

Phylum Echinodermata

Meaning 'Spiny Skin'

Examples: Sea Stars, Sea Urchins,
Sea Cucumbers, Sand Dollars,
Sea Lilies

Phylum Echinodermata

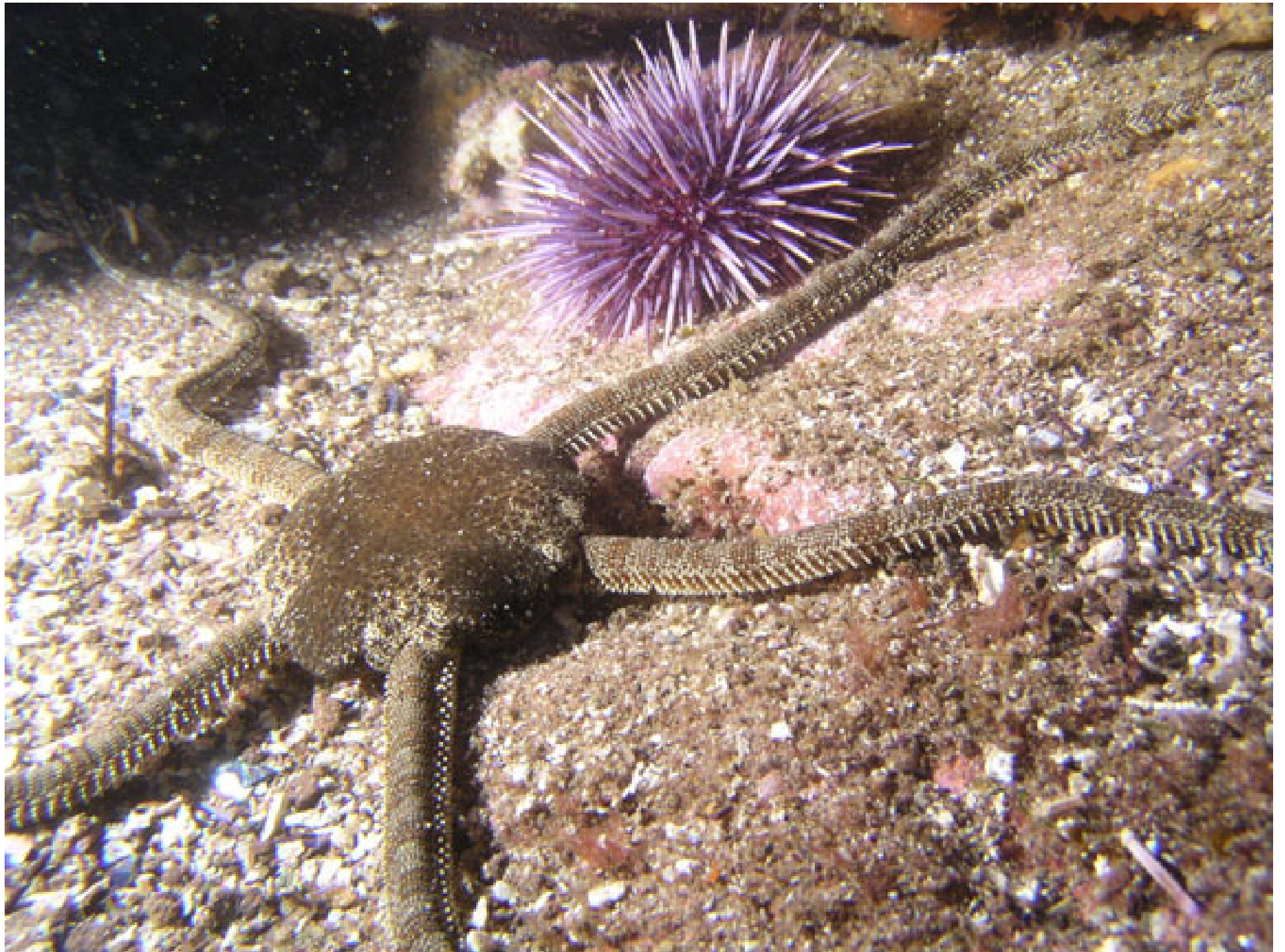
Learning Outcomes

- Describe the unifying characteristics of members of phylum echinodermata
- Describe how echinoderms carry out their life functions
- Describe the ecological roles of echinoderms





