

Shedd Aquarium's Microbiome Lab is optimized for microbial and molecular ecology and is highly collaborative. Using genomic approaches, we seek to better understand how aquarium management practices impact microbial assemblages that are important for animal health.

Our microbial ecology research questions include:

- How do we manage environmental and microbiomes to reduce host susceptibility to disease in intensively-managed habitats?
 - Areas of interest include marine mammals in human care and captive-rearing environments for species reintroduction.
- What alternatives to disinfection can help us reduce exposure to *Mycobacterium* species in built environments?
- How can an understanding of microbial communities help us promote nitrification and reduce drug resistance in fish systems?

The lab also supports Shedd's veterinary and *in situ* research teams by providing molecular identification of micro- and macro-organisms from both clinical and field settings. Capabilities include quantitative PCR and high-throughput sequencing on the Illumina MiSeq platform.

Publications

In preparation

- Role of environmental microbiome in artificial rearing environments of the endangered western pond turtle, an AZA S.A.F.E. (Saving Animals From Extinction) priority species. Monique Hazemi. Accepted for poster presentation at [Association of Zoos and Aquariums Annual Conference](#), September 2019 and Ecological Society of America Conference.
- Identifying sources of *Mycobacterium* species exposure and testing potential control strategies in a South American river habitat. With Yun Shen and Lut Raskin, University of Michigan. Presented by Chrissy Cabay at 44th Annual [Eastern Fish Health Workshop](#), April 2019 on behalf of Yun Shen (University of Michigan) and Frank Oliaro.
- Impact of water treatment on viral ecology of exhibits and support systems, with Michigan State University and the Alfred P. Sloan Microbiology of the Built

Environment program. Jean Pierre Nshimiyimana. Presented at International Association of Aquatic Animal Medicine Conference 2018.

- Metagenomic analysis of microbial function in Abbott Oceanarium and comparison of artificial marine mammal habitat water across comparable facilities. Christian Edwardson. Poster presentation at [2018 Ocean Sciences Meeting](#).

Ongoing studies

- Diet metabarcoding for Bahamian iguana populations with differential exposure to anthropogenic impacts. Research cruises on [R/V Coral Reef II](#) completed September 2018 and June 2019. Frank Oliaro with Conservation Research team and affiliated partners.
- Wetland restoration and the microbial ecology of amphibian habitats in the Great Lakes region, with Conservation Research team.
- Impact of probiotic treatment on host-associated microbiome and immune response of cetaceans, supported by [IMLS MG-60-18-0018-18](#).
- High-resolution microbial mapping and pathogen surveillance of habitat for nonreleasable western pond turtles.
- Role of microbial assemblages in antiparasitic drug degradation observed in quarantine systems.

Planned

- Impact of environmental microbial enrichment on cytokine expression and host-associated communities in cetaceans, with Randy Sacco at USDA, supported by [IMLS MG-60-18-0018-18](#).
- Community structure of heat-tolerant algal symbionts associated with vulnerable coral species, with Ross Cunning and Conservation Research team. Supported by [NSF Award# 1851305](#).
- Gut microbiota of Bahamian iguana populations with differential exposure to anthropogenic impacts. With Chuck Knapp and Susannah French (Utah State), supported by [NSF Award# 1752908](#).
- Fish gut microbiome, plant protein utilization and implications for aquaculture.

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