

Cnidaria Review Questions

- 1) Describe how jellyfish use rhopalia and nerve nets to sense their environments.

Rhopalia are located on the outside edge of a medusa.

Each rhopalium contains multiple sensory structures, including an eye-spot (to detect light), statocyst (to detect gravity and body orientation), and chemoreceptor (to detect chemicals in the water).

Rhopalia are connected to true neurons, which are included in a network of neurons spread out throughout the cnidarian's body; this network of neurons is the nerve net, and functions to integrate incoming information and make decisions.

- 2) Why do you suppose the nerve net is only found in radially symmetric animals, and not bilaterally symmetric ones (bilateral symmetry = two halves, like humans, horses, rabbits, chihuahuas, worms)?

A number of answers acceptable.

E.g. bilaterally symmetric animals have a head with a brain and a central nerve system (e.g. spinal cord in humans) that collects and processes information from neurons. Radially symmetric animals cannot have this type of body organization because there is no 'central line' where information could travel up, nor a brain where the information could travel to. Instead, there is a nerve net, which functions effectively to collect information from all over the body.

E.g. A different type of locomotion is required for these different animals. Radially symmetric ones want to have a centralized nerve net so that they can coordinate motion throughout their body (think about synchronizing many different epitheliomuscular cells to contract all at the same time), while there is more variety in bilaterally symmetric locomotion.

- 3) What subphylum are acrorhagi present in? Describe their structure and function.

Sea anemones. They are sacs packed with cnidocytes. They are used to compete with neighbouring anemones; they can 'explode' and offload all their cnidocytes at once, which can cause a significant amount of damage to other anemones.

- 4) Summarize the life cycle of a jellyfish. Describe the key similarities and differences between the medusa and polyp forms.

Jellyfish alternate between medusa and polyp forms. The medusa reproduces sexually, and is free-floating, which allows it to find a mate. The polyp reproduces asexually and is sessile. The medusa has its mouth/anus on the bottom, while the polyp has its mouth/anus on the top surface.

- 5)
 - a. What is a germ layer? If we know what germ layer a structure or cell belongs to, what does this tell us?

A germ layer is a layer of cells that develops together and conducts similar functions.

If we know what germ layer something is from, we can predict what functions it might be involved with (e.g. nervous system and skin is always ectoderm).

- b. What germ layers do Cnidaria have? Sort the following by germ layer: cnidocyte, gastrovascular cavity, nerve net, mouth, epidermis, rhopalium, epitheliomuscular cell, acrorhagi

Cnidaria have ectoderm and endoderm.

Ectoderm: cnidocyte, nerve net, epidermis, rhopalium, epitheliomuscular cell, acrorhagi

Endoderm: gastrovascular cavity, mouth

- 6) Describe how epitheliomuscular cells allow for cnidarian locomotion (movement)

Cnidarians do not have mesoderm so they cannot have true muscles. Instead, they have epitheliomuscular cells: modified epidermal cells that can contract and expand. Since the epidermis has many of these cells in it, they can work together like a tissue to allow the entire organism to contract or expand.

- 7) Name one trait for each of the cnidarian subphyla that would help you distinguish them in the wild.

A number of acceptable answers.

Hydra: living in freshwater whereas most cnidarians live in the ocean (marine)

Sea anemone: acrorhagi

Coral: have endo/exoskeletons

Jellyfish: have medusa form

- 8) What is a symbiotic relationship? Summarize the coral's symbiotic relationship with algae, in your own words.

A symbiotic relationship is a mutually beneficial relationship between two (or more) organisms. Algae are offered protection from the environment (because it lives in the gut of the coral), and also some of the things it needs for photosynthesis (carbon dioxide). The coral animal is provided with food that the algae has made through photosynthesis, and oxygen.

- 9) What is a hydrostatic skeleton? How does it compare with endo- and exoskeletons?

A hydrostatic skeleton is one where the body shape of an animal is supported by water or a jelly-like substance. In contrast, endo- and exoskeletons involve hard parts being embedded into the body or being present on the outside of the body.

- 10) In the sponge unit, we defined 'sessile' as 'being unable to move'. Given what we have learned in this unit, can you come up with a better definition for this word?

Attached to substrate (ground/ocean floor/sea floor) for most of its life. Movement over long distances is facilitated by passive forces rather than the actions of the animal/plant itself.