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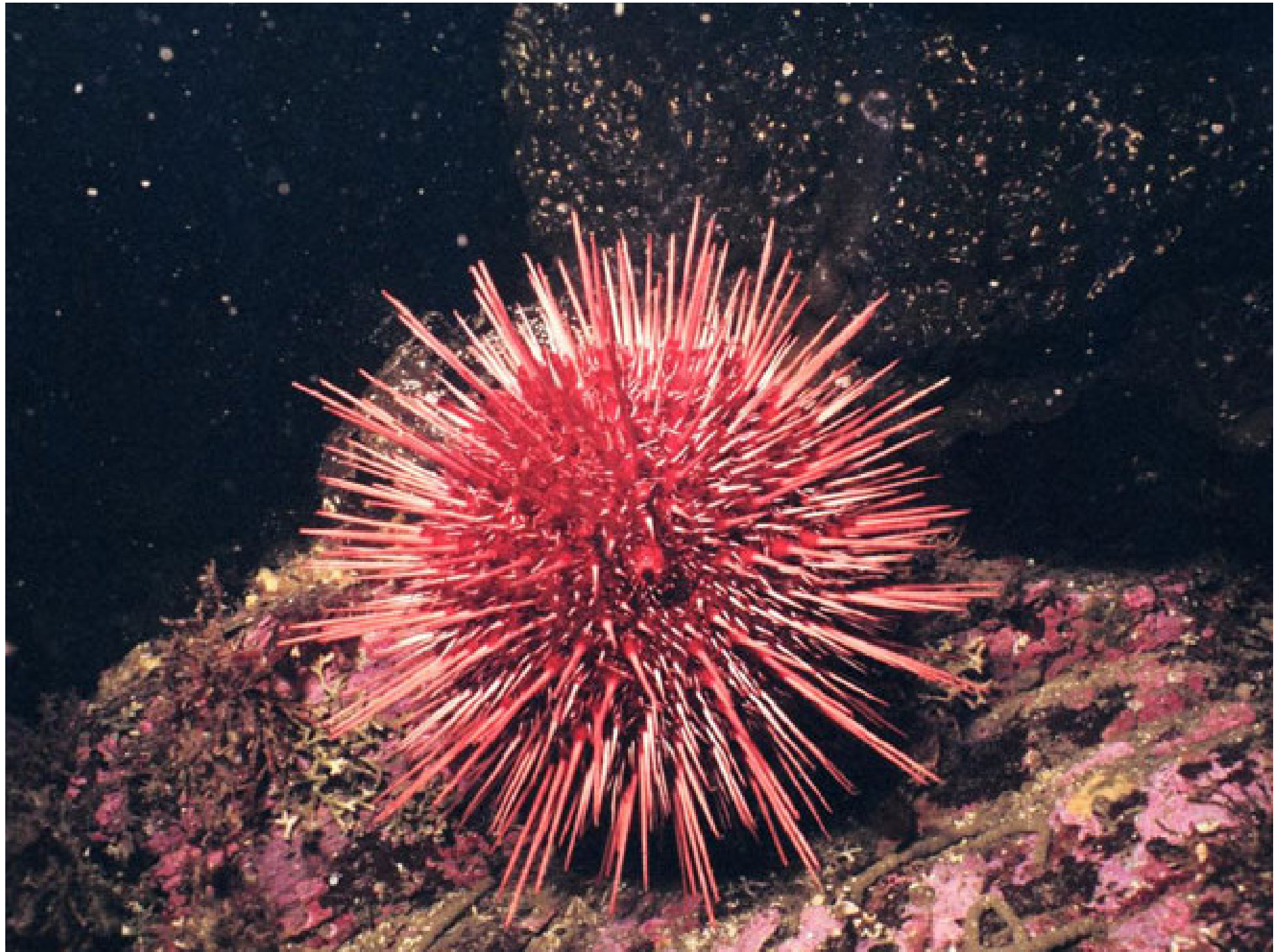












