

Ph. Echinodermata "spiny-skin"



Cl. Crinoidea



Cl. Echinoidea



Cl. Ophiuroidea



Cl. Holothuroidea



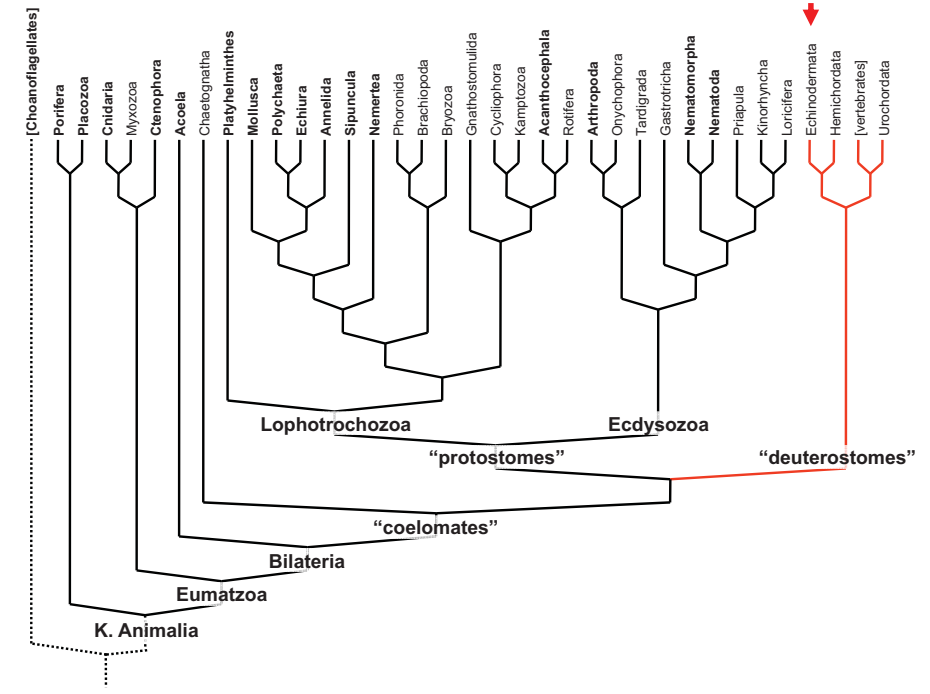
Cl. Asteroidea



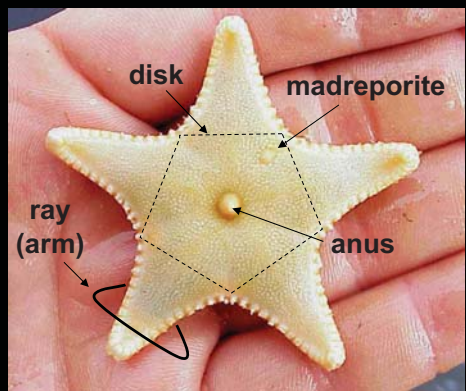
Concentricycloidea
Xyoplax turnarea

SubCl. ↑
Pechenik:
"Cl. Stelleroidea"
SubCl. ↓

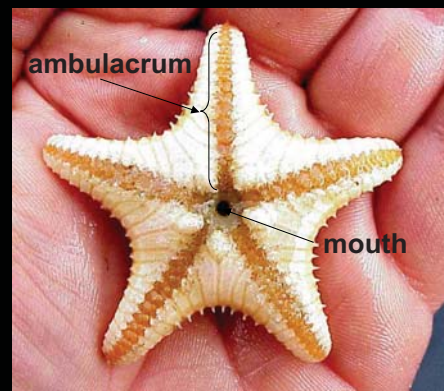
Theme: radical body design



