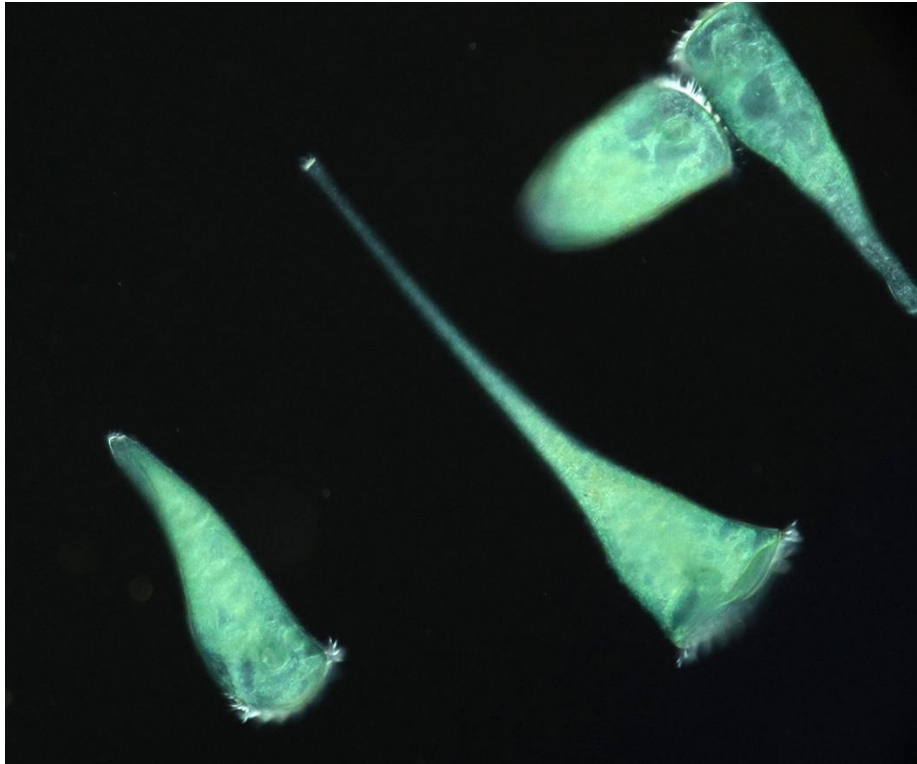


**For immediate release**

## **This tiny organism simply loves corners**

**A single-celled microorganism uses geometry to sense its world**



*Stentor coeruleus.* (Image: Laboratory of Physical Ethology, Hokkaido University)

A surprising observation in the lab has revealed a remarkable ability in *Stentor coeruleus*, a single-celled organism about one millimeter long. Sometimes nicknamed the “platypus” of microorganisms for its trumpet-like shape, this tiny creature appears to have a distinct preference for corners.