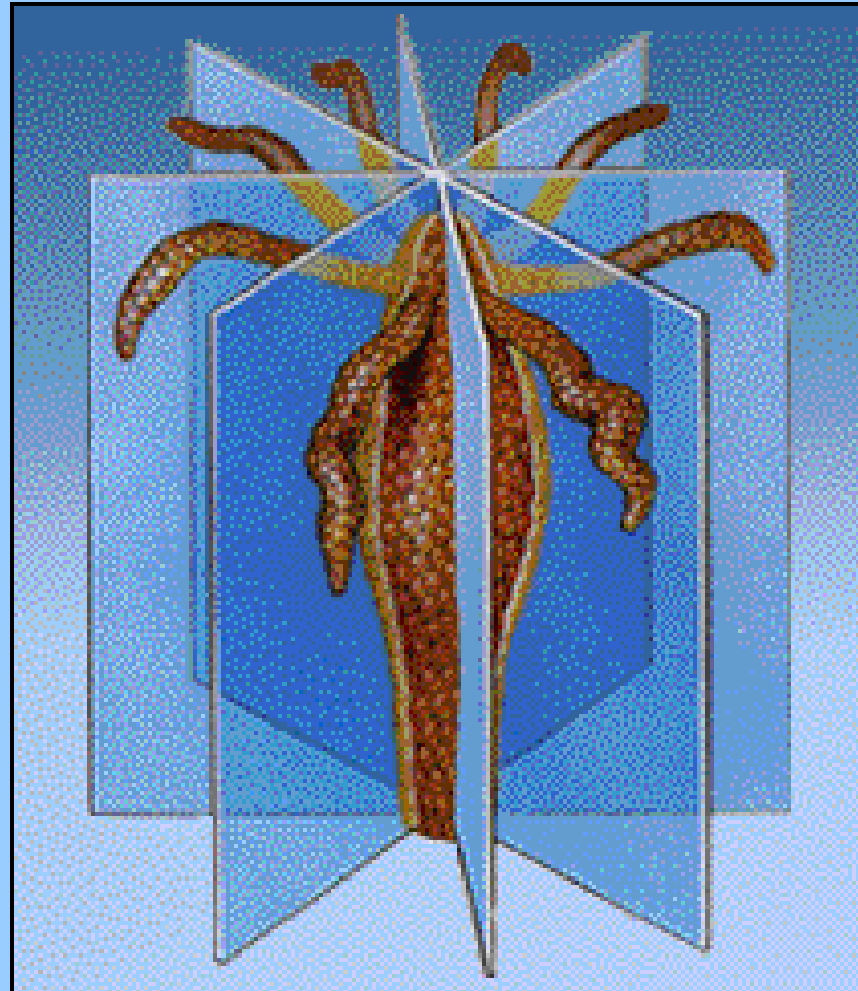


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General Characteristics

- Radial symmetry
- 3 cell layers
- Extensive coelom
- No head region or anterior end
- Have a water vascular system



