

NASTASSIA VIRGINIA PATIN

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Cooperative Institute for Marine and Atmospheric Studies
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Ocean Chemistry & Ecosystems Division
Atlantic Oceanographic and Meteorological Laboratory
National Oceanic and Atmospheric Administration
Stationed at Southwest Fisheries Science Center, La Jolla, CA

RESEARCH INTERESTS

Marine microbiology, genomics and metagenomics, bioinformatics, microbiomes, oceanography

EDUCATION AND PROFESSIONAL EXPERIENCE

National Oceanographic and Atmospheric Administration Aug. 2020 - present
Postdoctoral researcher at the University of Miami/AOML
Advisor: Kelly Goodwin

Georgia Institute of Technology 2016 – Aug. 2020
Postdoctoral researcher
Advisor: Frank Stewart
Co-advisor: Kostas Konstantinidis (as of February 2019)

Scripps Institution of Oceanography, University of California, San Diego 2011 – 2016
Ph.D. in Marine Biology
Advisor: Paul Jensen

San Francisco State University 2009 – 2011
M.S. in Marine Biology
Advisor: Frances Wilkerson
Co-advisor: Matthew Ashby

Stanford University 2004 –2008
B.S. in Biological Sciences, minor in French.

PUBLICATIONS

Patin NV, Jesser KJ, Peña-Gonzalez A, Hatt JK, Trueba G, Levy K, Konstantinidis KT. Comparison of metagenomic and traditional methods for diagnosis of *E. coli* enteric infections. *Under revision for mBio*.

Patin NV and Goodwin KD. Capturing Marine Microbiomes and Environmental DNA: A Field Sampling Guide. *Frontiers in Microbiology*. Research Topic: Marine Microbiomes: Towards Standard Methods and Best Practices. <https://doi.org/10.3389/fmicb.2022.1026596>

- Patin NV** and Goodwin KD. Long read sequencing improves recovery of marine picoeukaryotic genomes and provides insight into zooplankton biogeography. *mSystems* 0: e00595-22. <https://doi.org/10.1128/msystems.00595-22>.
- Truelove N, **Patin NV**, Min M, Pitz K, Preston C, Yamahara K, Zhang Y, Raanan B, Kieft B, Hobson B, Thompson LR, Goodwin K, Chavez F. 2022. Expanding the temporal and spatial scales of environmental DNA research with autonomous sampling. *Environmental DNA*, 00, 1-13. <https://doi.org/10.1002/edn3.299>
- Thompson LR, Anderson SR, Den Uyl PA, **Patin NV**, Sanderson G, Goodwin KD. 2022. Tourmaline: a workflow for rapid and reproducible amplicon sequence analysis using QIIME 2 and Snakemake. *GigaScience*. <https://doi.org/10.1093/gigascience/giac066>.
- Demko A, **Patin NV**, Jensen PR. 2021. Culture-dependent and culture-independent microbial diversity in tropical marine sediments. *Environmental Microbiology*. 23(11), 6859–6875. doi: 10.1111/1462-2920.15798
- Caughman A, Pratte ZA, **Patin NV**, Stewart PJ. 2021. Coral microbiome changes over the day-night cycle. *Coral Reefs*. <https://doi.org/10.1007/s00338-021-02097-8>
- Patin NV**, Dietrich ZA, Stancil A, Quinan M, Beckler JS, Hall ER, Culter J, Smith CG, Taillefert M, Stewart FJ. 2021. Gulf of Mexico blue hole harbors high levels of novel microbial lineages. *The ISME Journal*. doi: s41396-021-00917-x
- Abdelrahman SM, **Patin NV**, Hanora AM, Aboseidah AA, Desoky SM, Desoky FG, Stewart FJ, Lopanik NB. 2021. The natural product biosynthetic potential of Red Sea nudibranch microbiomes. *PeerJ* 9:e10525. doi: 10.7717/peerj.10525
- Patin NV**, Peña-Gonzalez A, Hatt J, Moe C, Kirby A, Konstantinidis K. 2020. The role of the gut microbiome in resisting norovirus infection as revealed by a human challenge study. *mBio*. 11 (6) e02634-20. doi: 10.1128/mBio.02634-20.
- Patin NV**, Brown E, Garfield C, Chebli G, Kubanek J, Stewart FJ. 2020. Microbial and chemical dynamics of a toxic dinoflagellate bloom. *PeerJ*. 8:e9493. doi: 10.7717/peerj.9493
- Thamdrup B, Steinsdottir HGR, Bertagnolli AD, Padilla CC, **Patin NV**, Garcia-Robledo E, Bristow L, Stewart FJ. 2018. Anaerobic methane oxidation is an important sink for methane in the ocean's largest oxygen minimum zone. *Limnology and Oceanography* 9999: 1-17. doi: 10.1002/lno.11235
- Patin NV**, Locklear S, Stewart FJ, Lopanik NB. 2018. Symbiont frequency predicts microbiome composition in a model bacterial-bryozoan symbiosis. *Aquatic Microbial Ecology* 83: 1-13. doi:10.3354/ame01901
- Tuttle RN, Demko A, **Patin NV**, Kapon C, Dorrestein PC, Jensen PR. 2018. The detection of specialized metabolites and their producers in ocean sediments. *Applied and Environmental Microbiology*. doi:10.1128/AEM.02830-18
- Pratte ZA, **Patin NV**, McWhirt M, Caughman A, Stewart FJ. 2018. Association with a sea anemone alters the skin microbiome of clownfish. *Coral Reefs*. doi:10.1007/s00338-018-01750-z
- Patin NV**, Floros D, Dorrestein PC, Hughes C, Jensen PR. 2018. The role of inter-species interactions in *Salinispora* specialized metabolite production. *Microbiology*. 164(7): 946-955.