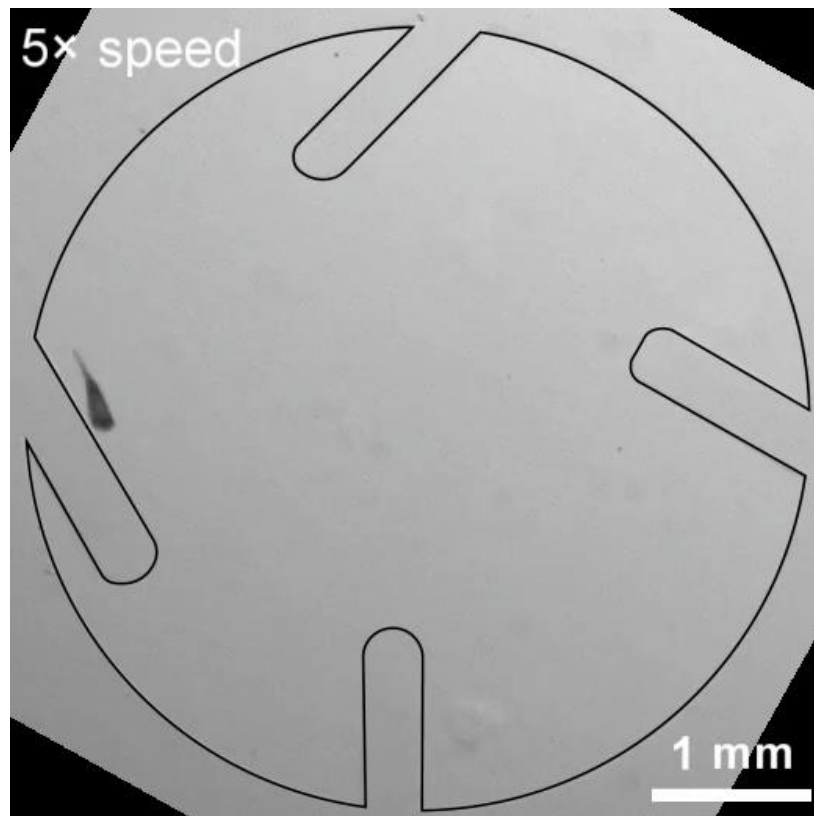
For nearly two years, Assistant Professor Syun Echigoya had been working to keep these delicate organisms alive in the lab. “Maintaining protists is challenging because it requires a very careful balance of culture medium and nutrient conditions,” he explains. One day, after reading that oat grains could serve as a good food source, he added some to the culture dish.

The next day, the organisms seemed to have all disappeared. But when he lifted an oat grain under the microscope, he found *S. coeruleus* clustered tightly in a narrow gap between a grain and the surface below. The microorganisms had gathered in this confined space, anchoring themselves in place.

“That moment led us to suspect that they might be sensitive to surrounding geometry,” says Echigoya. “We then set out to test this idea.” Working with collaborators at the University of Toyama, the team confirmed their hypothesis. Their findings were published in February 2026 in the *Proceedings of the National Academy of Sciences*.

The team designed tiny chambers with precisely controlled shapes, mimicking the kinds of structures that microorganisms encounter in natural aquatic environments. Some chambers had smooth, flat surfaces, while others featured edges, angles, and tight spaces resembling corners. “We systematically changed geometric features, such as corner angle and depth, to create distinct anchoring-site options. We then did a quantitative behavioral analysis using video recordings of the microbes, complemented by numerical simulations,” adds Echigoya.

What they observed was far from random movement. At first, the cells swam freely, exploring their surroundings. But as they approached a surface, their behavior changed. Their bodies subtly shifted into an asymmetric shape, and they began gliding along the walls, using the coordinated beating of hair-like structures called cilia. Gradually, they steered themselves toward tighter, corner-like spaces. Once there, they attached themselves firmly to the surface.



*Stentor coeruleus* moves through a specially designed chamber, showing how it anchors itself in response to surrounding shapes. (Video: Laboratory of Physical Ethology, Hokkaido University)

Despite being just a single cell, with no eyes, brain, or nervous system, *S. coeruleus* is able to navigate its environment strategically. It does this by changing its shape that allows it to sense and respond to its environment. “We were surprised by how effective this minimal strategy is,” says Echigoya. “*S. coeruleus* does not need to recognize structures in a cognitive sense. With a simple shift in body shape, it can physically interact with surfaces to find suitable corner spaces to attach.”

“These findings suggest that even subtle physical features in natural environments can have a big impact on where microorganisms live and how they spread. At the microscopic scale, landscapes are filled with small crevices and sheltered spaces. The ability to locate and settle into these protected niches may help explain how microorganisms survive, move, and form

communities,” adds Associate Professor Yukinori Nishigami, co-author and head of the Laboratory of Physical Ethology at Hokkaido University.

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## Original article:

Syun Echigoya et al., Geometrical preference of anchoring sites in the unicellular organism *Stentor coeruleus*. *Proceedings of the National Academy of Sciences*. February 25, 2026. DOI: 10.1073/pnas.2518816123

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