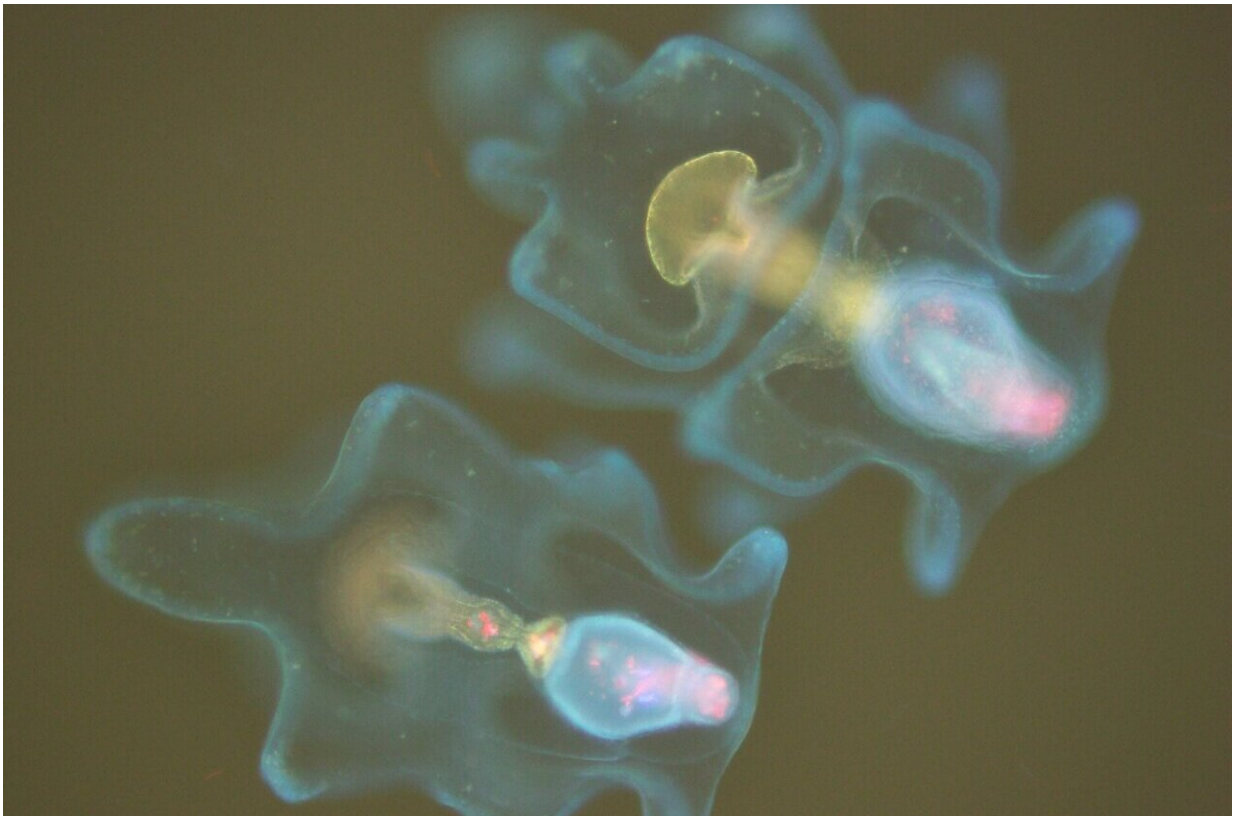


Crown-of-thorns starfish larvae feast on toxic cyanobacteria, study finds

July 17 2024



Two-week old crown-of-thorns starfish (*Acanthaster* sp.) larvae viewed under a fluorescence microscope. Such microscopes use UV (ultraviolet light) which causes the starfish larvae to glow blue and yellow and the microalgae food in their stomach to appear as pink/red dots. Credit: Corinne Lawson

Researchers have uncovered an under-the-sea phenomenon where coral-

destroying crown-of-thorns starfish larvae have been feasting on blue-green algae bacteria known as "sea sawdust."

The team of marine scientists from The University of Queensland and Southern Cross University found crown-of-thorns starfish (COTS) larvae grow and thrive when raised on an exclusive diet of *Trichodesmium*—a bacteria that often floats on the ocean's surface in large slicks. The research is [published](#) in *Science Advances*.

