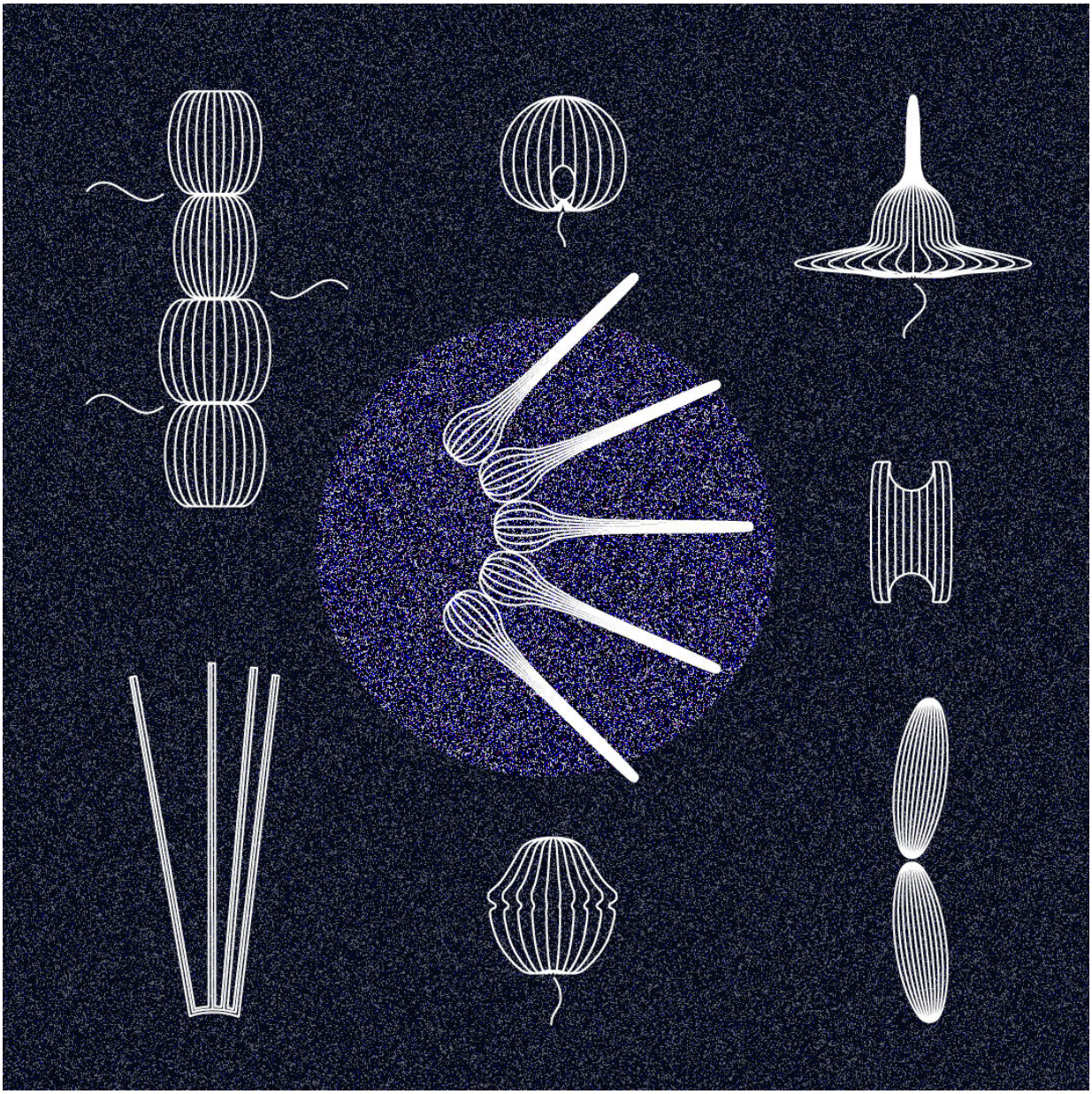
Mapping the ocean's unseen heroes, one microbe at a time

June 8 2019, by Jacqueline Middleton



Including but not limited to bacteria, algae, diatoms, dinoflagellates, fungi and plankton, their diversity helps to sustain the larger marine ecosystem. Credit: UTS Adrift Project

The picture of how climate change is impacting our ocean is often told via its larger inhabitants: scrawny polar bears, bleached coral, dwindling catch in fishing nets. But just as importantly, microscopic marine organisms play an essential role in our biosphere.

Not only do they form the foundational building blocks of the underwater food-web, but it's estimated that marine microbes consume almost 50% of the Earth's carbon dioxide through the process of photosynthesis.

Invisible to the naked eye, the health and movement of marine microbes that drift as part of the plankton is difficult to picture even for scientists—let alone everyday citizens.

This challenge, to visualise the range of conditions that drifting marine microbes encounter, brought a group of expert scientists and visual designers together on a path to create the online citizen science project Adrift.

Adrift is a portal that connects the public with the lives of microscopic marine microbes as they are propelled around the globe by ocean currents, with temperature and nutrient availability changing along the way.

Lead researcher and biological oceanographer Professor Martina Doblin from the University of Technology Sydney, says Adrift is designed to engage a diversity of participants, including those who may not have

technical or scientific expertise.

"We want to give people a view of what conditions microbes experience in different parts of the ocean, to provide clues about their capacity to adapt to the relatively fast pace of human-induced changes in ocean conditions.

High school students at the UTS Girls in STEM workshop in May were some of the first to explore Adrift. Credit: David Lawrey

"So, as they're drifting in different surface currents, microbes experience diverse conditions along their paths.

"Scientists can't be in the ocean to look at the plankton in all these places, so we have created a method to visualise their experience based on ocean simulations," says Doblin.

Doblin says that the collaborative aspect of the project—which includes data visualisation experts Professor Kate Sweetapple and Dr. Jacquie Lorber Kasunic from the UTS Design School, and Nancy Longnecker, Professor of Science Communication at Otago University in New Zealand—was essential to the success of Adrift.

Prof. Kate Sweetapple says that Adrift is unique in the way that it visually maps and summarises the specific conditions for plankton in any given location in the ocean.

"Adrift allows citizen scientists to virtually 'drop' microbes into the global ocean.

"The data produced by participants includes the geographic path travelled, and variations in temperature and nutrients experienced by the microbes."

Using visual tools participants can learn about, map and record these variations, enabling researchers to identify areas of the ocean where real-life microbes are experiencing the most extreme changes along their drift paths.

"It's a great entry point for students and citizens to get involved and begin to understand the challenges of living in the ocean today," says Sweetapple.

Provided by University of Technology, Sydney