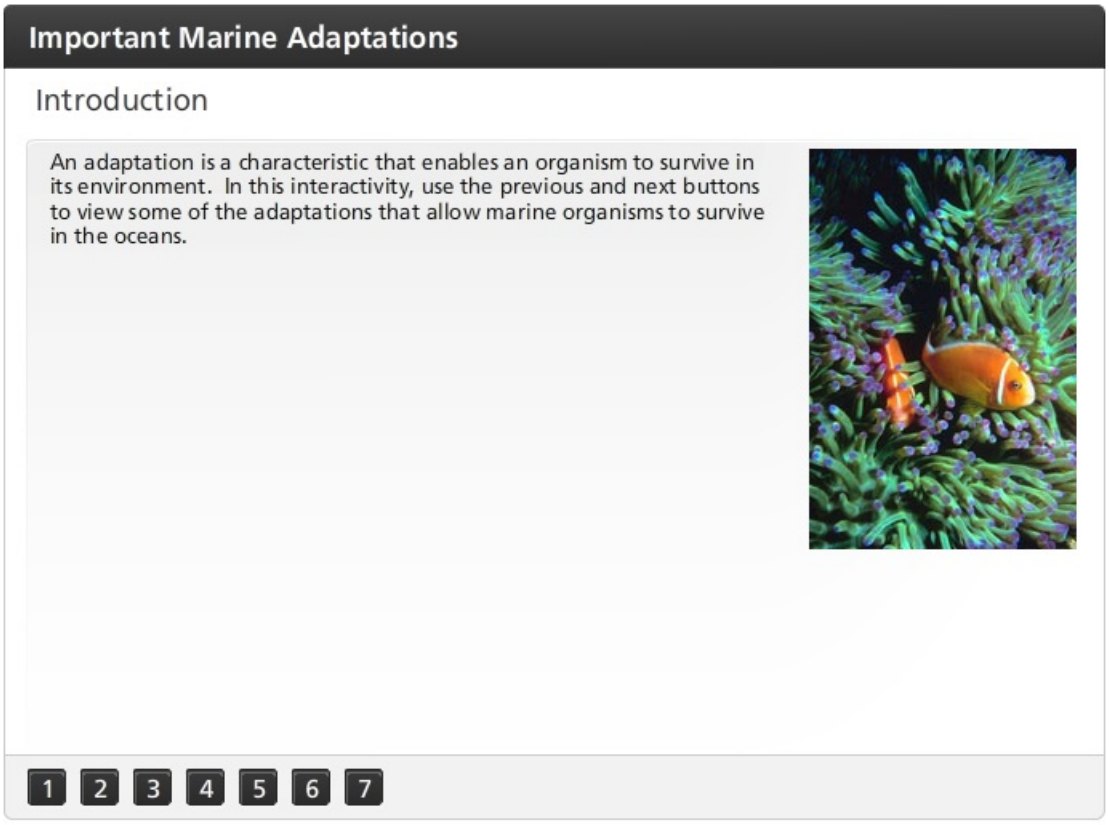
Module 8: Biological Oceanography
Topic 3 Content: Important Marine Adaptations Notes



An adaptation is a characteristic that enables an organism to survive in its environment. In this interactivity, use the previous and next buttons to view some of the adaptations that allow marine organisms to survive in the oceans.

