

Natalie R. Graham

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RESEARCH INTERESTS

Application of modern molecular methods to preserve biodiversity. eDNA for early detection of invasive species. Quantitative metabarcoding methodology. Ecological networks. Conservation genomics. Translation of scientific results into actionable information for resource management.

EDUCATION

University of California, Berkeley, Department of Env. Science, Policy and Management Berkeley, CA
Candidate for *Doctor of Philosophy Environmental Science, Policy and Management*, 2021

- **Concentration:** Organisms and Environment
- **Relevant Coursework:** GIS and Environmental Science, Statistical Analysis of Continuous Outcome Data, Global Environmental Change for Health Scientists, Research Design and Applications for Data and Analysis, Reproducible and Collaborative Data Science
- **Dissertation title:** Arthropods on Islands: An Approach for Understanding Community Assembly and Global Change Biodiversity Dynamics Using Molecular Tools and Network Thinking

Sonoma State University, Department of Biology

Rohnert Park, CA

Masters of Science, 2014

- **Relevant Coursework:** Climate Change Biology, Adaptation, Ecological Genetics
- **Thesis title:** Phylogeography in response to reproductive strategies and ecogeographic isolation in ant species on Madagascar: Genus *Mystrium* (Formicidae: Amblyoponinae)

Sonoma State University, Department of Biology

Rohnert Park, CA

Bachelors of Science, Biology 2005 *Cum Laude*

- **Concentration:** Ecology and Evolutionary Biology
- Minor in Chemistry
- Graduated with departmental distinction

WORK EXPERIENCE

Essig Museum of Entomology

Berkeley, California

Graduate Student Curator— 20 hours per week for 5 months, paid position

January 2019-May 2019

- Curatorial responsibilities including loan preparation and loan return processing, updating specimen taxonomy and location in collection, database management
- Training and supervision of undergraduate student researchers in data capture techniques for long term digitization of museum collections
- Special focus on Lepidoptera: Butterflies of California for CalScape project and Hymenoptera: Bees for John Ascher collection

Herpetofauna population genomics project

Caribbean

Field Team — 40 hours per week for 1.5 months, volunteer position

January 2018, June 2018

- Executed sampling of amphibian and reptile diversity for DNA and museum specimen acquisition in Florida and the island of Monserrat in the lesser Antilles

- Worked with team of three graduate students, one undergraduate and a government appointed local guide; coordinated with officials at Monserrat National Trust and Department of Environment

Hawaii Dimensions in Biodiversity project

Hilo, Hawaii

Field Team Leader – 40 hours per week for four months, paid position

May 2015-January 2016

- Planned/executed sampling of arthropods at 14 replicated sites across three islands (Hawaii, Maui, Molokai)
- Coordinated team of four graduate students and 15 undergraduate students
- Sampled according to an array of standard methods including: tree climbing/branch clipping, canopy and ground malaise traps, leaf litter Berlese funnels, and quantitative beat sampling of vegetation

Sonoma County Water Agency

Santa Rosa, California

Wetlands Consultant – 20 hours per week for four months, paid position

February 2015-May 2015

- Conducted population survey of an endangered species of salamander, *Ambystoma tigrinum*
- Sampled 25 vernal pools at five sites across Sonoma County
- Coordinated with team of two research scientists and 15 volunteers

Sonoma State University

Rohnert Park, California

Instructional Support Technician II – 40 hours a week for 36 months, paid position

August 2008 – January 2010

- Prepared materials for seven undergraduate laboratory courses in ecology, evolutionary, organismal, developmental, molecular and cellular biology
- Collected and housed hundreds of marine animal, plant and protozoan specimens
- Maintained department aquaria systems and cold room; managed campus experimental greenhouses

Environmental Research Group

Santa Rosa, California

Wetlands Consultant – 30 hours per week for three months, paid position

February 2008 – June 2008

- Repeatedly surveyed 20 vernal pools at both natural wetlands and man-made mitigation sites
- Conducted vegetation monitoring and identification of native and non-native plant species
- Collected hydrology data
- Facilitated endangered plant species establishment of Burke's goldfields (*Lasthenia burkei*), Sonoma Sunshine (*Blennosperma bakeri*) and Sebastopol meadowfoam (*Limnanthes vincularis*)