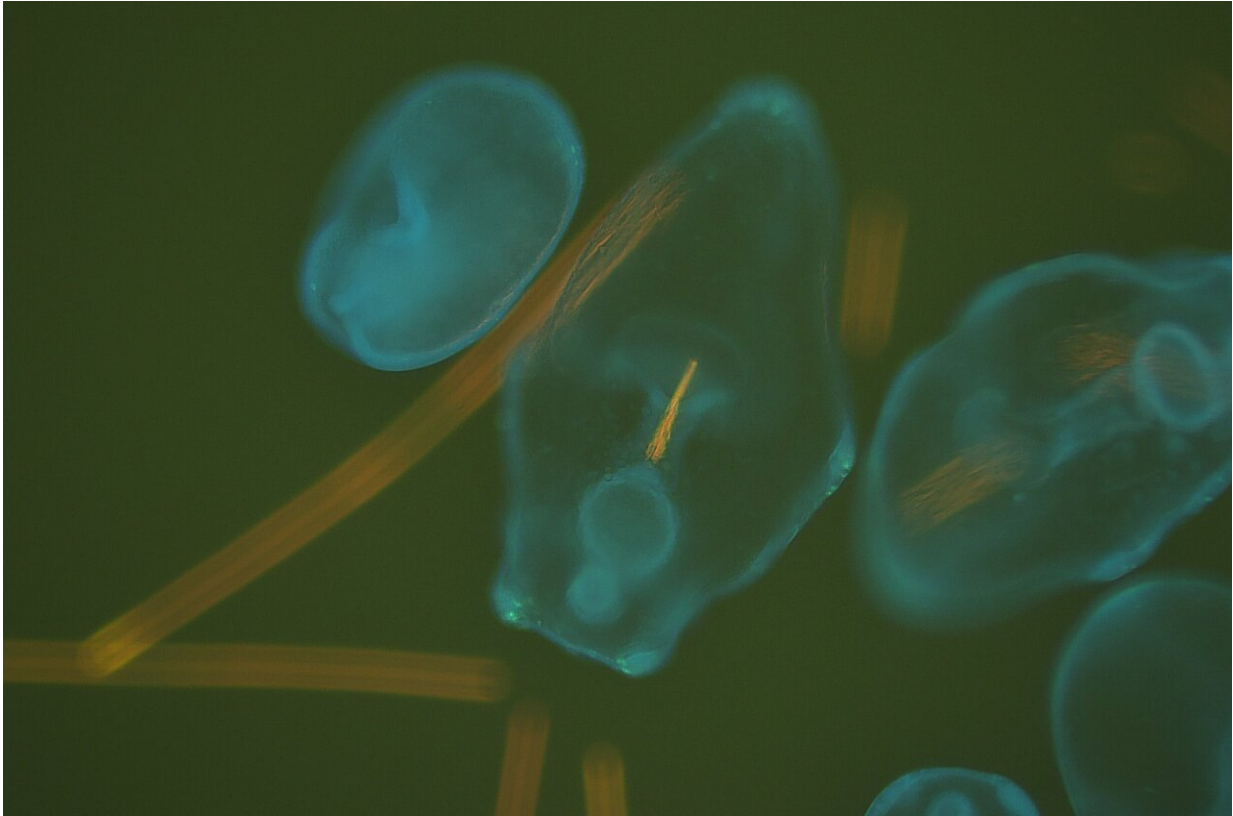
UQ's Dr. Benjamin Mos from the School of Environment said scientists had thought almost nothing touched this threadlike bacteria because of its toxicity and poor nutritional content.

"Until now, not much has been known about sea sawdust as a [food source](#), so we were certainly surprised to say the least," Dr. Mos said.

"Blue-green algae blooms can extend hundreds to thousands of kilometers across the ocean and often float on the surface in large rafts like sawdust—hence the name.

"It plays a crucial role in [marine ecosystems](#) by making nitrogen from the atmosphere available to other sea life, but now we know it is also a food source.

"By knowing how sea sawdust helps COTS thrive, we can potentially change the way we combat this very damaging coral predator."



Scientists were surprised to see crown-of-thorns starfish (*Acanthaster* sp.) larvae feasting on *Trichodesmium* cyanobacteria. Under a fluorescence microscope, UV (ultraviolet) light shows starfish larvae glowing blue while *Trichodesmium* trichomes appear fiery orange. A larva (center) has a trichome in its esophagus. Credit: Benjamin Mos