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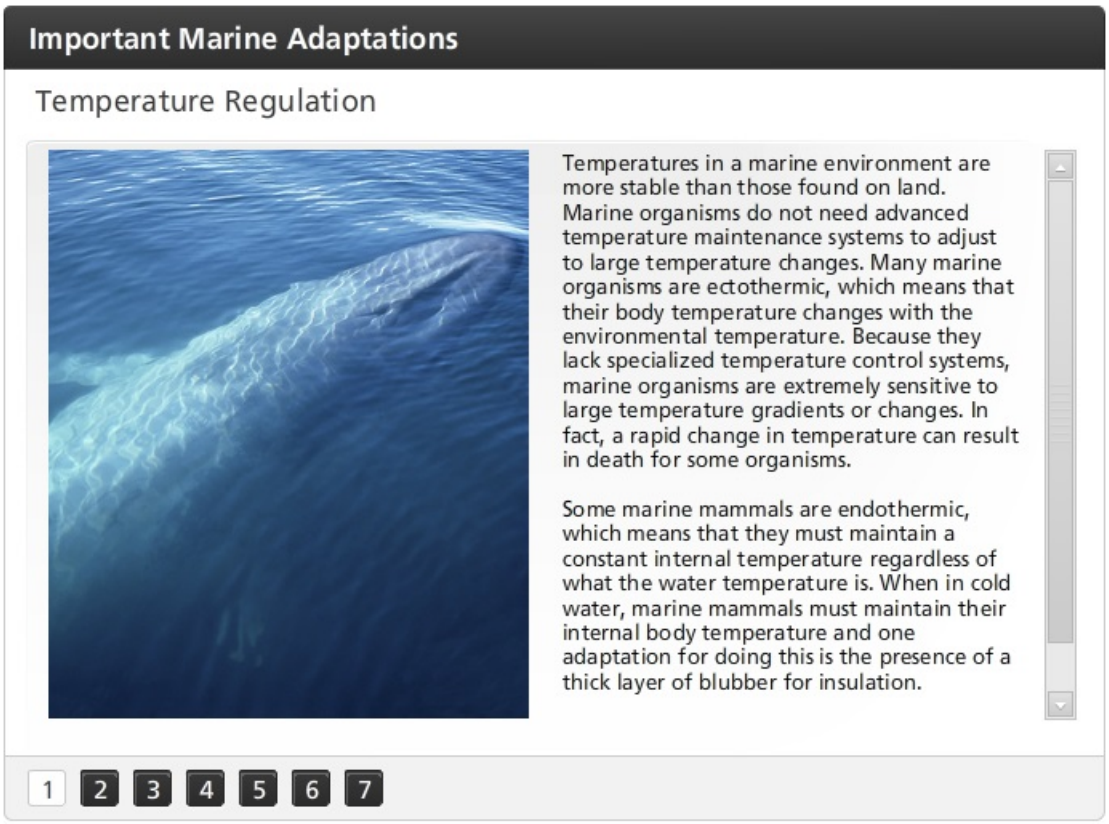

Temperatures in a marine environment are more stable than those found on land. Marine organisms do not need advanced temperature maintenance systems to adjust to large temperature changes. Many marine organisms are ectothermic, which means that their body temperature changes with the environmental temperature. Because they lack specialized temperature control systems, marine organisms are extremely sensitive to large temperature gradients or changes. In fact, a rapid change in temperature can result in death for some organisms.

Some marine mammals are endothermic, which means that they must maintain a constant internal temperature regardless of what the water temperature is. When in cold water, marine mammals must maintain their internal body temperature and one adaptation for doing this is the presence of a thick layer of blubber for insulation.

Image: Whales have a special layer of blubber to help insulate their bodies and maintain a regular internal body temperature.

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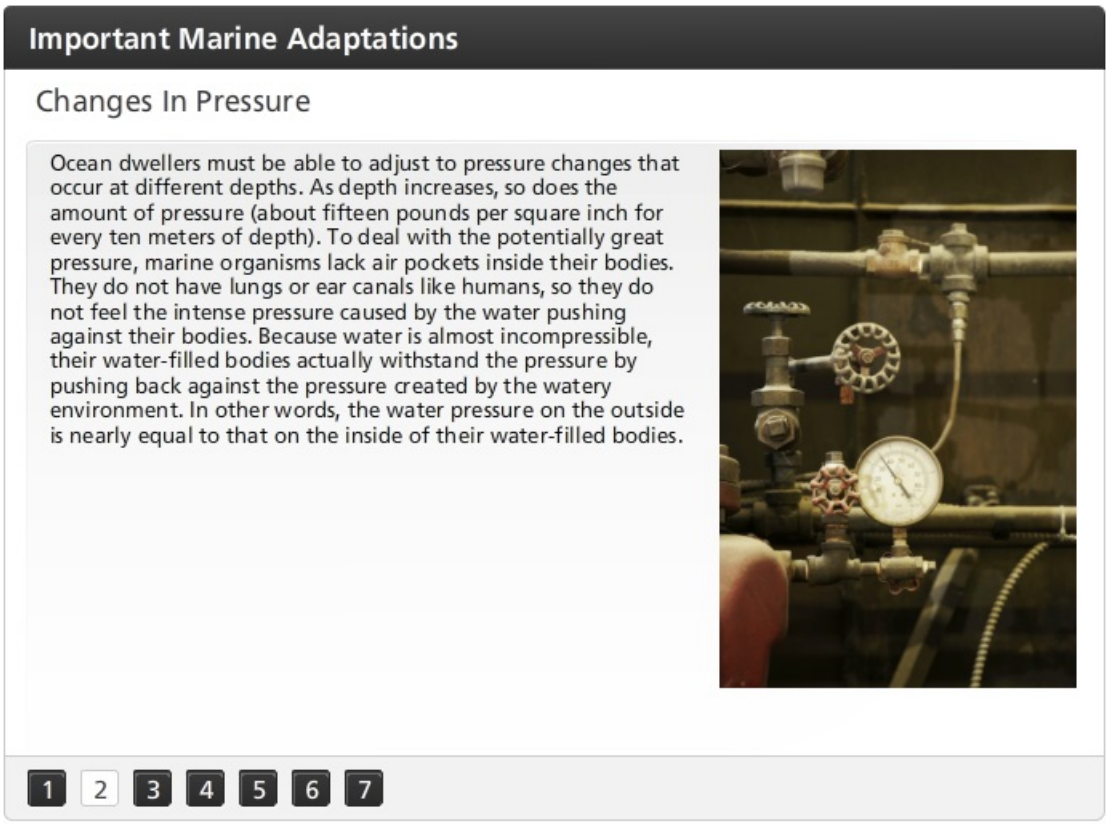

