AVAILABLE PROJECTS

The Bik Lab currently has NSF funding for a postdoc to contribute to two significant projects focused on marine microbial eukaryotes (nematode worms and other microbial metazoan taxa), including research on bacteria/archaea as part of host-associated microbiome project aims. The FFIRE candidate would be expected to contribute to both molecular wet lab and bioinformatics (dry lab) project aims, although the exact proportion and emphasis on wet vs. dry lab tasks is negotiable and based on the candidate's interest and skills. Basic computational training and development of scientific programming abilities are also feasible for candidates with a relevant biological background who want to acquire a strong bioinformatics skill set for the first time.

NSF Project #1: *"**Do molecular data support high endemism and divergent evolution of Antarctic marine nematodes and their host-associated microbiomes?**"*, OPP-2132641, National Science Foundation Office of Polar Programs ($609,982; July 2022 – June 2026)

The long isolation and unique biodiversity of the Southern Ocean represents an important case study for understanding the evolution and ecology of free-living marine nematodes. Is Antarctic endemism and high biodiversity supported by molecular data, or do marine nematodes exhibit truly cosmopolitan distributions with sustained dispersal capabilities even in the most remote ecosystems? Furthermore, does a mixture of nematode evolutionary histories (deep-sea vs. shallow water) and eurybathic species distributions contribute to distinct microbiome patterns in Antarctic marine nematodes? Nematode worms are abundant and ubiquitous in marine sediment habitats worldwide, performing key functions such as nutrient cycling and sediment stability. Yet, their unexplored diversity—and the extreme paucity of nematode data from Antarctic marine ecosystems— represents one of the major challenges in polar biology and currently limits our capacity to understand the accelerating consequences of environmental change. ***This project is using cutting edge -Omics approaches to test hypotheses regarding the biodiversity, evolution, and ecology of Antarctic marine nematodes and their host-associated microbiomes.*** Using a sampling strategy spanning both Western and Eastern Antarctic continental shelf regions, we aim to determine 1) if molecular data supports high biodiversity and endemism of benthic meiofauna in the Southern Ocean, 2) the proportion of marine nematode species that have a deep- sea vs. shallow-water evolutionary origin, and the level of cryptic speciation across genera, and 3) the most important drivers of the host-associated microbiome in Antarctic nematodes. Our approach will enable robust hypothesis testing across multiple domains of life, and provide insights on ecological interactions and evolutionary adaptations amongst congeneric as well distantly related nematode lineages.

NSF Project #2, ***"CAREER: Characterizing the phylogenetic lineages and genomic factors enabling adaptation in free-living marine nematodes"***, DEB-2144304, awarded by the National Science Foundation CAREER Program ($1,264,761; May 2022 – April 2027)

This project is using cutting edge -Omics approaches to characterize patterns regarding the biodiversity, evolution, and ecology of free-living marine nematodes and their host-associated microbiomes***. This study represents the first large-scale investigation that collects molecular data across marine habitat transitions (salinity, depth) and gradients of environmental stress (pollution, oxygen availability)***, providing a comparative dataset for the existing body of historical (morphological) nematode taxonomic studies. This proposal will generate a state-of-the-art dataset for free-living nematodes in benthic marine ecosystems, integrating high-throughput -Omics approaches with morphological taxonomy and molecular phylogenetics. Using a sampling strategy primarily focused on Southern California, we are pursuing the following research aims:

- **Aim 1**: Determine how overall meiofaunal biodiversity changes across marine habitat transitions (depth, salinity) and gradients of environmental stress (pollution, oxygen availability).
- **Aim 2**: Identify key nematode lineages which maintain “cosmopolitan” distributions, and lineages which can tolerate the most extreme environmental stressors.
- **Aim 3**: Characterize the nematode genomic adaptations and host-associated microbiome patterns that may facilitate nematode dispersal and adaptation to extreme environmental stress.

This educational aims of this CAREER award include a strong integration of bioinformatics training and science communication across all research aims. This project would be ideal for a postdoctoral trainee who is passionate about science communication, and who wants to further develop their communication and outreach skillset under the guidance of an experienced faculty mentor. PI Bik is a leader in science communication activities in the field of marine biology, and has published a number of peer-reviewed articles focused on this topic, in addition to maintaining an active public engagement strategy on social media platforms such as Twitter.