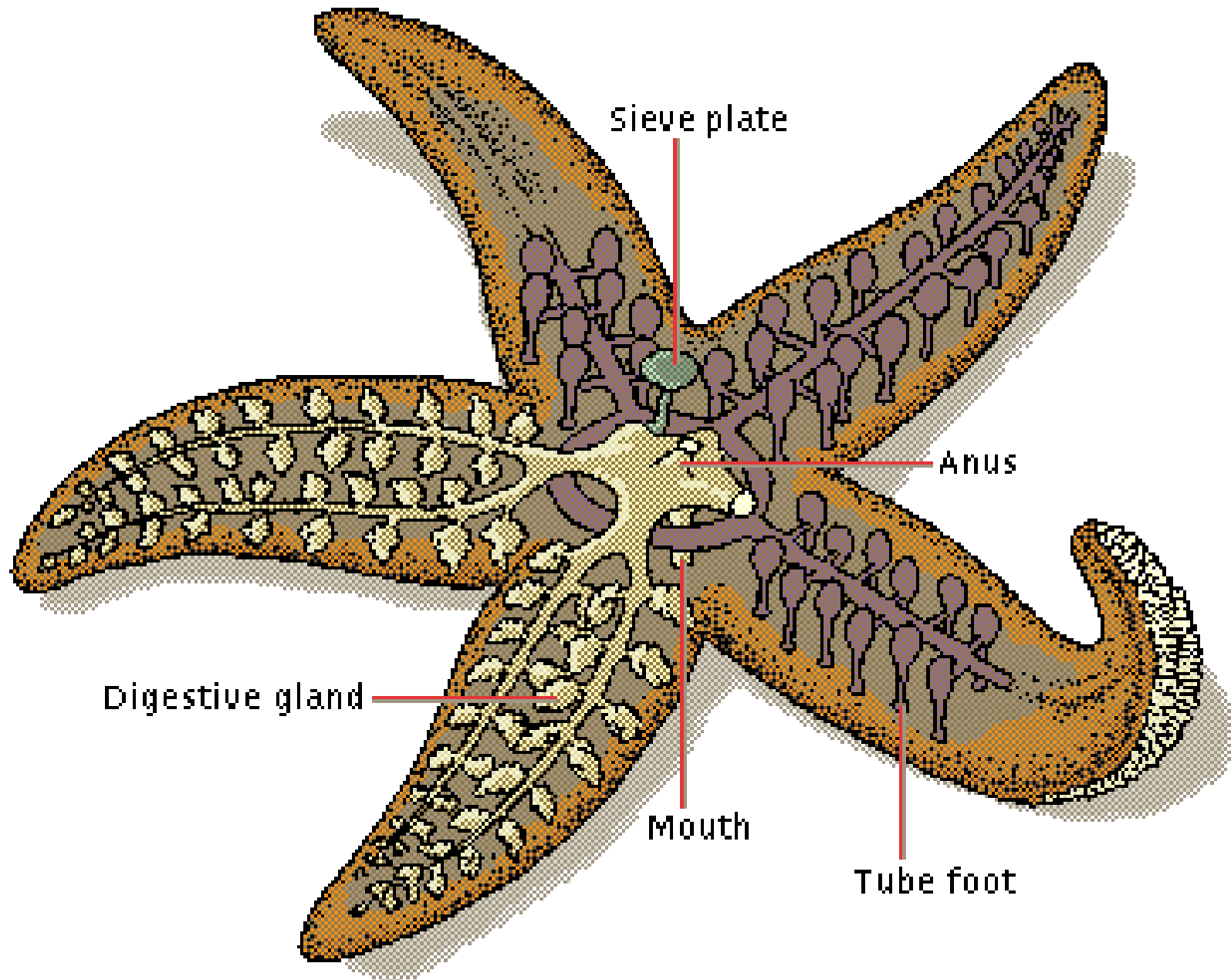
Sea Star Ingestion

- Sea stars have 2 stomachs (upper & lower)
- Suckers on tube feet separate the valves of a clam, mussel...
- Turns lower stomach inside out through mouth



Sea Star Digestion

- Enzymes are secreted to digest the clam inside it's shell
- Partially digested material is moved to the upper stomach
- Sea stars have 5 pairs of digestive glands (1 pair in each arm)



Sea Star Elimination

- Undigested food wastes exit through the anus on the aboral (top) surface



Respiration & Circulation

- Gas exchange takes place on the skin gills and tube feet
- Gases and nutrients are distributed in the coelom where the fluid bathes the organs

Pedicellariae

- Sea stars have pedicellariae (like little pinchers) which help to clean debris from the surface of their skin gills



Sea Star Excretion

- Nitrogenous wastes are diffused out the skin gills and out the tube feet

Sea Star Reproduction

Asexual Reproduction

- Sea stars are able to regenerate missing parts as long as there is a portion of the central disk present

Sexual Reproduction

- Sea stars have separate sexes
- Each arm contains 2 pairs of gonads
- Sperm/eggs are released into water
- Fertilization is external

Sea Star Nervous System

- No cephalization
- Sea stars do have sense organs and a nerve net
- Sea stars have an eyespot at the end of each arm

Sea Star Movement

Water Vascular System

- The water vascular system is a fluid hydraulic system used in locomotion and capturing prey
- Water enters through holes in the sieve plate located on the aboral surface
- Cilia draw water into the stone canal where it moves into the ring canal and then the 5 radial canals