- Patin NV**, Pratte ZA, Regensburger M, Gilde K, Hall E, Dove ADM, Stewart FJ. 2018. Microbiome dynamics in a large artificial seawater aquarium. *Applied and Environmental Microbiology*. 84(10): e00179-18.
- Patin NV**, Schorn MA, Aguinaldo K, Lincecum T, Moore BS, Jensen PR. 2016. Effects of actinomycete secondary metabolites on sediment microbial communities. *Applied and Environmental Microbiology*. 83(4): e02676-16.
- Schorn MA, Alanjary MM, Aguinaldo K, Korobeynikov A, Podell S, **Patin NV**, Lincecum T, Jensen PR, Ziemert N, Moore BS. 2016. Sequencing rare marine actinomycete genomes reveals high density of unique natural product biosynthetic gene clusters. *Microbiology*. 162(12): 2075-2086.
- Patin NV**, Duncan K, Dorrestein PC, Jensen PR. 2016. Competitive strategies differentiate closely related species of marine actinobacteria. *The ISME Journal*. 10: 478-490.
- Wietz M, Duncan K, **Patin NV**, Jensen PR. 2013. Antagonistic interactions mediated by marine bacteria: The role of small molecules. *Journal of Chemical Ecology*. 9: 879-891.
- Patin NV**, Kunin V, Lidström U, Ashby M. 2012. Effects of OTU clustering and PCR artifacts on microbial diversity estimates. *Microbial Ecology*. 65(3): 709-19.
- Bagulayan A, Bartlett-Roa JN, Carter AL, Inman BG, Keen EM, Orenstein EC, **Patin NV**, Sato KNS, Sibert EC, Simonis AE, Van Cise AM, Franks PJS. 2012. Journey to the center of the gyre: The fate of the Tohoku Tsunami debris field. *Oceanography* 25(2): 200–207.

CURRENT RESEARCH PROJECTS

Characterizing California Current microbiomes over temporal, spatial, and oceanographic scales using shotgun metagenomics and machine learning methods.

Linking microbiomes to plankton and metazoan communities using eDNA and 'Omics approaches.

