Jina _____

Echinoderm Station Lab

Directions: Each Echinoderm Class is represented in the five stations around the lab counters. Your task is to identify features and associate major characteristics, feeding habits, and interesting facts with the representative organisms at each station. Use the magnifying glasses to better see the specimens and complete the questions and/or tasks in the lab handout along the way. Have fun!!

STATION 1. Class at this station: _____ (use card at station)

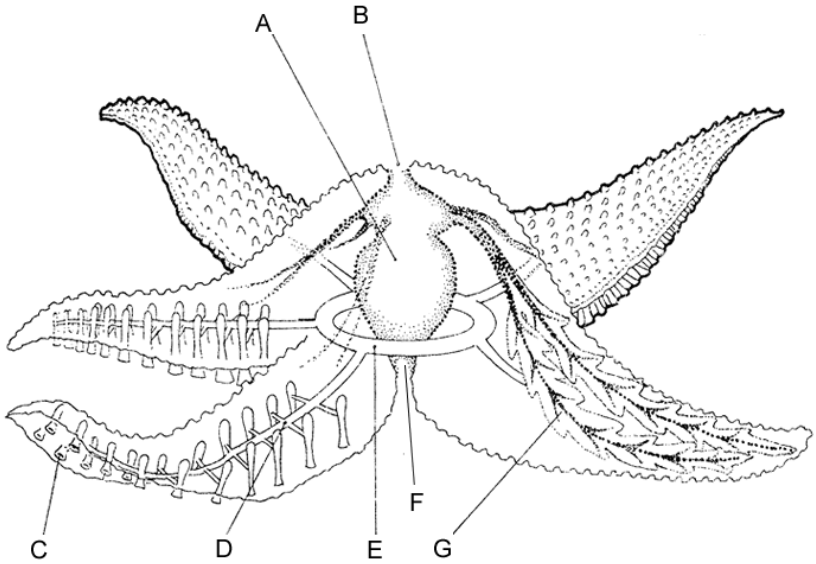
Which major features of this Class does this organism clearly exhibit (use card at station)

_____ _____

_____ _____

_____ _____

_____ _____



Match the letters in the diagram to the following terms:

_____ madreporite

_____ cardiac stomach

_____ radial canal

_____ ring canal

_____ tube feet

_____ digestive glands

The tube feet, radial canal, and ring canal are all part of what system that takes the place of musculature?

_____

STATION 2. Class at this station: _____ (use card at station)

Which major features of this Class does this organism clearly exhibit (use card at station)