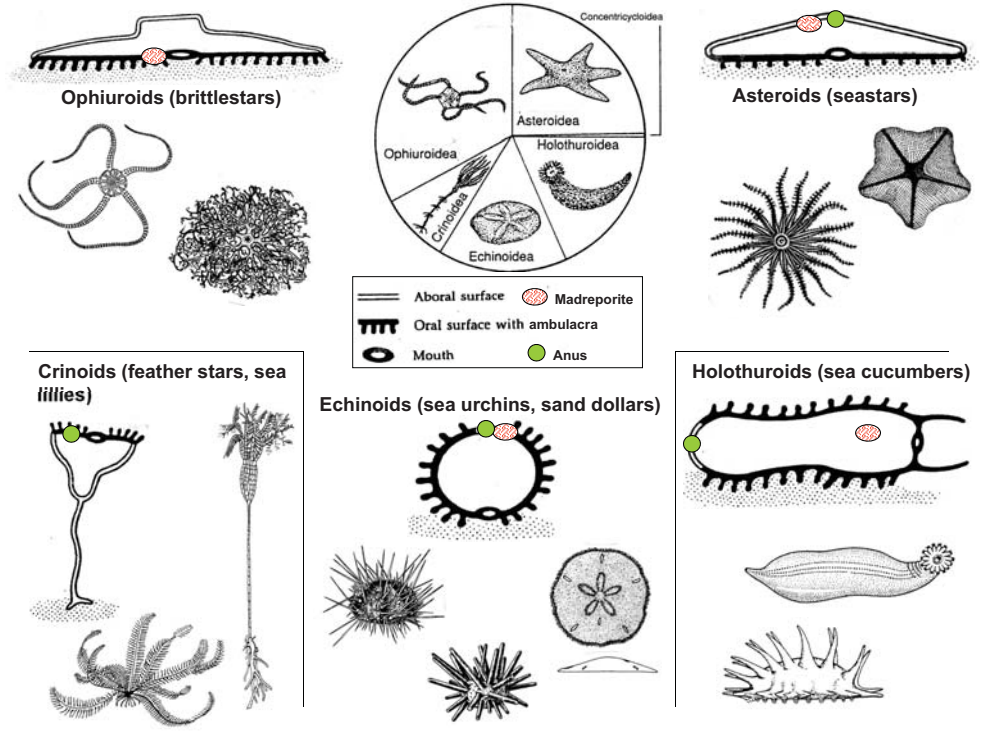
Pentamerous radial symmetry



aboral (dorsal)



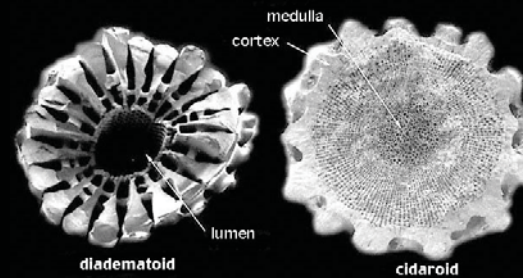
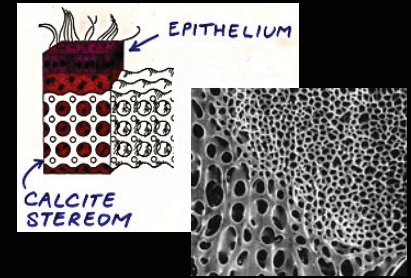
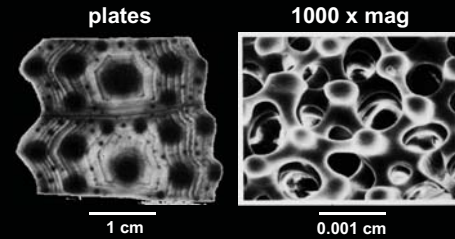
oral (ventral)



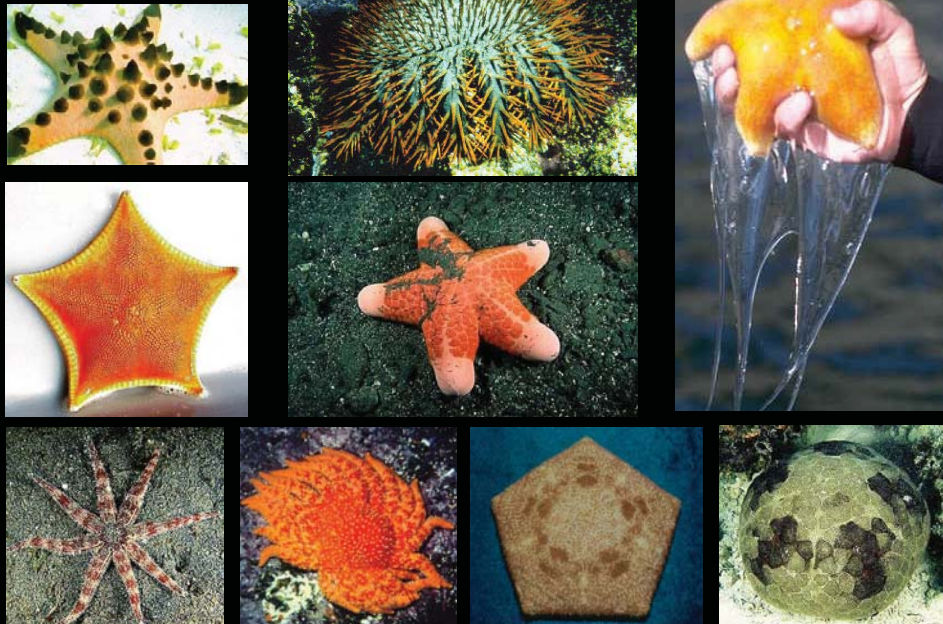
Body wall endoskelton { CaCO_3 ossicles (*stereom*)
connective tissue (*mutable collagen*)