Core DNA Analysis Facility at Sonoma State University

Rohnert Park, California

Facility manager – 20 hours per week for 24 months, paid position

May 2005 – December 2008

- Trained students in methods and applications of genetic analysis including: DNA extraction, polymerase chain reaction, gel electrophoresis, dye terminator cycle-sequencing, sequence editing and evolutionary analyses
- Performed maintenance and troubleshooting on laboratory equipment (ABI 3100 genetic analyzer, RT-PCR)
- Adapted protocols specified by Applied Biosystems into facility sequencing methods resulting in reduced costs

Population Structure Rainbow Trout (*Oncorhynchus mykiss*) project

Rohnert Park, California

Lab assistant – 10 hours per week for three months, volunteer position

June 2004 – August 2004

- Assisted in microsatellite data acquisition

Spatial Estimation of Host Populations for Sudden Oak Death project Rohnert Park, California
Field Team Leader – 10 hours per week for 18 months, paid position January 2003 – June 2004

- Ground and geographical information systems (GIS) assessment of variables relating to spread of the emerging disease Sudden Oak Death, *Phytophthora ramorum*
- Coordinated with private landowners and public authorities to visit sites across Sonoma County
- Assembled, deployed and retrieved data for HOBO® micro-climate monitoring devices

Alliance Redwoods Occidental, California
Outdoor Education Instructor – 20 hours per week for 18 months, paid position May 2000 – August 2002

- Taught principles of conservation science and forest ecology
- Instructed groups in ropes course, zipline, and trust exercises

PUBLICATIONS

Krehenwinkel, H., Pomerantz, A., Henderson, J.B., Kennedy, S.R., Lim, J.Y., Swamy, V., Shoobridge, J.D., **Graham, N.**, Patel, N.H., Gillespie, R.G. and Prost, S., 2019. Nanopore sequencing of long ribosomal DNA amplicons enables portable and simple biodiversity assessments with high phylogenetic resolution across broad taxonomic scale. *GigaScience*, 8(5), p.giz006.

Graham, N.R., Gruner, D.S., Lim, J.Y. and Gillespie, R.G., 2017. Island ecology and evolution: challenges in the Anthropocene. *Environmental Conservation*, pp.1-13.

Graham N.R., Fisher B.L., and Girman D.J., 2016. Phylogeography in Response to Reproductive Strategies and Ecogeographic Isolation in Ant Species on Madagascar: Genus *Mystrium* (Formicidae Amblyoponinae). *PLoS ONE* 11(1): e0146170.

TEACHING & MENTORSHIP

UC Berkeley Graduate Student Instructor Berkeley, California
Paid Graduate Student Instructor – 20 hours per week each semester January 2016–December 2019

- Teaching fellow seven semesters (*Biogeography, Environmental change genetics, Spider biology*)
- Developed materials for seven weeks of hands-on instruction in *Biogeography* Fall 2019

UC Berkeley Graduate Student Mentor Berkeley, California
Volunteer Graduate Student Mentor – 8 hours per week each semester August 2015-current

- Developed genomics and bioinformatics *Molecular-mini Course* taken by eight advanced undergraduate student researchers, two UCB graduate students, and six MSc and PhD students at Trier University, Germany
- Spring 2020 & Fall 2020; Transitioned all student researchers to online databasing of Hawaiian Interactions Literature using remote instruction post Covid-19
- Provided hands on molecular biology lab training for 26 students in four years
- Initiated and carried out projects with four campus partners: Undergraduate Research Apprentice Program, department independent student, work-study program and Sponsored Projects for Undergraduates
- Coordinated student independent research on arthropod biodiversity and data science
- Co-designed, provided lab and data analysis supervision for three senior honors theses

Sonoma State University Teaching Assistant

Paid Teaching Assistant – 20 hours per week each semester

Rohnert Park, California

January 2005-May 2014

- Teaching fellow seven semesters (Biological diversity and ecology, Introductory genetics and cell biology, Genetics, evolution and ecology & Molecular and cellular biology)

Piner High School Biotechnology Program

Volunteer guest instructor– bi-annually

Santa Rosa, California

March 2004 – May 2007

- Conducted lectures and ran laboratory experiments with high-school juniors and seniors
- Taught basics of forensic analysis, polymerase chain reaction and gel electrophoresis