Customizing long read bioinformatic work flows for marine eDNA and shotgun metagenomes.

Investigating the role of marine microbiomes in recent thiaminase deficiencies in salmon populations.

TECHNICAL SKILLS

Python, including visualization packages like Seaborn and machine learning platforms like Tensorflow
R, including biostatistical and Bayesian approaches with packages like JAGS
HPC and cloud computing, including AWS and GCP
Git and GitHub

GRANT PROPOSALS LED OR CO-WRITTEN

2022 Characterization of deep-sea sediment biodiversity and biopharmaceutical potential, NOAA Ocean Exploration, **Lead PI**. Co-PIs: Jordon Beckler (FAU), Matthew Harke (GMGI), and Greg Rouse (SIO); \$733,027 requested; **submission encouraged following successful pre-proposal**

2021 Assessing Google Terra as a Potential Platform for 'Omics Data Storage and Analysis, NOAA, **Co-Lead PI** with Krista Nichols (NOAA NMFS) and Kelly Goodwin (NOAA AOML), \$279,660 requested; unsuccessful

2021 Standardizing bioinformatics workflows and accelerating machine learning for eDNA/omics using cloud workspaces, NOAA, **Co-Lead PI** with Luke Thompson (NOAA AOML), 50,000 CPU core hours and 10 TB storage; **granted**

2019 Positive effects of coral biodiversity on coral performance: patterns, processes, and dynamics, NSF OCE – Biological Oceanography, postdoc with Frank Stewart and Mark Hay, \$1,310,678; **granted**

2018 Dynamics of Microbial Chemistry and Community Organization During an Ecosystem Perturbation, NSF OCE – Biological Oceanography, postdoc with Frank Stewart and Julia Kubanek, \$833,015 requested; unsuccessful

2018 The microbiome of the living building, Georgia Institute of Technology, postdoc with Frank Stewart, \$10,000 requested; unsuccessful

2018 Autism Spectrum Disorder and Extreme Food Restriction Effects on Patient Microbiomes, Simons Foundation, postdoc with Frank Stewart, Jeffery Lewis, and William Sharp, \$79,574 requested; unsuccessful

2017 Chemical drivers of microbe-phytoplankton interactions over a shifting environment, NSF OCE – Biological Oceanography, postdoc with Frank Stewart and Julia Kubanek, \$716,168 requested; unsuccessful

2017 The mangrove microbiome and its role in supporting ecosystem health, Sea Grant Puerto Rico, postdoc with Frank Stewart and Ariel Lugo, \$67,092 requested; unsuccessful

AWARDS, HONORS, AND RESEARCH SUPPORT

Peggy Cotter Travel Award, American Society for Microbiology	2019
Best Talk, Georgia Tech Postdoctoral Symposium	2017
Edward A. Frieman Director's Prize for Excellence in Graduate Student Research <i>Awarded for the 2016 ISMEJ publication listed above.</i>	2016
International Society for Microbial Ecology Student Travel Grant	2014, 2016
SIO Department Graduate Student Excellence Travel Award	2014, 2016

PRESENTATIONS AND INVITED TALKS

Patin NV , Pitz K, Truelove K, Chavez F, Goodwin KD. Shotgun metagenomes combined with metabarcoding link microbial function to higher trophic levels in the California Current. Poster presentation at the Royal Society meeting "Marine Microbes in a Changing Climate."	2022
Patin, NV . 31 Days aboard <i>Tara</i> in Antarctica. Oral presentation for the OneNOAA Seminar Series.	2022

