

Portals to the World



Sea Urchins - Echinoderms

Evolution of radial symmetry



Week 4

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From the comfort of your own home, join Giacomo Gattoni and Sara Steele as they highlight an animal with a strange body plan. We'll hear why Giacomo is so excited by a group of animals called echinoderms and how studying them can help with understanding both evolution and conservation. This session will include a recorded video from the Museum of Zoology, as well as a live interview plus a question and answer period. At the end, we'll review the inspired art making opportunity with Nathan Huxtable from the Fitzwilliam Museum.

Echinoderms and evolution of body plans

Echinoderms (including starfish and sea urchin) have a body plan that is very different to our bodies.



We are able to draw one line down the middle of a human body to separate the left and right sides.

With starfish and other echinoderms it is possible to draw five lines at different angles and still find two symmetrical sides.



Giacomo uses the live starfish shown here to show us an example of radial symmetry.

It is in a shallow bowl of water and viewed from above.

Sea urchin and larvae



Edible sea urchin skeleton
Echinus esculentus
Found in north east Atlantic



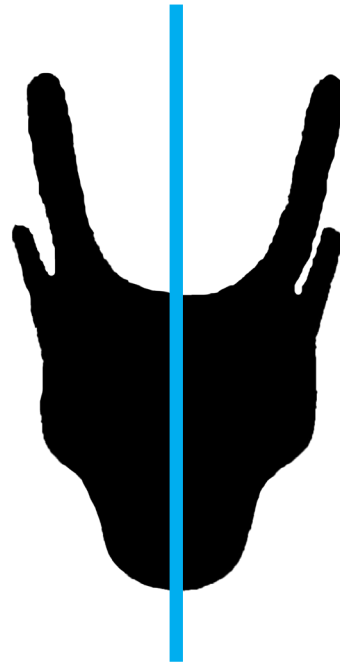
Sea urchin larvae model
Museum of Zoology
collection

Larvae and bilateral symmetry

The way that a sea urchin looks during its larval stage of development is very different to the adult. During this stage, we are able to draw just one line to separate a left and right side. This is called bilateral symmetry.



Sea urchin larvae model
side view



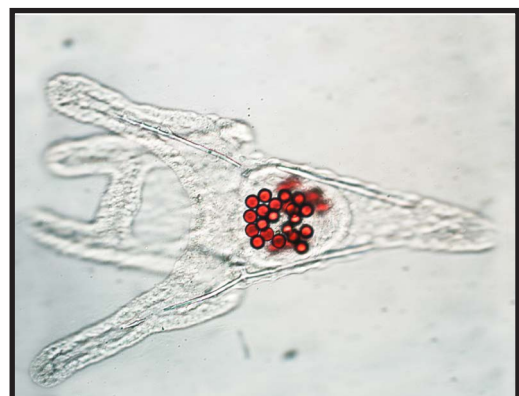
Silhouette of a sea urchin larvae
showing the single line of symmetry
in blue

Echinoderm larvae and conservation

Echinoderm larvae are small in size but large in number. This development stage can range from a few weeks to a few months. They feed on particles in the water by filter feeding; meaning that they can provide us with information about the quality of the water they are in.



This microscope image shows a larvae in clean water. It will be feeding on organic matter.



This microscope image shows a larvae in water containing microplastic pollutants. The red plastic particles are in its stomach.

Sea urchin development

Sea urchins develop from their larval stage to their adult stage using small changes.

1 Egg

Size: 1/10th of a millimetre



Eggs and sperm are released into the surrounding water to fertilise. Eggs develop into a larvae.

2 Larvae

Size: one third of a millimetre



A larvae, with bilateral symmetry, swims about the water. It eats particles found in the water by filter-feeding.

3 Juvenile

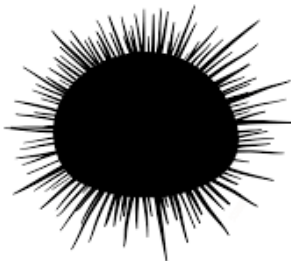
Size: half a millimetre



The familiar spiny, circular sea urchin adult begins to form within and overtakes the larval form as it grows.

4 Adult

Size: 3-10cm or 1-4 inches



The adult sea urchin continues to grow and become the large, spiny animal with a radial symmetry; shown in image on the first page. As an adult, sea urchins feed on vegetation on the sea floor.

Speaker Biography

Giacomo Gattoni



Giacomo is a PhD student at the Department of Zoology in Cambridge. He is interested in animal evolution, and his current project is trying to understand the origin of our brain. The more we understand about how our brains have evolved, the more we understand what makes us human. To understand where our brain comes from, Giacomo is comparing how it develops in different animals. How similar is our nervous system compared to that of a fish? And of a starfish? By answering these questions, Giacomo hopes to trace the evolution of the brain from our ancestors living millions of years ago to us today.