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"Living crystals" Formed by Starfish Embryos

Tom Sebastian

A surprising crystal structure forms spontaneously when multiple starfish embryos spin toward the surface of the water and gravitate toward each other. As a result, a honeycomb-like structure is formed. The team of scientists has been observing the development of starfish embryos and particularly how embryonic cells divide into the earliest stages. According to key author Nikta Fakhri, the Thomas D. and Virginia W. Cabot Career Development Associate Professor of Physics at MIT, "Starfish are one of the oldest model systems for studying developmental biology because they have large cells and are optically transparent." She calls it a "serendipitous discovery" It has recently been discovered that starfish embryos exhibit a surprising spontaneous organization behavior, leading them to join in certain situations and form crystalline structures. Self-assembling robotic swarms could be designed using this feature. Besides creating a structure similar to a honeycomb, the collective "living crystal" is also remarkably elastic, allowing individual cells, in this case, embryos, to spin. Throughout the structure, much larger waves are simultaneously triggered. The technology of robotics could also be greatly impacted by this feature.

Crystals like these do not form under conventional conditions. Natural crystals are found in metals, rocks, ceramics, and ices. Occasionally, these crystals form highly periodic lattice structures because of the attraction between atoms and molecules.

The nucleation, growth, and dissolution of the living chiral crystals occur naturally as embryos progress through their development, according to lead author Tzer Han Tan. In addition to raising interesting questions about the evolution of these structures, the discovery also raises the question of what kind of advantages they offer starfish. It is also possible for other species to form crystals. The crystalline structures formed by some bacteria and the spherical colonies of other algae, such as volvox, are known to "dance" around each other. It is also possible that this type of crystalline behavior is related to flocking or shoaling.

Researchers are now investigating whether other organisms exhibit similar crystalline behavior, such as sea urchins. Robotic systems might also be able to replicate this self-assembling structure.

KEYWORDS

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