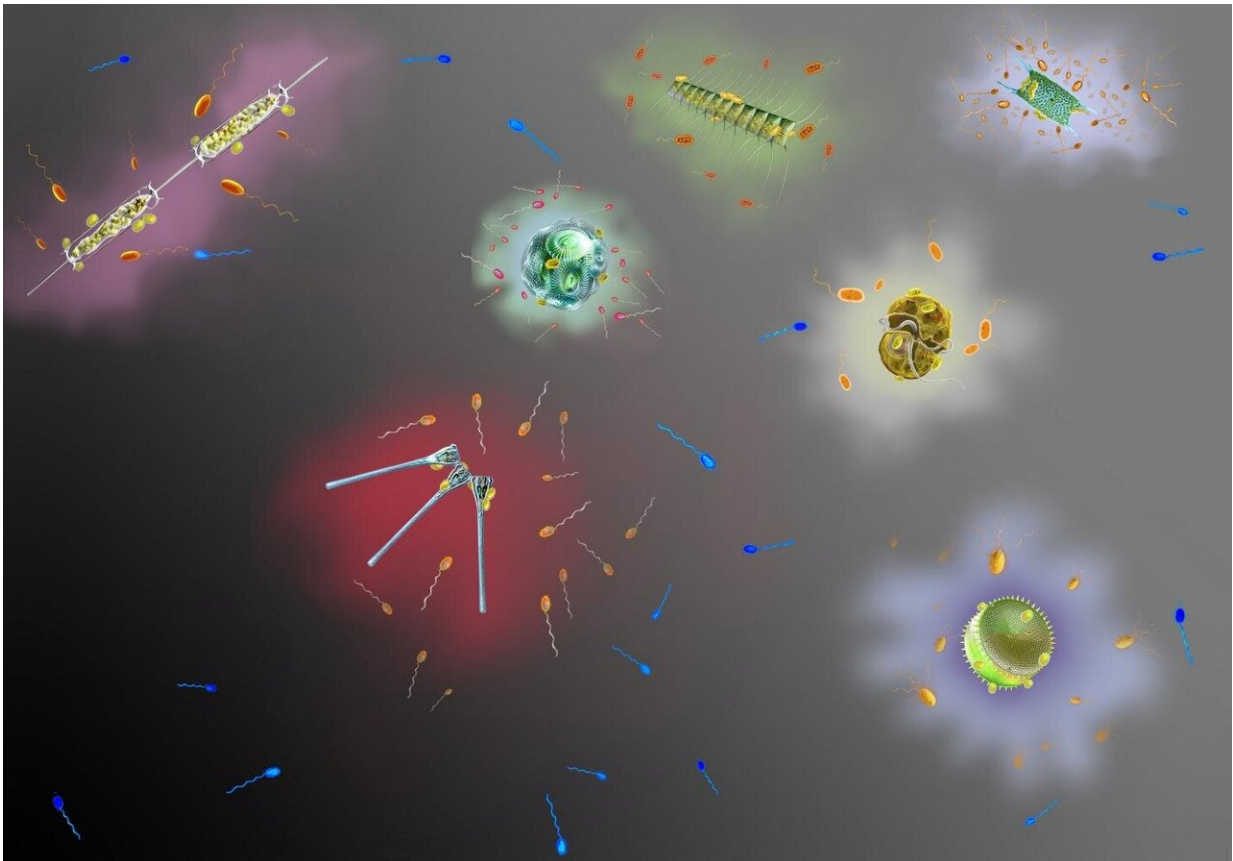


# Study discovers how some single-cell organisms control microbiomes

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Graphical depiction of the microbiomes surrounding microalgae Credit: NYU Abu Dhabi

Large swaths of single-celled eukaryotes, non-bacterial single-cell organisms like microalgae, fungi or mold, can control microbiomes (a

collection of tiny microbes, mostly bacteria) by secreting unusual small molecules around their cells, maintaining host survival and ecological success, according to a new study by NYU Abu Dhabi (NYUAD) Assistant Professor of Biology Shady Amin.

Research in the past decade has shown that most eukaryotes need microbiomes to survive. While we understand how large eukaryotes, like humans, corals and plants, control their microbiomes, scientists do not know how single-celled eukaryotes, like microalgae, do so.

In humans, microbiomes can influence digestion, physical features, weight, susceptibility to disease, and even mental health. In corals, microbiomes sustain corals and enable them to withstand [environmental change](#). In trees, microbiomes provide [essential nutrients](#) that enable forests and agricultural crops to grow. In microalgae, these microbiomes provide vitamins and other nutrients that keep microalgae alive.

In the paper, "Diatom Modulation of Select Bacteria Through Use of Two Unique Secondary Metabolites," published in the *Proceedings of the National Academy of Sciences (PNAS)*, researchers from NYUAD and other institutions, found that single-celled eukaryotes can control the behavior and growth of microbiomes by promoting [beneficial microbes](#) while preventing bad (parasitic) microbes from coming close, enabling scientists to understand how organisms like microalgae control bacteria around them.

The findings will enable scientists to predict how [climate change](#) will impact fisheries and atmospheric gas composition because single-celled eukaryotes in the oceans are responsible for a significant fraction of oxygen production on Earth and support the marine food web, including the fish and corals. The findings will also help expand scientists' understanding of evolution since single-celled eukaryotes constitute a significant fraction of life on earth.

"The discovery that a cryptic chemical language enables some single-celled eukaryotes to manipulate bacterial behavior is significant since most eukaryotes on Earth are single-celled and many are essential for our survival, " said Amin.

**More information:** Ahmed A. Shibl et al. Diatom modulation of select bacteria through use of two unique secondary metabolites, *Proceedings of the National Academy of Sciences* (2020). [DOI: 10.1073/pnas.2012088117](https://doi.org/10.1073/pnas.2012088117)

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