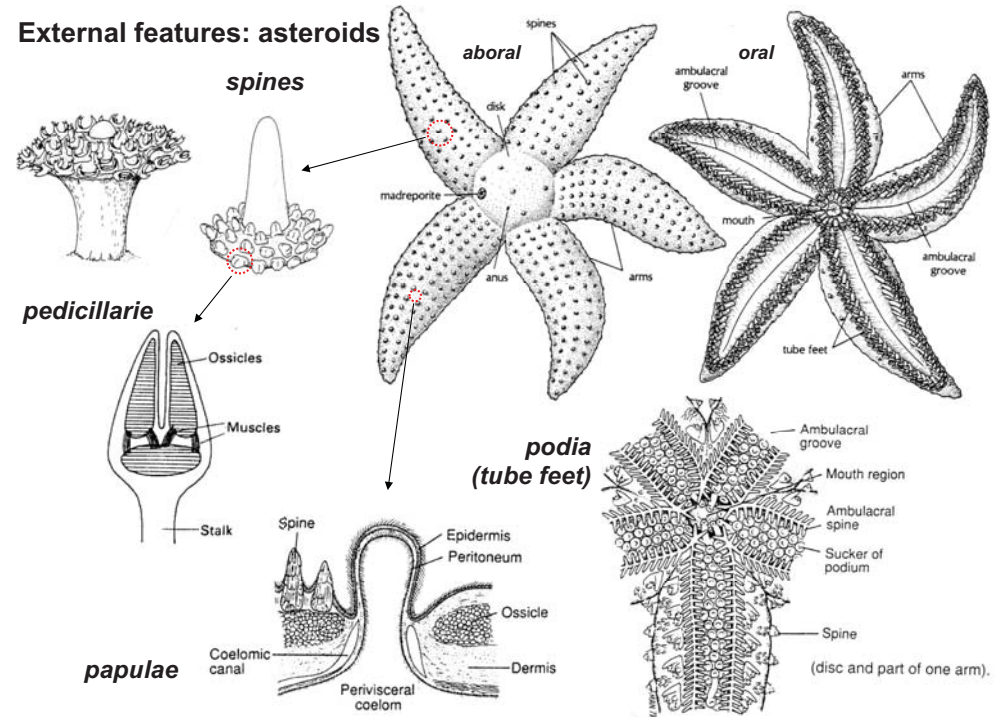
Stereom: a living meshwork of skeletal material



Cl. Asteroidea



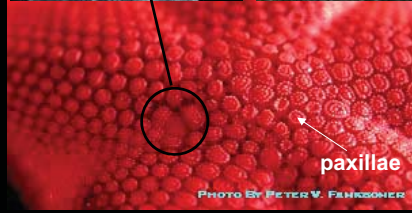
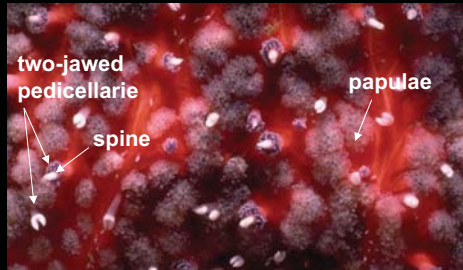
External features: asteroids



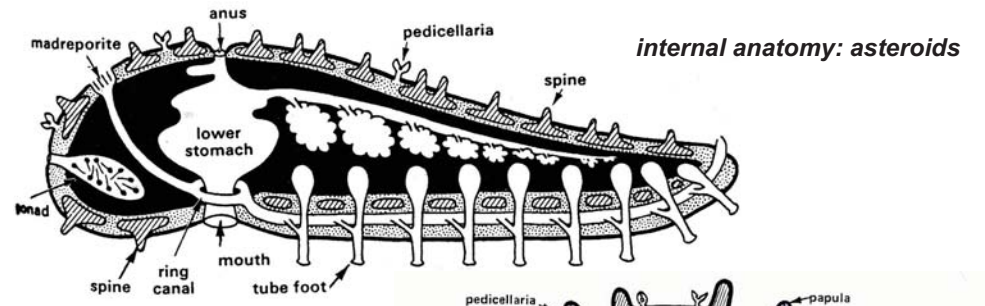
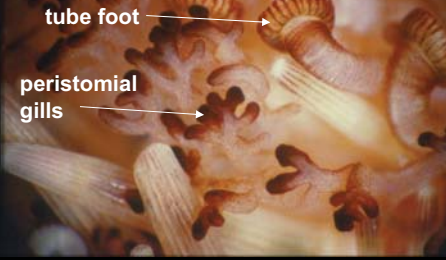
Complex surface features

Sea star

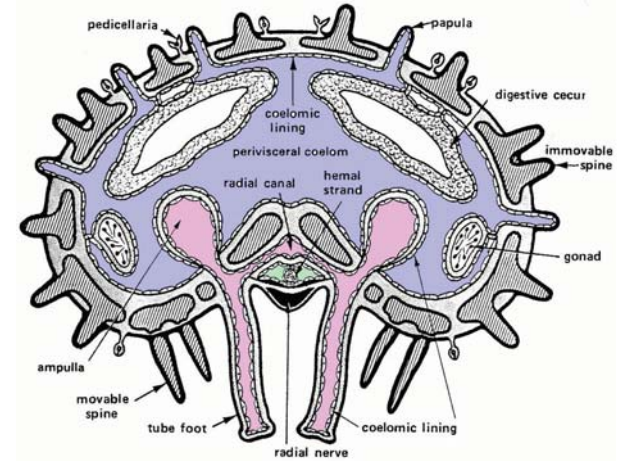
Sea urchin



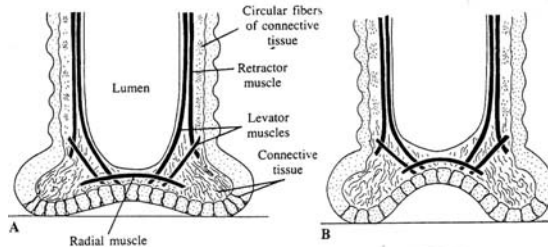
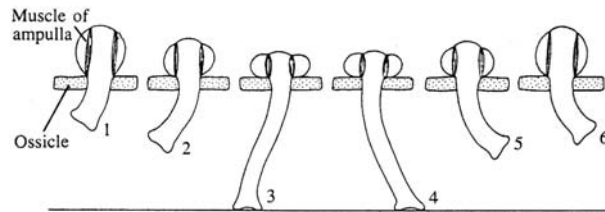
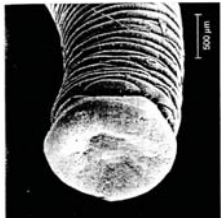
respiration