- Patin NV**, Pitz K, Truelove K, Chavez F, Goodwin KD. Shotgun metagenomes combined with metabarcoding link microbial function to higher trophic levels in the California Current. Oral presentation at the NOAA Omics Seminar Series. 2021
- Patin NV**, Pitz K, Truelove K, Chavez F, Goodwin KD. Shotgun metagenomes combined with metabarcoding link microbial function to higher trophic levels in the California Current. Oral presentation at the 5th annual eDNA Technical Exchange Workshop. 2021
- Patin NV**, Pitz K, Truelove NK Chavez F, Goodwin KD. Comparing microbial eDNA captured by automated and manual sampling methods. Oral presentation at NCCOS-AOML Symposium. 2021
- Patin NV**, Dietrich Z, Beckler J, Hall E, Stewart FJ. Metagenome-assembled genomes of the rare and enigmatic Woese archaeota inform their role in blue hole biogeochemistry. Oral presentation at Ocean Sciences Meeting 2020. 2020
- Patin NV**, Brown E, Chebli G, Garfield C, Kubanek J, Stewart FJ. Microbial and chemical dynamics of a toxic dinoflagellate bloom. Oral presentation at 10th US Symposium on Harmful Algae. 2019
- Patin NV**, Pratte ZA, Regensburger M, Gilde K, Hall E, Dove ADM, Stewart FJ. The *Ocean Voyager* Microbiome. Poster. American Society for Microbiology Microbe 2019 Conference. 2019
- Patin NV**. Chemical Ecology in the Age of Microbiome Science and Big Data. **Invited Talk**. 35th annual meeting of the International Society of Chemical Ecology. Atlanta, GA. 2019
- Patin NV**, Pratte ZA, Regensburger M, Gilde K, Hall E, Dove ADM, Stewart FJ. The *Ocean Voyager* Microbiome. **Invited Talk**. Kennesaw State University. 2018
- Patin NV**, Pratte ZA, Regensburger M, Gilde K, Hall E, Dove ADM, Stewart FJ. The *Ocean Voyager* Microbiome. **Invited Talk**. Astrobiology Graduate Conference, Georgia Institute of Technology. 2018
- Patin NV**, Locklear S, Stewart FJ, Lopanik NB. The microbiome of the bryozoan *Bugula neritina* is shaped by a cytotoxin-producing symbiont. Poster. 7th Conference on Beneficial Microbes. 2018
- Patin NV**, Pratte ZA, Regensburger M, Gilde K, Hall E, Dove ADM, Stewart FJ. The *Ocean Voyager* Microbiome. Poster. 11th Georgia Tech Bioinformatic Conference. 2017
- Patin NV**, Pratte ZA, Regensburger M, Gilde K, Hall E, Dove ADM, Stewart FJ. The *Ocean Voyager* Microbiome. Talk. Georgia Tech Postdoctoral Symposium. 2017
- Patin NV**, Schorn M, Aguinaldo K, Lincecum T, Moore BS, Jensen PR. Effects of actinomycete secondary metabolites on sediment microbial communities. Poster. International Society for Microbial Ecology-16 Conference. 2016
- Patin NV**, Duncan K, Dorrestein PC, Jensen PR. Competitive strategies differentiate closely related species of marine actinobacteria. Poster. International Society for Microbial Ecology-15 Conference. 2014

Patin NV, Kunin V, Lidström U, Ashby M. Effects of OTU clustering and PCR artifacts on microbial diversity estimates. Poster. International Society for Microbial Ecology-13 Conference. 2010

FIELD EXPERIENCE

Tara Oceans, Mission Microbiomes; Antarctica and Southern Ocean January-February 2022
Collection and filtration of water samples for the preservation of eDNA as part of a major international research collaboration to sample marine microbiomes in the Southern Ocean.

Rockfish Recruitment and Ecosystem Assessment Survey Spring 2021, 2022
NOAA NMFS Annual Cruise in the California Current
Collected and filtered >300 water samples for the preservation of eDNA. Sole scientist responsible for sample design, sample collection, and collaboration with fisheries scientists to link eDNA and trawl data.

Gulf of Mexico Blue Hole study, Mote Marine Lab, Sarasota, Florida 2019, 2020
Led the microbial sampling of blue hole formations in the Gulf of Mexico over three field expeditions. Collected water and sediment samples via SCUBA diving and robotic lander deployment, in collaboration with Mote Marine Laboratory and Florida Atlantic University. Two expeditions sampling included mentorship of students who gained valuable field experience and one of whom is a co-author the resulting publication.

