

Planet's smallest microbes examined at nation's largest aquarium

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More than 2 million people flock to Georgia Aquarium annually to see Ocean Voyager Built by Home Depot, the largest salt water habitat in the United States and home to whale sharks, the world's largest fish. But for microbiologists at Georgia Tech, the most significant attraction within this 6.3-million-gallon environment of aquatic life is the community of species invisible to the naked eye living within the water.

The university and [aquarium](#) collaborated to advance a new scientific frontier - study of the aquarium microbiome - to better understand the millions of marine microorganisms living in the water and what role they play in keeping the ecosystem healthy.

The research is revealed, May 1, in the scientific journal *Applied and Environmental Microbiology*.

"Microbiology has advanced extensively over the past decade. Using cutting edge tools and methods we now have a growing body of knowledge about the roles of various microbes within ocean environments and the human body, but aquariums are a new frontier, very little is known, studied or understood," said lead author Dr. Nastassia Patin, a microbiologist with Georgia Institute of Technology.

For 14 months, researchers routinely sampled Ocean Voyager's water comparing the community of microbes over time with those living in open ocean habitats at three different locations around the globe and with data provided by another aquarium. The dynamics of the microbe

community living at Georgia Aquarium surprised them.

"What was most surprising to me was the diversity of the microbes that inhabit the Ocean Voyager exhibit and how dynamic the community of [bacteria](#) is over time," said co-author Dr. Alistair Dove, vice president, research and conservation, Georgia Aquarium.

The aquarium intentionally grows various strains of [beneficial bacteria](#) to help keep the aquarium systems healthy. The authors note there is a growing trend and market for probiotic additives for hobbyist aquarists, but very little is known or studied about microbes living within aquarium environments. The research efforts of Georgia Tech and Georgia Aquarium are breaking new ground.

Zoological Operations staff at Georgia Aquarium know that certain varieties of beneficial bacteria are critical to a healthy environment. Because of the closed aquatic system, they help break down nutrients and keep the water clear. "We don't want sterile water. A really healthy aquarium environment will have millions of microorganisms. One might say we are really keeping bacteria on exhibit, the animals just happen to be there," said Eric Hall, senior director, zoological operations, life support systems and water quality, Georgia Aquarium.

But beyond the bacteria the aquarium is intentionally growing and maintaining, relatively little is known about what else is living in the [environment](#) and how that community of organisms may change over time.

"Knowing which beneficial bacteria live in the filters, and how they clean the water is a key to keeping the bigger animals in tip-top shape and the [water](#) blue and clear so guests can enjoy them," said Dove. "It's all part of the grand incremental march of science towards a better understanding of the world around us."

With high tech DNA methods that expand the field of microbial study, both the university and the aquarium see this study as one of many collaborations in the future that will ask and answer important questions that will help the aquarium make data driven decisions to further their care and conservation of aquatic species.

Provided by Georgia Aquarium

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