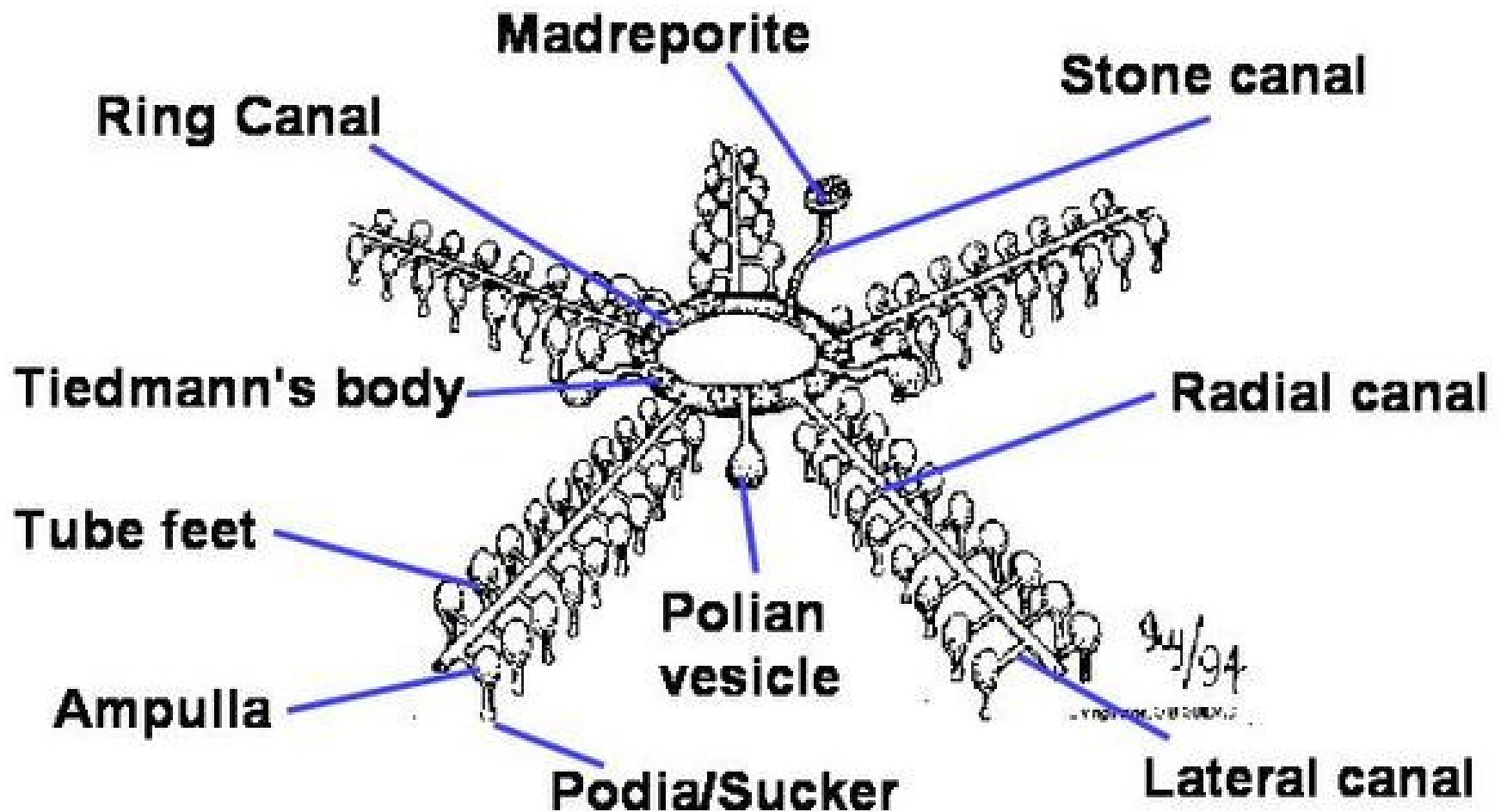
Water Vascular System (2)