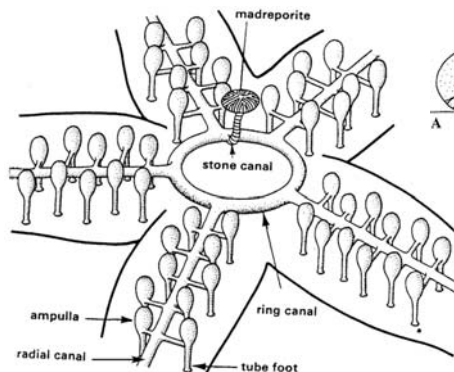
internal anatomy: asteroids



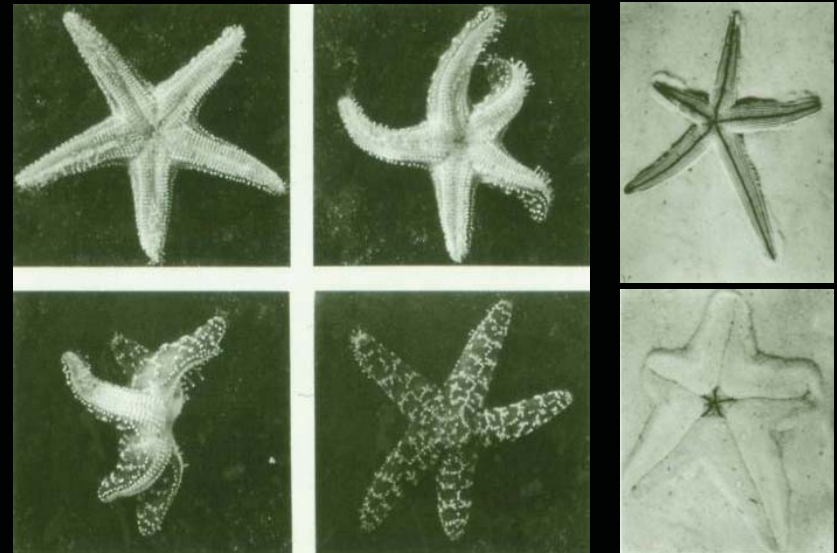
locomotion: asteroids



locomotion: ophiuroids



Variation in tube foot design and function



righting

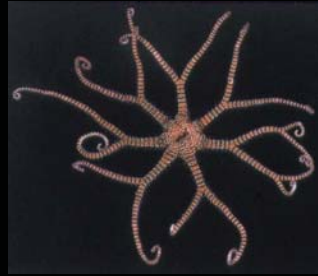
burying

Cl. Ophiuroidea

brittle star



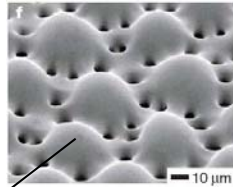
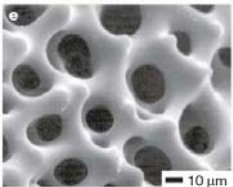
two ovaries per disk section



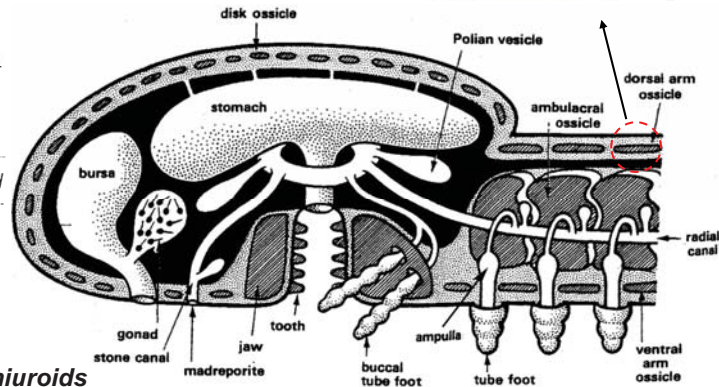
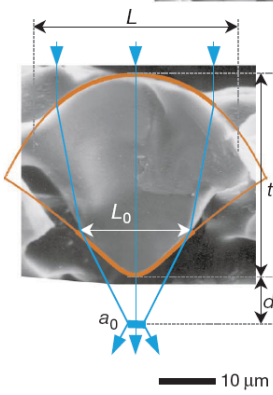
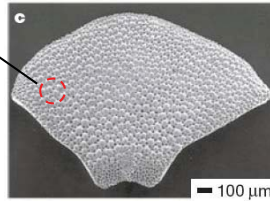
basket star