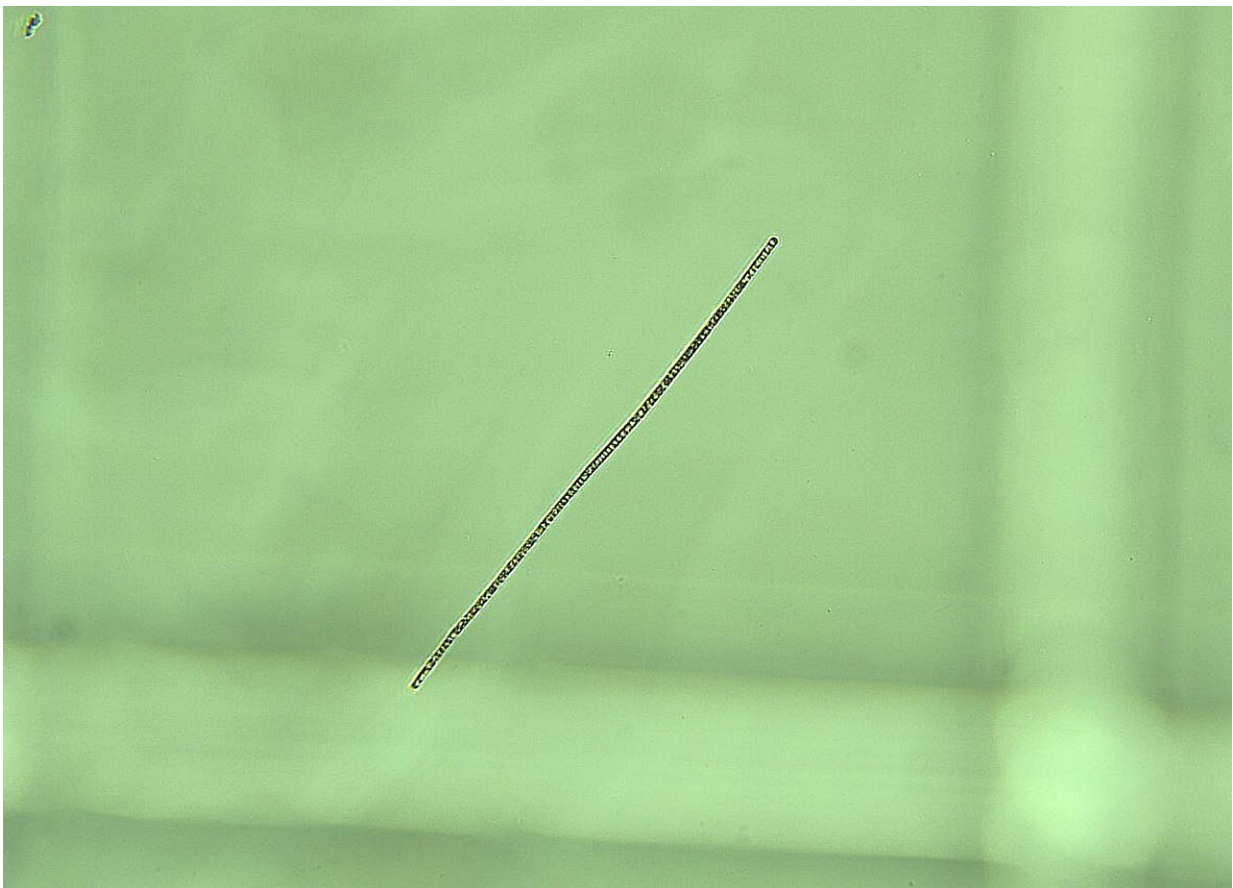
By tracing atoms from bacteria to COTS larvae, researchers found the larvae digested nitrogen from sea sawdust, with the nitrogen moving into their tissues for sustenance.

"With sea sawdust blooms on the rise in recent years, our findings suggest this could help explain the increase in COTS populations, which have devastated our coral reefs for decades," Dr. Mos said.

These findings build on earlier research that suggests human activities, such as fertilizer use, [sewage treatment](#), and [stormwater runoff](#), may be responsible for the increase in blue-green algae blooms.

"It's important we understand the flow-on effect of how [human impacts](#) in one ecosystem might flow on to other seemingly unrelated ecosystems," Dr. Mos said.

Professor Symon Dworjanyn from Southern Cross University's National Marine Science Center said further work was needed to investigate the potential connection between sea sawdust blooms and the number of coral-eating COTS.



A trichome of *Trichodesmium erythraeum* viewed under a light microscope. At approximately 0.1 mm long, this trichome is made of many cells joined together. Trichomes can be found in the ocean singly or can bunch together to create spiky clumps that often float at the surface of the ocean, giving rise to this cyanobacteria's common name – sea sawdust. Credit: Corinne Lawson



A 15-day-old crown-of-thorns starfish (*Acanthaster* sp.) larvae viewed under a light microscope, showing typical coloration. At this stage the 0.5 mm long larvae are ready to move out of the plankton and settle on to a coral reef to grow into a fearsome coral predator. Credit: Symon Dworjanyn

"If we can figure out how to reduce the impact of COTS, we might give coral reefs a little more time," Professor Dworjanyn said.

"We don't yet know if sea sawdust blooms result in more adult COTS on [coral reefs](#), so this research needs more work.

"However, our findings could be an important part of cracking that puzzle."

More information: Benjamin Mos, Crown-of-thorns starfish complete their larval phase eating only nitrogen fixing *Trichodesmium* cyanobacteria, *Science Advances* (2024). [DOI: 10.1126/sciadv.ado2682](https://doi.org/10.1126/sciadv.ado2682). www.science.org/doi/10.1126/sciadv.ado2682

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