

## What is an echinoderm?

- Echinoderms move by means of hundreds of hydraulic, suction-cup-tipped appendages and have skin covered with tiny, jawlike pincers.
- Echinoderms are found in all the oceans of the world.



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## Echinoderms

### Echinoderms have endoskeletons

- SKIN: all have a hard, spiny, or bumpy endoskeleton covered by a thin epidermis.
- Endoskeleton of all echinoderms is made primarily of calcium carbonate, the compound that makes up limestone.



## Echinoderms have endoskeletons

- Some spines have become modified into pincerlike appendages called pedicellariae (PEH dih sih LAHR ee ay).
- An echinoderm uses its jawlike pedicellariae for protection and for cleaning the surface of its body.

Pedicellariae



## Echinoderms have radial symmetry

- Radial symmetry is an advantage to animals that are stationary or move slowly.
- Radial symmetry enables these animals to sense potential food, predators, and other aspects of their environment from all directions.



## The water vascular system

- The water vascular system is a hydraulic system that operates under water pressure.
- Water enters and leaves the water vascular system of a sea star through the madreporite (mah druh POHR ite), a sievelike, disk-shaped opening on the upper surface of the echinoderm's body.

## The water vascular system

- The underside of a sea star has tube feet that run along a groove on the underside of each ray.



## The water vascular system

- **Tube feet** are hollow, thin-walled tubes that end in a suction cup.
- The round, muscular structure called the **ampulla** (AM pew lah) works something like the bulb of a dropper.
- Each tube foot works independently of the others, and the animal moves along slowly by alternately pushing out and pulling in its tube feet.

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## Echinoderms

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### The water vascular system

- Tube feet also function in gas exchange and excretion.



## Echinoderms have varied nutrition

- All echinoderms have a mouth, stomach, and intestines, but their methods of obtaining food vary.
- Sea stars are carnivorous and prey on worms or on mollusks such as clams.

## Echinoderms have varied nutrition

- Most sea urchins are herbivores and graze on algae.
- Brittle stars, sea lilies, and sea cucumbers feed on dead and decaying matter that drifts down to the ocean floor.

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## Echinoderms

### Echinoderms have a simple nervous system

- Echinoderms have no head or brain, but they do have a central nerve ring that surrounds the mouth.



## Echinoderms have a simple nervous system

- Nerves extend from the nerve ring down each ray.
- Echinoderms have cells that detect light and touch, but most do not have sensory organs.
- A sensory organ known as an eyespot and consisting of a cluster of light-detecting cells is located at the tip of each arm, on the underside.

## Echinoderms have a simple nervous system

- Eyespots enable sea stars to detect the intensity of light.
- Sea stars also have chemical receptors on their tube feet.

## Echinoderms are deuterostomes

- Echinoderms are deuterostomes; a broad classification of triploblastic animals that tend to share certain embryological traits.
- This pattern of development indicates a close relationship to chordates, which are also deuterostomes.

## Diversity of Echinoderms

- Approximately 6000 species of echinoderms exist today.
- About one-fourth of these species are in the class Asteroidea (AS tuh ROY dee uh), to which the sea stars belong.



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## Echinoderms

### Diversity of Echinoderms

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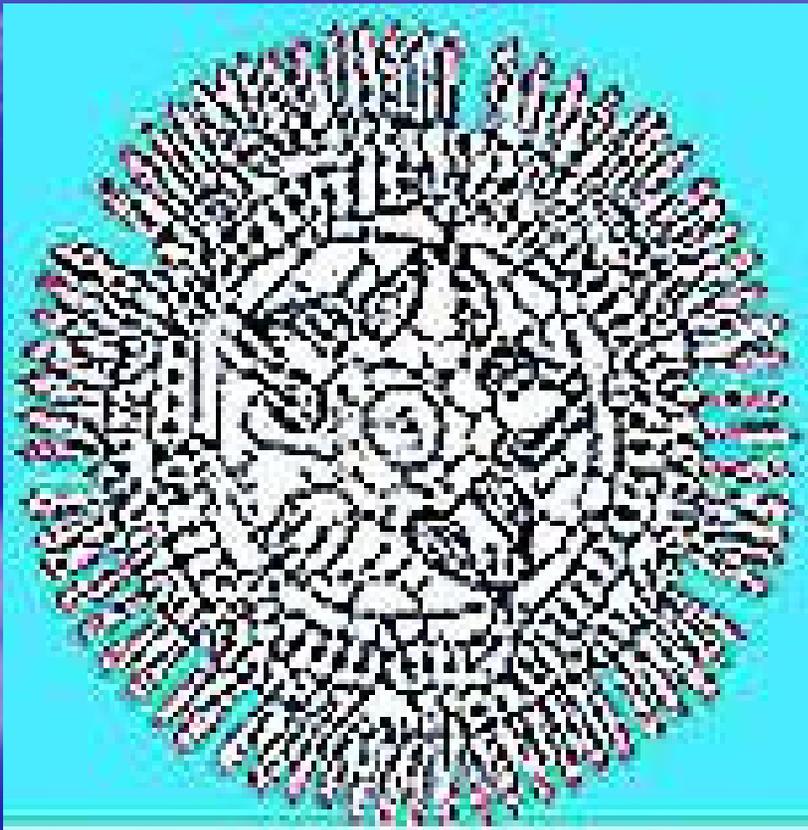
- The five other classes of living echinoderms are:

1.) Ophiuroidea (OH fee uh ROY dee uh), the brittle stars

2.) Echinoidea (eh kihn OY dee uh), the sea urchins & sand dollars.



## Diversity of Echinoderms



- 3.) Holothuroidea (HOH loh thuh ROY dee uh), the sea cucumbers
- 4.) Crinoidea (cry NOY dee uh), the sea lilies & feather stars
- 5.) Concentricycloidea (kon sen tri sy CLOY dee uh), the sea daisies.

