

Study sheds light on Earth's first animals

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Researchers at UC Riverside are studying the world's oldest fossil animal, Dickinsonia, to learn more about the evolutionary history of animals. Credit: University of California, Riverside

More than 550 million years ago, the oceans were teeming with flat, soft-bodied creatures that fed on microbes and algae and could grow as big as bathmats. Today, researchers at the University of California, Riverside are studying their fossils to unlock the secrets of early life.

In their latest study, published today in the journal *PLOS ONE*, Scott Evans, a graduate student in the Department of Earth Sciences, and Mary Droser, a professor of paleontology, both in UCR's College of Natural and Agricultural Sciences, show that the Ediacaran-era fossil animal *Dickinsonia* developed in a complex, highly regulated way using a similar genetic toolkit to today's animals. The study helps place *Dickinsonia* in the early evolution of [animal life](#), and showcases how the large, mobile sea creature grew and developed.

Dickinsonia was a flat, oval-shaped creature that ranged in size from less than an inch to several feet, and is characterized by a series of raised bands—known as modules—on its surface. These animals are of interest to paleontologists because they are the first to become large and complex, to move around, and form communities, yet little is known about them. For years, scientists have been debating the taxonomic status of *Dickinsonia*—placing it with fungi, marine worms and jellyfish, to name a few. It is now generally accepted that *Dickinsonia* was an animal, now extinct.

"Part of this study was trying to put *Dickinsonia* in context in the development of [early life](#). We wanted to know if these creatures were part of a group of animals that survived or a failed evolutionary experiment. This research adds to our knowledge about these animals and our understanding of life on Earth as an artifact of half a billion years of evolution," Droser said.



Dickinsonia, which lived more than 550 million years ago, were flat, soft-bodied creatures that moved along the sea bed to eat microbes and algae. Credit: University of California, Riverside

To study *Dickinsonia*, the researchers travelled to South Australia's desert outback, which was once underwater and is now home to an abundance of Ediacaran fossils.

They measured the size, shape and structure of almost 1,000 specimens of *Dickinsonia costata*, paying attention to the number and size of the modules. The work was done in collaboration with James Gehling of the South Australian Museum in Adelaide, Australia, who is a coauthor on the paper.

The study showed that *Dickinsonia's* development, and particularly that of the modules, was complex and systematic to maintain the oval shape of the animal. The accumulation of new modules, by a process called terminal addition, suggests that *Dickinsonia* developed in a related way to bilaterians, a complex group that display bilateral symmetry, including animals ranging from flies and worms to humans. However, the researchers do not believe *Dickinsonia* was ancestrally related to bilaterians, since it lacked other features that most bilaterians share, most notably a mouth, gut and anus.

"Although we saw some of the hallmark characteristics of bilateral growth and development, we don't believe *Dickinsonia* was a precursor to today's bilaterians, rather that these are two distinct groups that shared a common set of ancestral genes that are present throughout the animal lineage," Evans said. "*Dickinsonia* most likely represents a separate group of animals that is now extinct, but can tell us a lot about the evolutionary history of [animals](#)."

The title of the paper is "Highly Regulated Growth and Development of the Ediacara Macrofossil Dickinsonia Costata."

More information: *PLOS ONE* (2017). [DOI: 10.1371/journal.pone.0176874](https://doi.org/10.1371/journal.pone.0176874)

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