. Llopez, P.H. Wiebe, W.G. Zhang. (2021) *Exploring the Use of Environmental DNA (eDNA) to Detect Animal Taxa in the Mesopelagic Zone*. *Frontiers in Ecology and Evolution*. Vol. 9, doi: 10.3389/fevo.2021.574877. [full text](#).

M. C. Salanga, N. R. Brun, **R.D. Francolini**, J. J. Stegeman, J. V. Goldstone. (2020) *CRISPR-Cas9 Mutated Pregnane X Receptor (pxr) Retains Pregnenolone-induced Expression of cyp3a65 in Zebrafish (Danio rerio) Larvae*. *Toxicological Sciences*, Vol. 174, Issue 1, pgs 51-62, doi: 10.1093/toxsci/kfz246. [full text](#).

G.A. Cary, A.M. Cheatle Jarvela, **R.D. Francolini**, V. F. Hinman. (2017) *Genome-wide use of high- and low- affinity Tbrain transcription factor binding sites during echinoderm development*. *Proc Natl Acad Sci USA*. Vol. 114 no. 23. 5854-5861, doi: 10.1073/pnas.1610611114. [full text](#).

Pope WH, Bowman CA, et al. (2015) *Whole genome comparison of a large collection of mycobacteriophages reveals a continuum of phage genetic diversity*. *Kolter R, ed. eLife*. 2015; 4:e06416. doi:10.7554/eLife.06416. **(contributing author)**. [full text](#).

PRESENTATIONS:

Using Population Genetics to Characterize the Gulf of Maine Kelp Forests. May 11, 2021. School of Marine Sciences Graduate Student Symposium. Maine. Virtual Talk.

How are Gulf of Maine Kelp Forests Responding to Climate Change? October 26, 2020. Maine EPSCoR Maine-eDNA All-Hands Meeting. Maine. Virtual Talk.

On Podcasting & Communicating Science. March 4, 2020. Sea Education Association. Invited Talk.

LabOratory Podcast: Documenting Personal Narratives of Scientific Significance. February 17, 2020. Ocean Sciences. San Diego. eLightening Session.

GRANTS:

Maine Sea Grant Program Development, *co-written with Dr. Doug Rasher* April 2021
Graduate Student Government Individual Grant, *University of Maine* March 2021
Technical Staff Training & Development Opportunity, *WHOI* July 2018

SPECIAL COURSEWORK:

OceanHackWeek, *University of Washington/Bigelow Laboratory* August 2020
Strategies & Techniques for Analyzing Microbial Populations & Structures,
Marine Biological Laboratory August 2018
Oxford Nanopore Training, *Woods Hole Oceanographic Institution* December 2017

AWARDS:

NSF-REU Honorable Mention April 2020
Academic Achievement Scholarship 2015-2016
CMU Senior Leadership Recognition May 2015
Biology Student Advisory Council Service Award May 2015
Alpha Phi Omega Distinguished Service Key May 2015
CMU Dean's List May 2014
CMU Dean's List with Honors December 2013
Tartans Abroad Scholarship Summer 2013

MENTORING:

Katie Pell, WHOI Undergraduate Guest Student, 2020
Sarah Stover, WHOI Undergraduate Guest Student, 2019
Nicole Suren, WHOI Summer Student Fellow, 2018

OUTREACH:

Skype A Scientist , <i>Girl Guides of Canada</i>	April 2021
Skype A Scientist , <i>Ellis Mendell Elementary School 3rd Grade</i>	March 2021
Skype A Scientist , <i>MSU Montclair Marine Biology Organization</i>	March 2021
Skype A Scientist , <i>Parkway South High School AP Bio</i>	March 2021
Judge , <i>Falmouth Academy Science Fair</i>	February 2021
Host and Producer , <i>LabOratory Podcast</i>	January 2020 – April 2021
Interviewee , <i>Kai Talks Science, Falmouth Community TV</i>	February 2020
Volunteer , <i>Woods Hole Science Stroll</i>	August 2018
Instructor , <i>East Falmouth Elementary School 3rd Grade Field Trip</i>	2018
Judge , <i>Falmouth Academy Science Fair</i>	February 2018
Tutor , <i>Falmouth Volunteers in Public Schools High School</i>	2017-2018
Volunteer , <i>Woods Hole Science Stroll</i>	August 2017
Instructor , <i>East Falmouth Elementary School 3rd Grade Field Trip</i>	June 2017
Instructor , <i>Leonard Gelfand Center Biological Sciences Outreach</i>	2012-2016
Instructor , <i>Pennsylvania Junior Academy of Science Workshops</i>	2011-2016

CRUISE

PARTICIPATION:

R/V Armstrong, Woods Hole, March 10 – March 16, 2020
R/V Manta, Texas, September 21 – September 27, 2019
R/V Henry B. Bigelow, Rhode Island, July 24 – August 8, 2019
S.S.V. Corwith Cramer, Visiting Scientist, Bermuda to NYC, April 22 – May 2, 2019

PROFESSIONAL

AFFILIATIONS:

Society for Women in Marine Science (SWMS)