GRANTS & AWARDS

Berkeley-Greifswald Research Grant, 2020 (850 €)

Panel for 201C Starter Grant Research Award, 2020 (\$1000)

Philomathia Environmental Science Fellowship, 2019 (\$20,000), 2020 (\$20,000)

Outstanding Graduate Student Instructor Award, 2019

Robert van den Bosch Memorial Scholarship, 2017 (\$15,000), 2018 (\$20,000) & 2019 (\$20,000)

Edna and Yoshinori “Joe” Tanada Endowed Fellowship in Entomology, award years 2018 (\$1500) & 2019 (\$1500)

Robert L. Usinger Graduate Award, 2017 (\$1000)

Walker grant for systematic entomology, award years 2016 (\$1200), 2017 (\$1200), 2018 (\$2000), 2019 (\$2000), 2020 (\$2000)

Portuguese Studies Program summer research award, 2016 (\$3900)

Departmental award for best research proposal among incoming graduate students, 2015 (\$3200)

Outstanding Oral Presentation award, West Coast Biological Sciences Undergraduate Research Conference, 2005

SCIENTIFIC MEETINGS

European Congress of Arachnology (2020, Covid-19 postponed) – Greifswald, Germany, *planned talk*, “Timing of Colonization and Diversification of a Genus of Diurnal Web Building Spiders with Extensive Gene Flow”

American Arachnological Society (2020, Covid-19 postponed) – Davis, CA, *planned talk*, “Patterns of Diversification in Endemic Species of Diurnal Web Building Spiders of Genus *Cyclosa* (Family: Araneidae)”

Entomological Society of America (2020, Covid-19 postponed) – Spokane, WA, *invited symposium speaker* for Classical Biological Control Projects Targeting Weed and Arthropod Pests Afflicting Perennial Ecosystems, *planned talk*, “Using next-generation sequencing for assessment of agent evolution and post-introduction non-target effects in Hawaiian rainforest communities”

American Geophysical Union (AGU) meeting (2019) – San Francisco, CA, *invited symposium speaker* for Mapping Biodiversity Through Space and Time: Integrating Sedimentary DNA, Metagenomics, Phylogenetics, and Ecological Approaches to Resolve Biodiversity Gaps, *presented talk*, “Biodiversity Dynamics of Arthropod and Plant Communities on an Island Archipelago using Quantitative NGS Metabarcoding and Literature Mining”

III International Conference Island Biology (2019) – La Reunion Island, French Republic, *invited symposium speaker* for “New insights into the assembly of island biota” symposium, *presented talk*, “Using islands to understand the dynamics of ecological networks”

Bay Area Conservation Biology (2019) symposium – Berkeley, CA, *presented talk*, “Dynamics of ecological networks on islands provide insight for global change: 1st lessons from Hawaii”

American Genetics Association (2018) meeting – Waimea, HI, *presented poster*, “Host use and phylogeography reconstruct diversification history in the endemic Hawaiian parasitoid wasps of Genus *Spolas* (Hymenoptera: Ichneumonidae)”

7th International Conference on Environmental Future: Humans and Island Environments (2018) – Honolulu, HI, *presented paper*, “Island ecology and evolution: challenges in the Anthropocene.”

Society for Integrative and Comparative Biology (2018) meeting – San Francisco, CA, *presented poster*, “Species Delimitation and Phylogeography of Endemic Hawaiian Parasitoid Wasps: Genus *Spolas* (Hymenoptera: Ichneumonidae)”

Pacific Entomological Society (2017) meeting – Honolulu, HI, *presented talk*, “Construction of a Molecular Barcode Reference Library for Hawaiian Arthropod Taxa”

Entomological Society of America (2017) meeting – Denver, CO, *presented poster*, “Species Delimitation and Phylogeography of Endemic Hawaiian Parasitoid Wasps: Genus *Spolas* (Hymenoptera: Ichneumonidae)”

Island Biology (2016) meeting - Angra do Heroísmo, Azores, Portugal *presented poster*, "Exploring biotic and abiotic factors predicting native and alien parasitoid wasps across the Hawaiian Islands using environmental niche modeling"