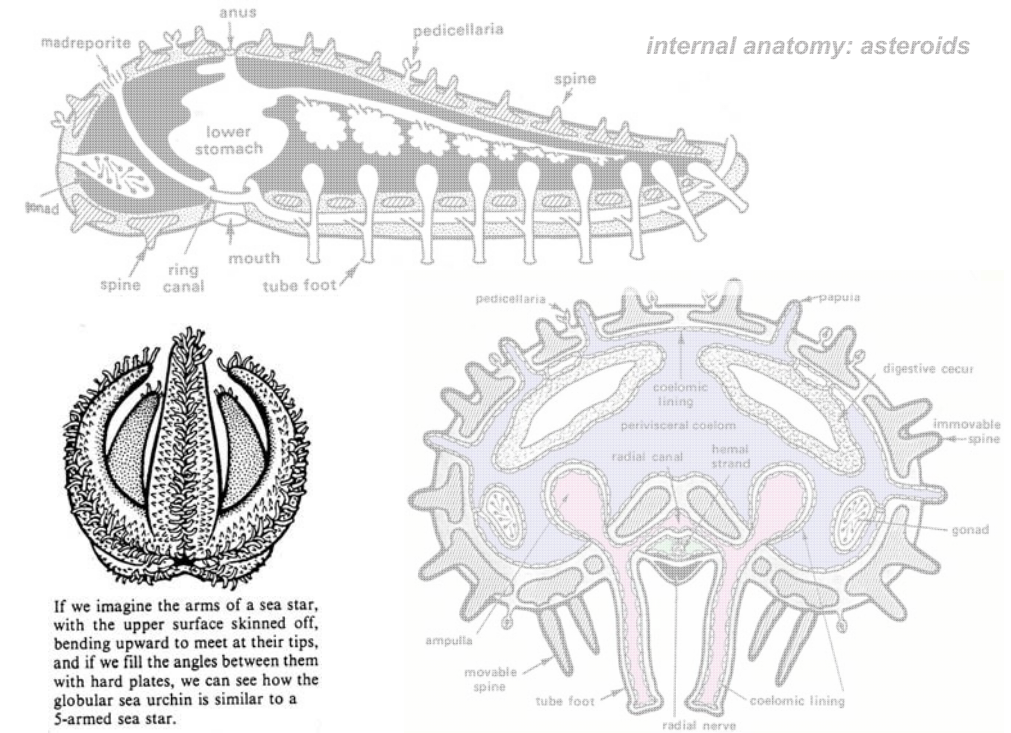
typical stereom



Arm ossicle of light-sensitive brittle star

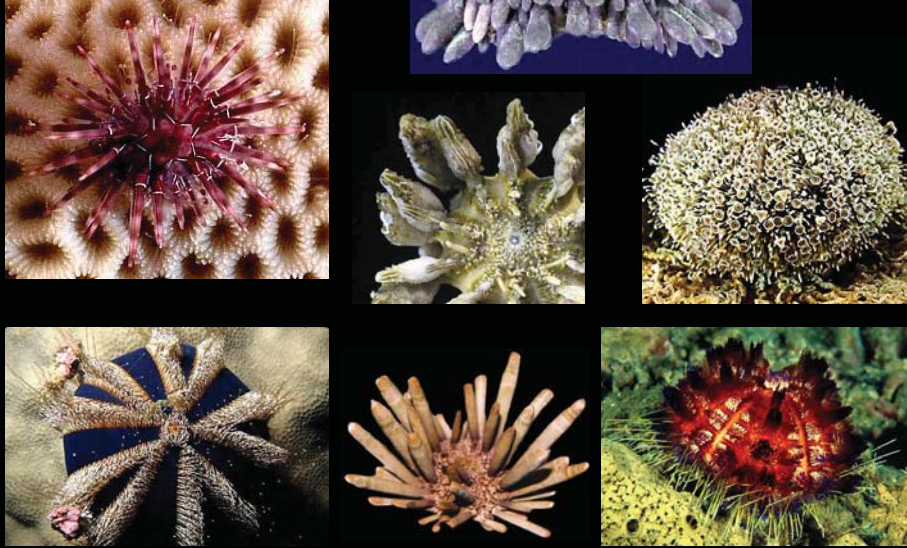


internal anatomy: ophiuroids

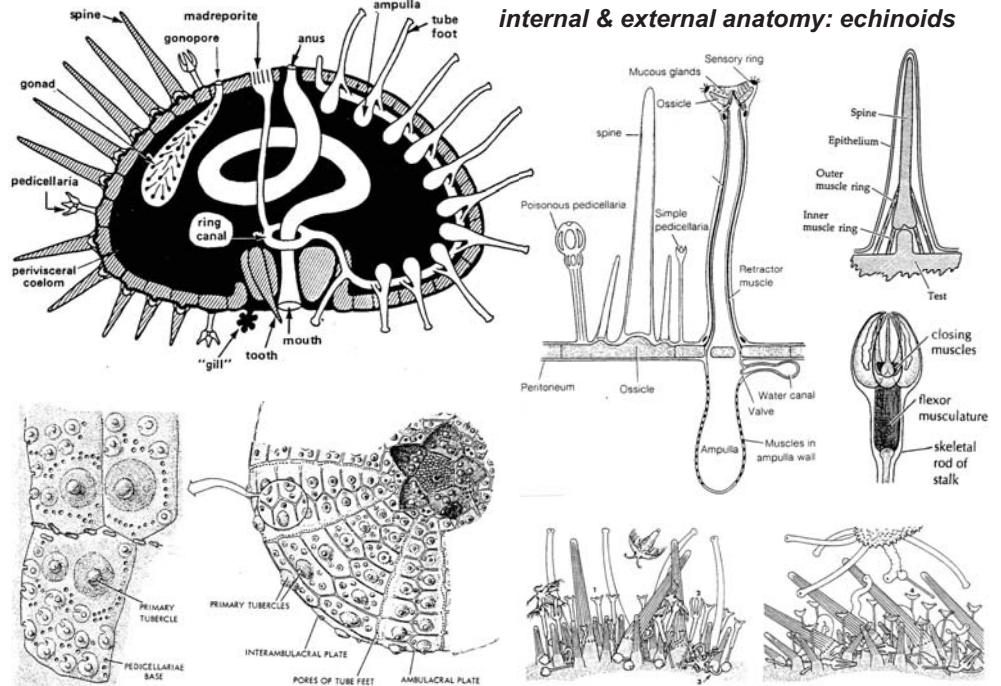


Cl. Echinoidea