_____ _____

_____ _____

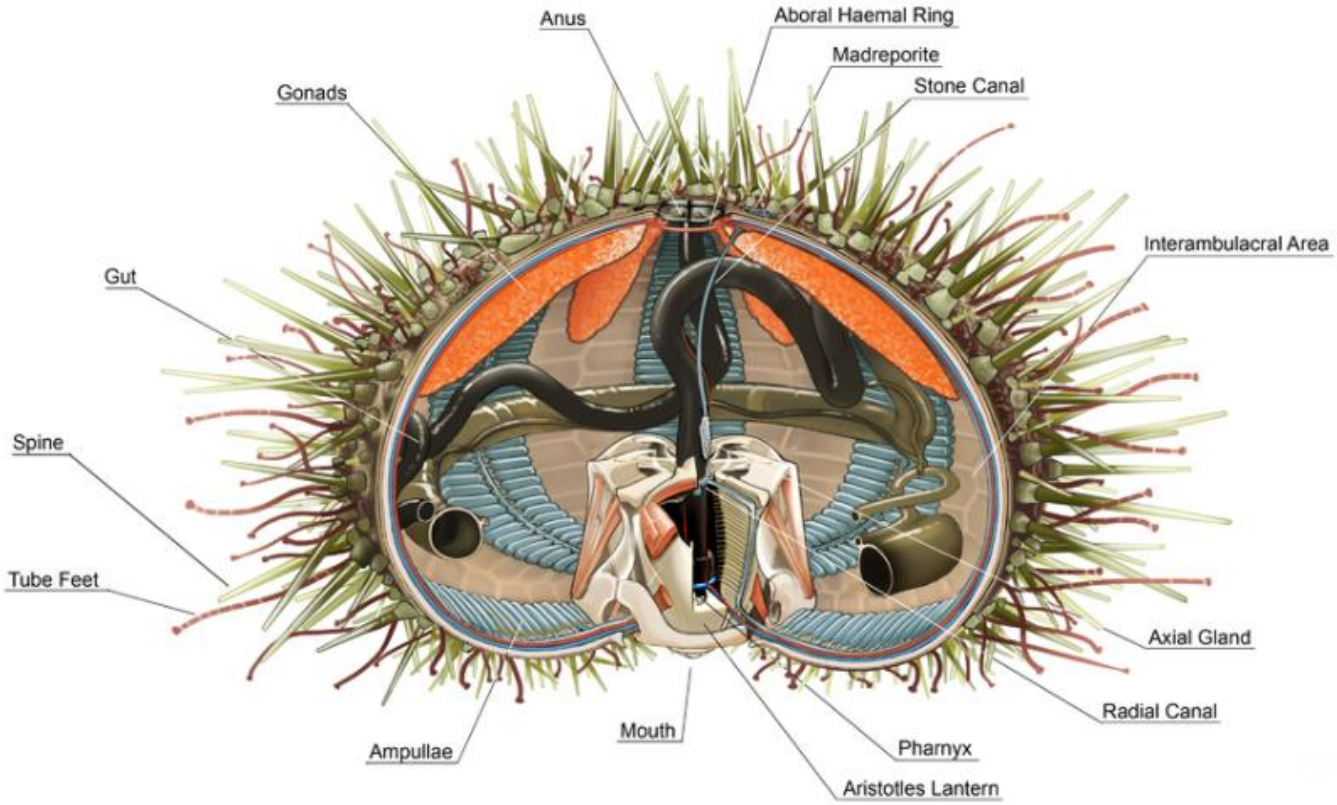
_____ _____

_____ _____

Describe the relationship that the urchin, kelp beds, and sea otter have. Discuss in the presence and absence of the sea otter.

_____

_____



How is the water vascular system similar & different in this Class than in the previous class? _____

_____

_____

_____

_____

STATION 3. Class at this station: _____ (use card at station)

Which major features of this Class does this organism clearly exhibit (use card at station)

_____ _____

_____ _____

_____ _____

_____ _____

Look at the unique defense mechanism of this group of organisms. What is it that you think happens to predators when this defense is triggered? From the article abstract, what is it about this defense that works for this organism?

_____

_____

_____

_____

STATION 4. Class at this station: _____ (use card at station)

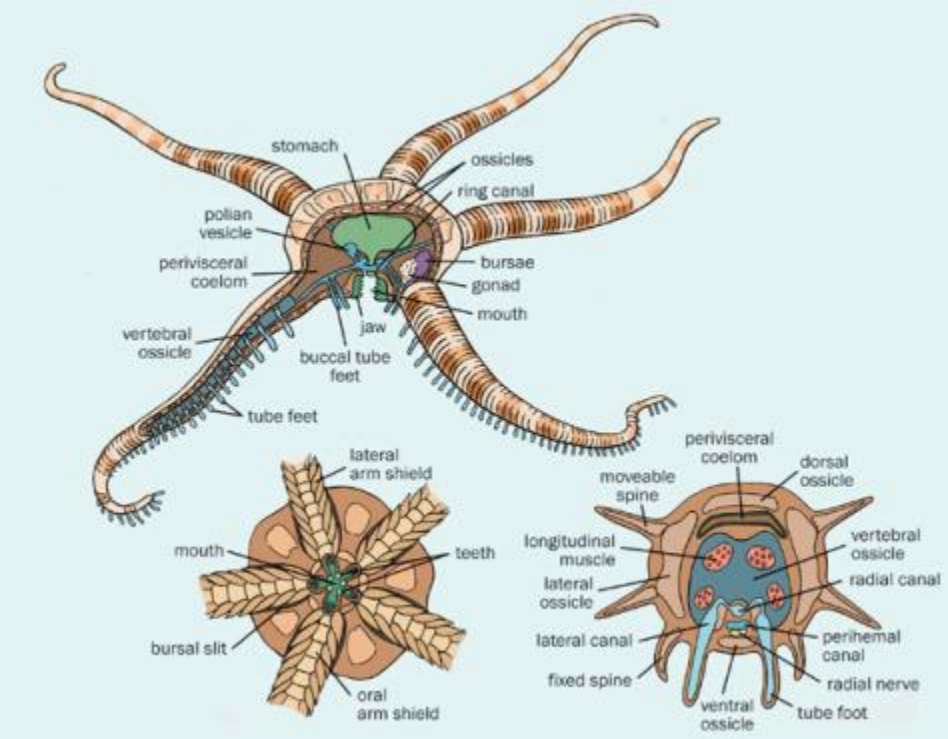
Which major features of this Class does this organism clearly exhibit (use card at station)

_____ _____

_____ _____

_____ _____

_____ _____



Look at yesterday's diagram of the sea star and compare it to the organism in the diagram to the left. What do you notice?

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Read over the article at this station about how these organisms move. Note 5 key points from the article and how the move differently than sea stars.