K. brevis harmful algal bloom field study, Mote Marine Lab, Sarasota, Florida 2018
Organized and led a field collection experiment to the southwest coast of Florida with two undergraduate students. Collected water samples from twelve sites and size-fractionated for particle-associated and free-living microbial community analyses. Taught all methods to the accompanying students and included them as co-authors on a pending publication.

Gump Research Station, Mo'orea, French Polynesia 2017
Collected crabs for gut microbiome analyses. Conducted feeding experiments on crabs for gut transcriptome analyses. Collected seaweeds for study on nutrient loads and algal microbiomes. Sampled coral over a 48-hour period for diel microbiome study.

Institute of Marine Sciences, Morehead City, North Carolina 2017
Collected colonies of the bryozoan *Bugula neritina* for a study on microbiome structure, function, and biogeography. Assisted with ecological experiments assessing predation levels in different *B. neritina* habitats.

Carrie Bow Cay Field Station, Belize 2014, 2015
Conducted *in situ* experiments to detect microbial bioactive compounds in marine sediments and to assess effects of actinomycete compounds on natural communities.

Viti Levu, Fiji 2014
Conducted *in situ* experiments on microbial chemical competition. Collected sediment samples for cultivation of actinomycete bacteria.

UNOLS cruise, Bahamas 2013

Collected sediment samples for cultivation of actinomycete bacteria and culture-independent sediment community analyses.

UNOLS cruise, Yucatán Peninsula, Mexico

2012

Collected sediment, algal, and invertebrate samples for cultivation of actinomycete bacteria.

SERVICE, OUTREACH, AND MEDIA

Author, International cooperation drives oceanographic discovery aboard Tara. April 2022
<https://www.aoml.noaa.gov/news/international-cooperation-drives-oceanographic-discovery/>
A personal account of my 31 days sampling in the Southern Ocean aboard the French research sailboat *Tara*.

Creator, Video tutorial on metagenomic analysis Dec. 2021
<https://www.youtube.com/watch?v=eeJehUYVsHM&t=8s>
Step-by-step guide on theory and practice of bioinformatic approaches to analyzing shotgun metagenomic sequence data.

Contributor, Skype a Scientist 2017-present
Regular virtual presentations to middle and high school classes about marine science, bioinformatics, and scientific careers.

Invited Member, NOAA 'Omics Working Group July 2021
Contributing member of the subcommittee on bioinformatics and data management

Author, *It's the little things: Studying marine microbes*. Feb. 2021
Blog post: Cooperative Institute for Marine and Atmospheric Sciences, Rosenstiel School For Marine and Atmospheric Sciences.
<https://cimas.rsmas.miami.edu/news-events/cimas-blog/little-things/index.html>

Author, *Diving for microbes: journey into a blue hole*. Feb. 2021
Nature Microbiology: Behind the Paper. <https://naturemicrobiologycommunity.nature.com/posts/diving-for-microbes-journey-into-a-blue-hole>

Founder and Organizer, Georgia Tech Bioinformatics User Group (GT-BUG) 2017-2020
Established a regular meeting of students, postdoc, and faculty interested in bioinformatics for discussions, tutorials, and invited speakers in order to address community needs in sharing knowledge and experience among scientists from Georgia Tech, Emory University, the Centers for Disease Control and Prevention, and Georgia State University.

Co-organizer, Summer Workshop in Marine Science (SWiMS) 2017, 2018
Helped developed tutorials on incorporating marine science into high school lesson plans and delivered tutorials to workshop attendees (high school teachers).

Invited Presenter, Science Salon (Atlanta Science Tavern) May 2018
Presented to an audience of interested members of the public on microbial chemical ecology.