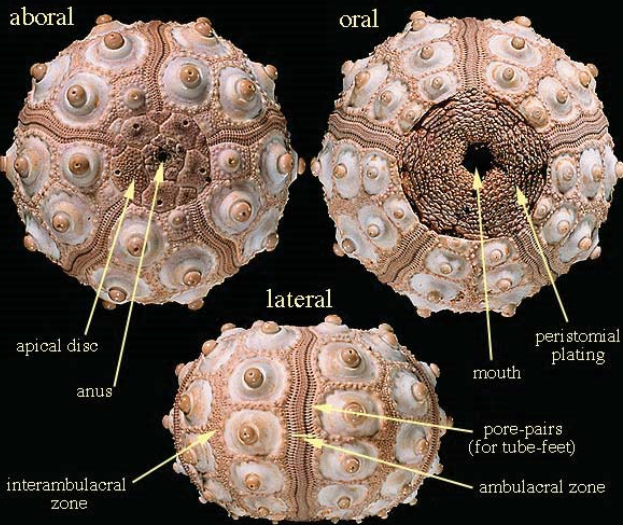
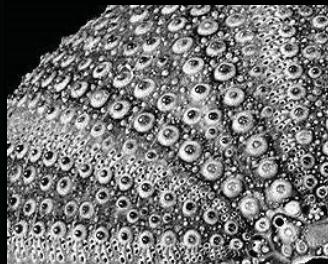
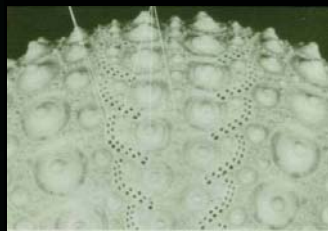
"regular" > sea urchins



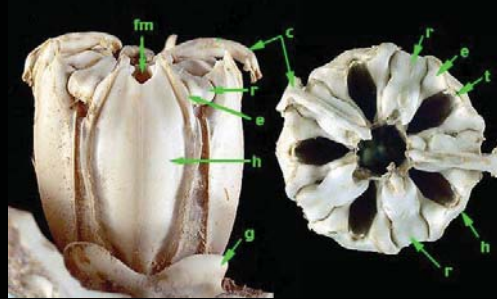
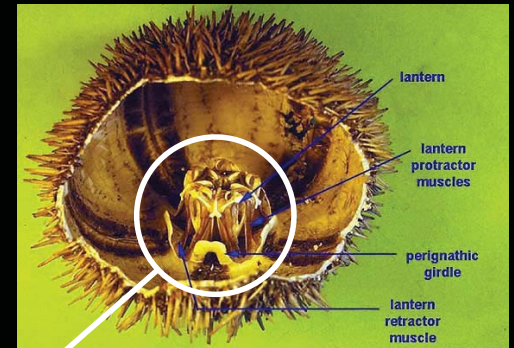
internal & external anatomy: echinoids