_____

_____

_____

_____

_____

_____

_____

_____

5 Classes

Holothuroidea

Ophiurodea

Echinoidea

Astroidea

Crinoidea

5 Classes

Holothuroidea

Ophiurodea

Echinoidea

Astroidea

Crinoidea

5 Classes

Holothuroidea

Ophiurodea

Echinoidea

Astroidea

Crinoidea

5 Classes

Holothuroidea

Ophiurodea

Echinoidea

Astroidea

Crinoidea

5 Classes

Holothuroidea

Ophiurodea

Echinoidea

Astroidea

Crinoidea

5 Classes

Holothuroidea

Ophiurodea

Echinoidea

Astroidea

Crinoidea

Characteristics

Spiny skinned

Radial symmetry

Bilateral symmetry

Benthic life

Endoskeleton

Water vascular system

Has arboral/oral surfaces

Is a carnivore/scavenger

Is a grazer

Regenerates

Tube feet @ 5 ambulacral grooves

Has spines

“Aristotle’s lantern” teeth

Cuverian tubes defense

First Echinoderm Class

Can devour kelp beds

Crucial prey of sea otter

Prey of sea spider

Core temp must remain above 35 degrees

Characteristics	Characteristics	Characteristics
Spiny skinned	Spiny skinned	Spiny skinned
Radial symmetry	Radial symmetry	Radial symmetry
Bilateral symmetry	Bilateral symmetry	Bilateral symmetry
Benthic life	Benthic life	Benthic life
Endoskeleton	Endoskeleton	Endoskeleton
Water vascular system	Water vascular system	Water vascular system
Has arboral/oral surfaces	Has arboral/oral surfaces	Has arboral/oral surfaces
Is a carnivore/scavenger	Is a carnivore/scavenger	Is a carnivore/scavenger
Is a grazer	Is a grazer	Is a grazer
Regenerates	Regenerates	Regenerates
Tube feet @ 5 ambulacral grooves	Tube feet @ 5 ambulacral grooves	Tube feet @ 5 ambulacral grooves
Has spines	Has spines	Has spines
“Aristotle’s lantern” teeth	“Aristotle’s lantern” teeth	“Aristotle’s lantern” teeth
Cuverian tubes defense	Cuverian tubes defense	Cuverian tubes defense
First Echinoderm Class	First Echinoderm Class	First Echinoderm Class
Can devour kelp beds	Can devour kelp beds	Can devour kelp beds
Crucial prey of sea otter	Crucial prey of sea otter	Crucial prey of sea otter
Prey of sea spider	Prey of sea spider	Prey of sea spider
Core temp must remain above 35 degrees	Core temp must remain above 35 degrees	Core temp must remain above 35 degrees
Arms look like tangles of snakes	Arms look like tangles of snakes	Arms look like tangles of snakes

Characteristics	Characteristics
Spiny skinned	Spiny skinned
Radial symmetry	Radial symmetry
Bilateral symmetry	Bilateral symmetry
Benthic life	Benthic life
Endoskeleton	Endoskeleton
Water vascular system	Water vascular system
Has arboral/oral surfaces	Has arboral/oral surfaces
Is a carnivore/scavenger	Is a carnivore/scavenger
Is a grazer	Is a grazer
Regenerates	Regenerates
Tube feet @ 5 ambulacral grooves	Tube feet @ 5 ambulacral grooves
Has spines	Has spines
“Aristotle’s lantern” teeth	“Aristotle’s lantern” teeth
Cuverian tubes defense	Cuverian tubes defense
First Echinoderm Class	First Echinoderm Class
Can devour kelp beds	Can devour kelp beds
Crucial prey of sea otter	Crucial prey of sea otter
Prey of sea spider	Prey of sea spider
Core temp must remain above 35 degrees	Core temp must remain above 35 degrees
Arms look like tangles of snakes	Arms look like tangles of snakes

Biomechanics of Adhesion in Sea Cucumber Cuvierian Tubules (Echinodermata, Holothuroidea)1 FREE

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Abstract

Several species of sea cucumbers, all belonging to a single family, possess a peculiar and specialized defense system, the Cuvierian tubules. It is mobilized when the animal is mechanically stimulated, resulting in the discharge of a few white filaments, the tubules. In seawater, the expelled tubules lengthen considerably and become sticky upon contact with any object. The adhesiveness of their outer epithelium combined with the tensile strength of their collagenous core make Cuvierian tubules very efficient at entangling and immobilizing most potential predators. We have designed a method to measure the adhesion of holothuroid Cuvierian tubules. Tubule adhesive strength was measured in seven species of sea cucumbers belonging to the genera *Bohadschia*, *Holothuria* and *Pearsonothuria*. The tenacities (force per unit area) varied from 30 to 135 kPa, falling within the range reported for marine organisms using non-permanent adhesion. Two species, *H. forskali* and *H. leucospilota*, were selected as model species to study the influence of various factors on Cuvierian tubule adhesive strength. Tubule tenacity varied with substratum, temperature and salinity of the seawater, and time following expulsion. These differences give insight into the molecular mechanisms underlying Cuvierian tubule adhesion. Tenacity differences between substrata of varying surface free energy indicate the importance of polar interactions in adhesion. Variation due to temperature and time after expulsion suggests that an increase of tubule rigidity, presumably under enzymatic control, takes place after tubule elongation and reinforces adhesion by minimizing peeling effects.

Posterior End

Anterior End