Evolution (2016) meeting - Austin, TX, *presented poster*, "Exploring biotic and abiotic factors predicting native and alien parasitoid wasps across the Hawaiian Islands using environmental niche modeling"

Integrative Biology Women in Science (2016) chapter meetings -Berkeley, CA, *invited speaker*, panel on field work

Association of Tropical Biology and Conservation, (2015) - Honolulu, HI, *invited symposium speaker* for Resilience of Island Systems in the Context of Climate Change: Challenges for Biological and Cultural Diversity and Conservation, *presented talk*, “Phylogeography in Response to Reproductive Strategies and Ecogeographic Isolation in Ant Species on Madagascar: Genus *Mystrium* (Formicidae: Amblyoponinae).”

Ant Course (2012) – Kibale National Park, Uganda *field course participant*

Laboratoire Écologie and Évolution, (2012) Hymenoptera group - Université Pierre et Marie Curie, France *invited talk* “Phylogeography of *Mystrium* ants in Madagascar”

Evolution (2005) meeting - Fairbanks, AK *presented poster* “DNA Barcoding Ants in Madagascar”

Conservation Genetics (2005) symposium - Monterey, CA *attended meeting*

VOLUNTEER SERVICE & LEADERSHIP

Scholarly peer review May 2018 – current

- Reviewed five manuscripts as part of the peer review process for the scientific journals: Molecular Ecology, Evolution, Ecography, Ecology and Evolution, and Journal of Biogeography

Community Outreach and Education

SF Bay Area, California

Volunteer – several events each semester

May 2016 – current

- Coordinated outreach events with undergraduate volunteers to teach the public about arthropod diversity and conservation
- Special events in evenings at California Academy of Sciences Nightlife (e.g. Women in Science Night, Halloween) and Exploratorium After Dark (e.g. Venom, Halloween)

- Campus open house events (e.g. Cal Day, Homecoming) with the Essig Museum of Entomology at UC Berkeley
- Wrote 'student perspective' fundraising letter for Big Give 2020 for Essig Museum
- K-12 education: Bay Area Science Festival, Cragmont Elementary School Spider Day

BioBlitz events

California

Volunteer – weekends semi-annually

May 2008 – current

- Counting species through citizen science; ant, spider and other arthropod collection and identification
- National geographic and National Park Service BioBlitz events or regional parks & preserves: Santa Monica Mountains NP (2008), Golden Gate NRA (2014), Point Reyes NP (2016), Hopland Research Station (2016), Marin County parks at Roy's redwoods (2017), Marsh Creek State Recreation Area (2017)

Riparian zone restoration of urban creeks

SF Bay Area, California

Volunteer – weekends bi-annually

March 2001 - current

- Clean up and invasive species removal in Copeland creek and Dutch Bill creek in Sonoma county and Strawberry creek on UC Berkeley Campus with team of community and student volunteers, personally pulled-out approximately 1000 blackberry bushes
- Replanting native plants for erosion control

Cambodia relief work

Cambodia

Team coordinator – summer trips and weekly coordination meetings

March 2004 – May 2008

- Partnered with the largest NGO for orphans in Cambodia, Foursquare Children of Promise
- Fundraising and facilitation for construction projects, well digging and medical relief

UTURN program

Santa Rosa, California

Leadership team member – weekly

March 2001 – May 2008

- Mentoring for foster children and at-risk teens in community
- Volunteer tutoring in biology, math and chemistry

SKILLS & INTERESTS

Technical: Entomology, Arachnology, Plant taxonomy, Scientific Research and Collecting Permits (U.S. National Park Services, State Parks, Forest Reserves, The Nature Conservancy)

Molecular genetics/genomics: Sanger sequencing, NGS amplicon sequencing, Double digest restriction-site associated DNA (ddRAD), DNA metabarcoding/metagenomics, eDNA, non-destructive DNA extraction for museum specimens. Bioinformatic and statistical analysis of next-generation data.

Computing: UNIX/Linux, R, Python

Memberships: Graduate Women in Science (GWIS), 500 Women Scientists (500WS), Society for Conservation Biology (SCB), Society for Island Biology (SIB), Entomology Society of America (ESA), American Arachnological Society (AAS)

Interests: Biking, Hiking, Gourmet cooking, Science Fiction/Fantasy