Endoskeleton: the echinoid test

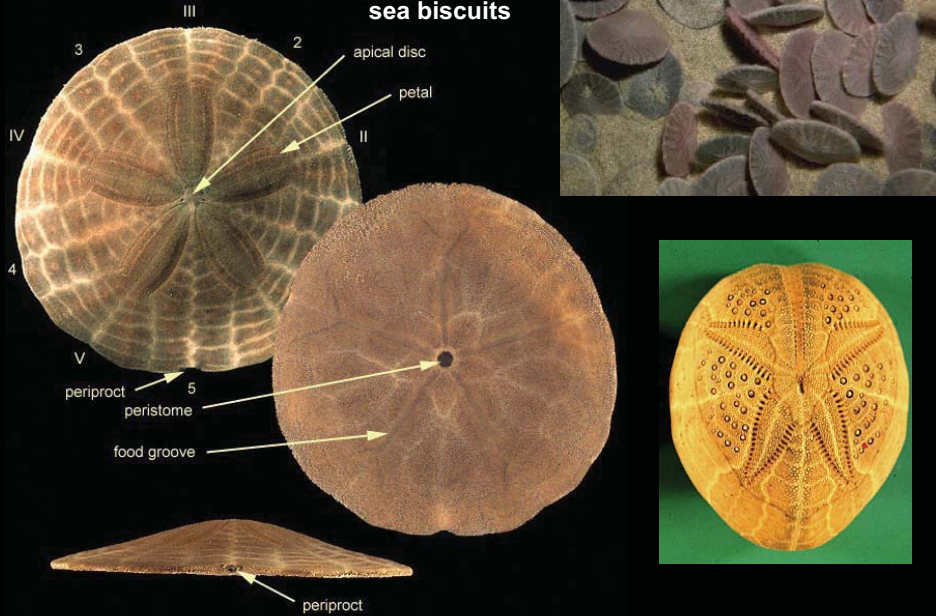


Echinoid internal feeding structure: Aristotle's lantern



Cl. Echinoidea

"irregular" > sand dollars, heart urchins, sea biscuits



Cl. Holothuroidea

("sea cucumbers")