Visiting speaker, Gwinnett High School. April 2018

Spent a day giving short talks and interactive lessons on ocean pollution to 9th graders.

Judge, Morningside Elementary School Science Fair 2017, 2018
Assessed and ranked the quality of 3rd-5th grade science fair projects.

Visiting speaker, Northwestern Middle School March 2017
Presented short talks and interactive lessons on microbiology to 6th and 7th graders.

Co-coordinator, Scripps Community Outreach Program for Education 2013-2016
Facilitated educational outreach opportunities at SIO and volunteered for these opportunities.

Student Representative, SIO Heritage Committee 2015-2016
Generated recommendations to the UC San Diego administration for the upkeep and preservation of historical buildings, facilities, and other resources.

Organizer, Microbial Oceanography Journal Club 2012-2014
Organized monthly paper discussions for graduate students and postdocs.

Member, Marine Biology Curricular Group Student Committee 2012, 2013
Wrote evaluations for SIO faculty members based on course evaluations, instructor evaluations, and student feedback.

Volunteer, Sea Lion Bowl, National Ocean Sciences Bowl 2009, 2010
Assisted with preparation and logistics of two annual high school marine science quiz bowls.

TEACHING AND MENTORING EXPERIENCE

Mentor, Connie Machuca (summer NERTO intern) summer 2022
Oversaw student-led sequencing and bioinformatic analyses of environmental DNA from polluted and unpolluted fresh and brackish water samples. Provided career guidance, academic support, and technical assistance to student.

Mentor, Zoë Dietrich (summer REU student, fall field assistant) summer 2019
Guided student through sample processing and analysis of marine water column and sediment samples obtained from a blue hole field expedition. By the end of the summer the student had produced high-quality amplicon sequence data and interpreted the results in oral presentation, poster, and written report formats. The student participated in the second sampling trip and contributed substantially to sample collection and processing. She is anticipated to be a co-author on future publications describing our results.

Mentor, Chloe Pryor (undergraduate) fall 2018-present
Taught molecular biology laboratory skills to a first-year undergraduate, leading to the generation of high-throughput sequencing data set. Currently teaching basic bioinformatic data analysis methods (quality control, taxonomic assignment, and ecological statistics).

Mentor, Claire Garfield and Gabriella Chebli (summer REU students) summer 2018
Developed a summer research project incorporating field collections, molecular

biology, and metabolomic data generation and analyses for two undergraduate students. Guided students through all components of the project including a 4-day field trip to Florida as the single head scientist in charge of all aspects of the trip (scientific, educational, and logistical). By the end of the summer students had generated two major preliminary data sets that were used in an NSF grant proposal. They also presented their results as a poster and a paper at the Georgia Tech REU Research Symposium.

Organizer/lecturer, Georgia Tech Bioinformatics User Group 2017 - present
Conducting tutorials on basic bioinformatic programs and skills on topics including amplicon and metagenome sequencing data analysis, phylogenetics, and ecological statistics.

Mentor, Doug Sweeney (undergraduate) 2015 - 2016
Taught microbiology and molecular biology techniques to an undergraduate student, leading to an independent research project and his ultimately joining the lab as a PhD student.

Teaching Assistant, SIO282: Microbial Life in Extreme Environments, UCSD 2016
Prof. Doug Bartlett
Graded exams and conducted exam review sessions. Designed and presented a lecture on microbial symbiosis.

Teaching Assistant, GES56: Changes in the Coastal Ocean, Stanford, CA 2008
Prof. Rob Dunbar
Provided teaching support for class on the science and policy of the California coast. Created and executed lesson plan about the Channel Islands marine reserve.

PROFESSIONAL ASSOCIATIONS

American Society for Microbiology
Association for the Sciences of Limnology and Oceanography

OTHER

Citizenship: United States and Switzerland
Programming languages: Proficient in Python and R
Spoken languages: Proficient in French and German, basic knowledge of Spanish
Society memberships: 500 Women Scientists, American Society for Microbiology
Other: PADI Divemaster