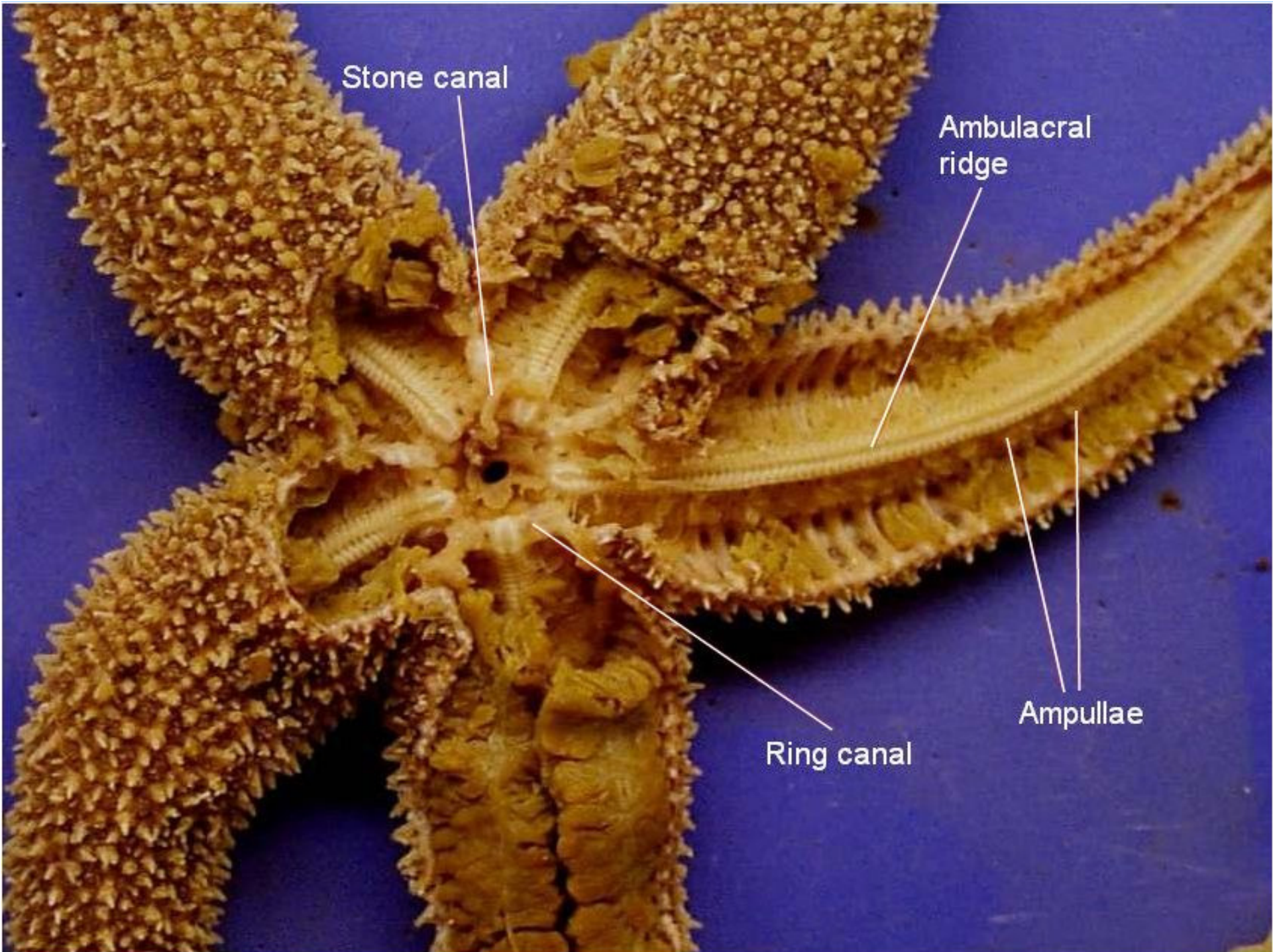
- Water is carried to the pairs of tube feet
- The ampulla fills with water
- Muscles around the ampulla contract forcing water into the stalk
- Due to the hydrostatic (water) pressure the stalk lengthens and the suction cup attaches to the surface

Water Vascular System (3)

- When muscles of the ampulla relax the stalk shortens and water is forced back into the ampulla
- The suction cup detached from the surface

Water Vascular System





Stone canal

Ambulacral ridge

Ring canal

Ampullae

\$ Economic Importance \$

- Sea stars are predators to many things that people like to eat (crabs, bivalves...)
- Some are also used as a food source for people

Ecological Importance

- Sea urchins play a large role in the functioning of kelp forest ecosystems – help to control kelp populations
- Food source for marine & terrestrial animals (sea urchins are food for sea otters)
- Sea stars are important carnivores – control populations of marine animals