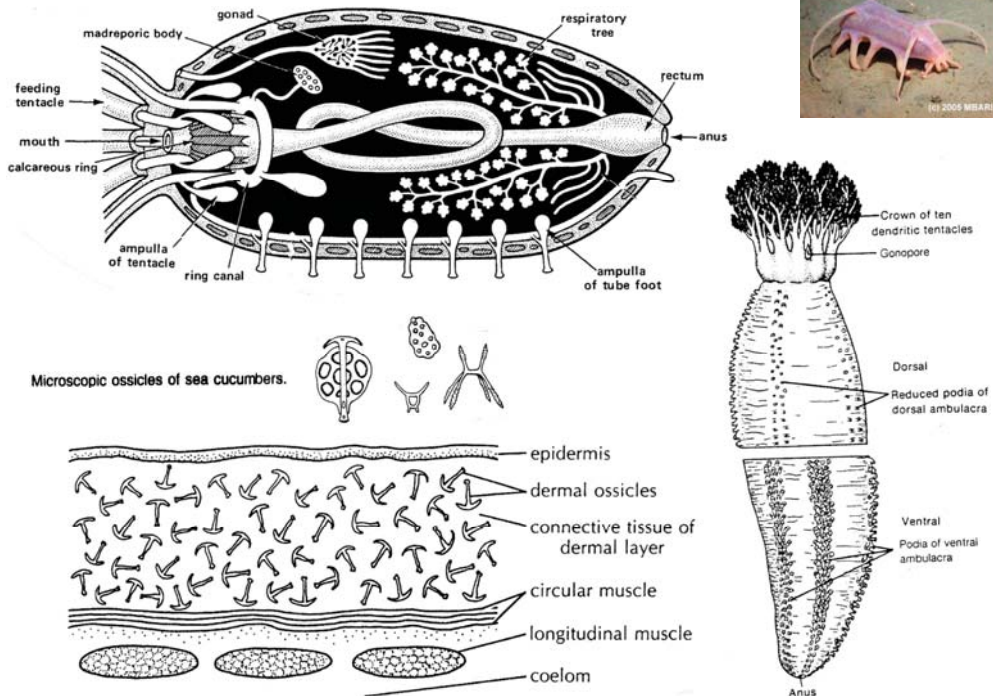


deposit feeders

suspension feeders



anatomy: holothuroids

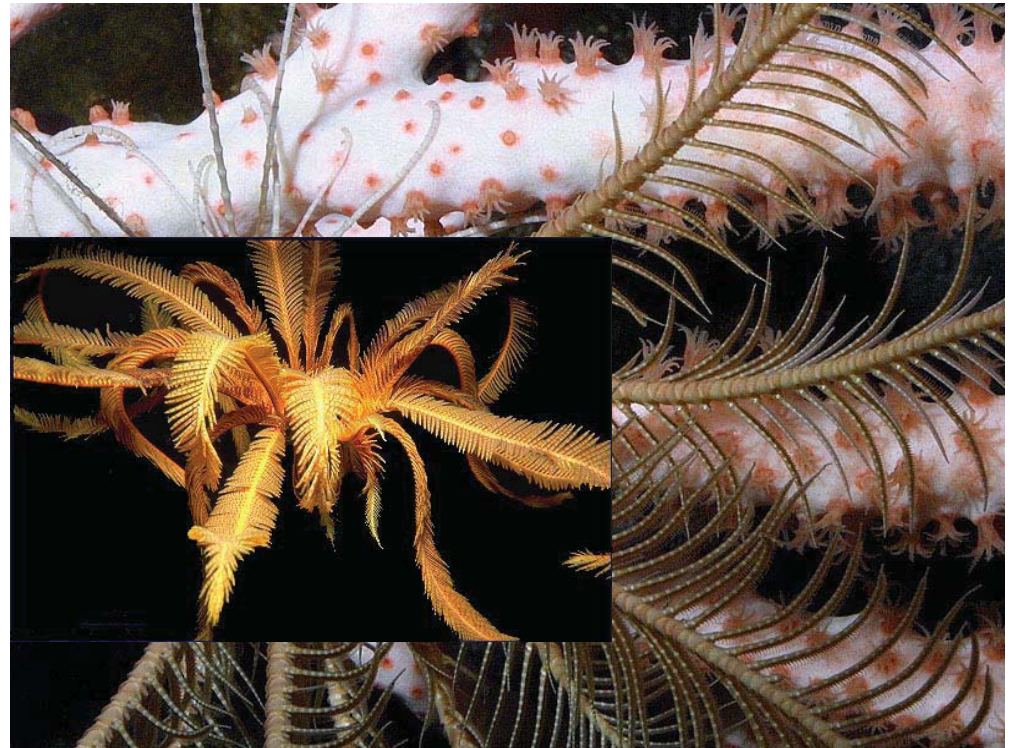
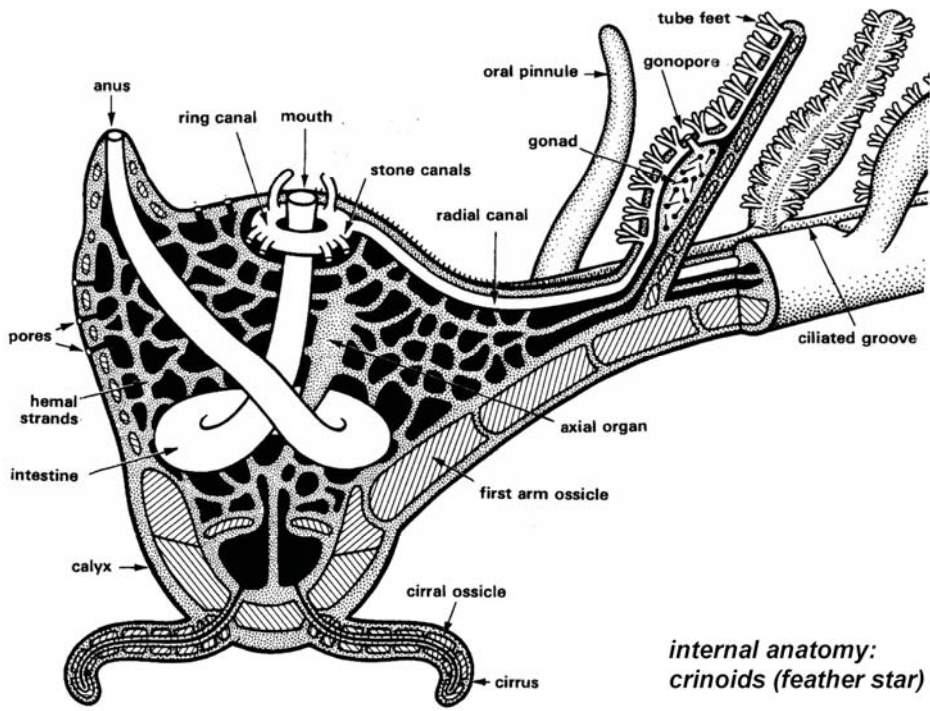


Cl. Crinoidea

"feather stars"
non-stalked crinoids

"sea lilies"
stalked crinoids





mutable ("catch") connective tissue

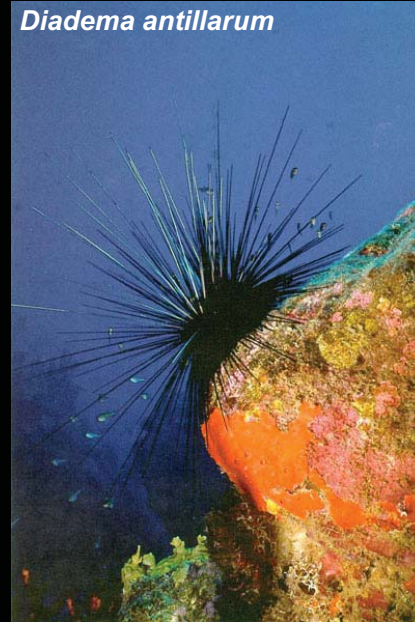
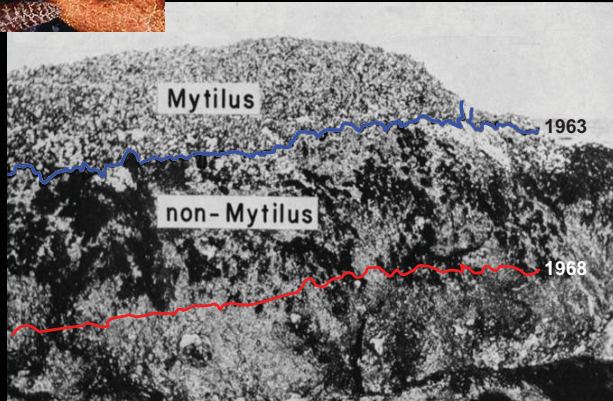
Examples of echinoderm ecology
(time permitting)



Pisaster ochraceus

Experimental removal of predatory sea stars

(Paine 1974)



Diadema antillarum

Mass mortality of sea urchins in the Caribbean (Carpenter 1990)



Effects of sea otter recovery on algal diversity

(Duggins 1990)



Strongylocentrotus purpuratus

S. droebachiensis

S. franciscanus



Damage to coral reefs by crown-of-thorns seastars



Acanthaster planci