Ocean dwellers must be able to adjust to pressure changes that occur at different depths. As depth increases, so does the amount of pressure (about fifteen pounds per square inch for every ten meters of depth). To deal with the potentially great pressure, marine organisms lack air pockets inside their bodies. They do not have lungs or ear canals like humans, so they do not feel the intense pressure caused by the water pushing against their bodies. Because water is almost incompressible, their water-filled bodies actually withstand the pressure by pushing back against the pressure created by the watery environment. In other words, the water pressure on the outside is nearly equal to that on the inside of their water-filled bodies.

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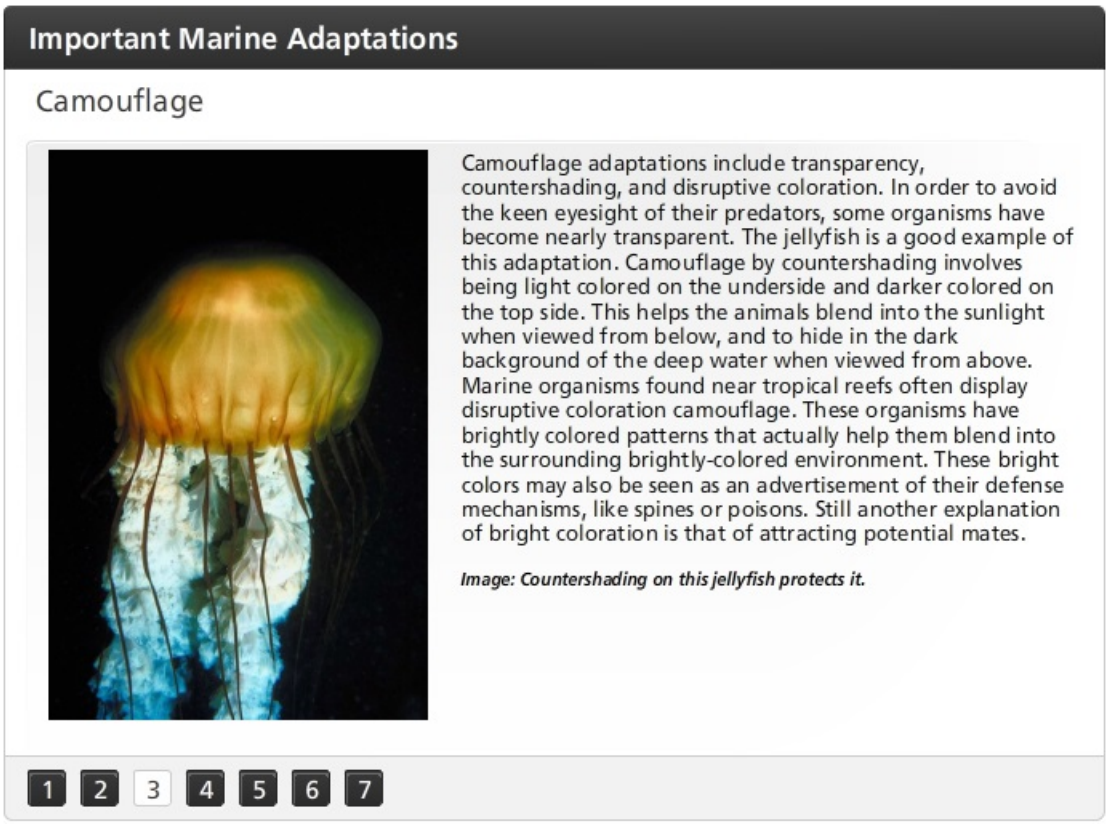
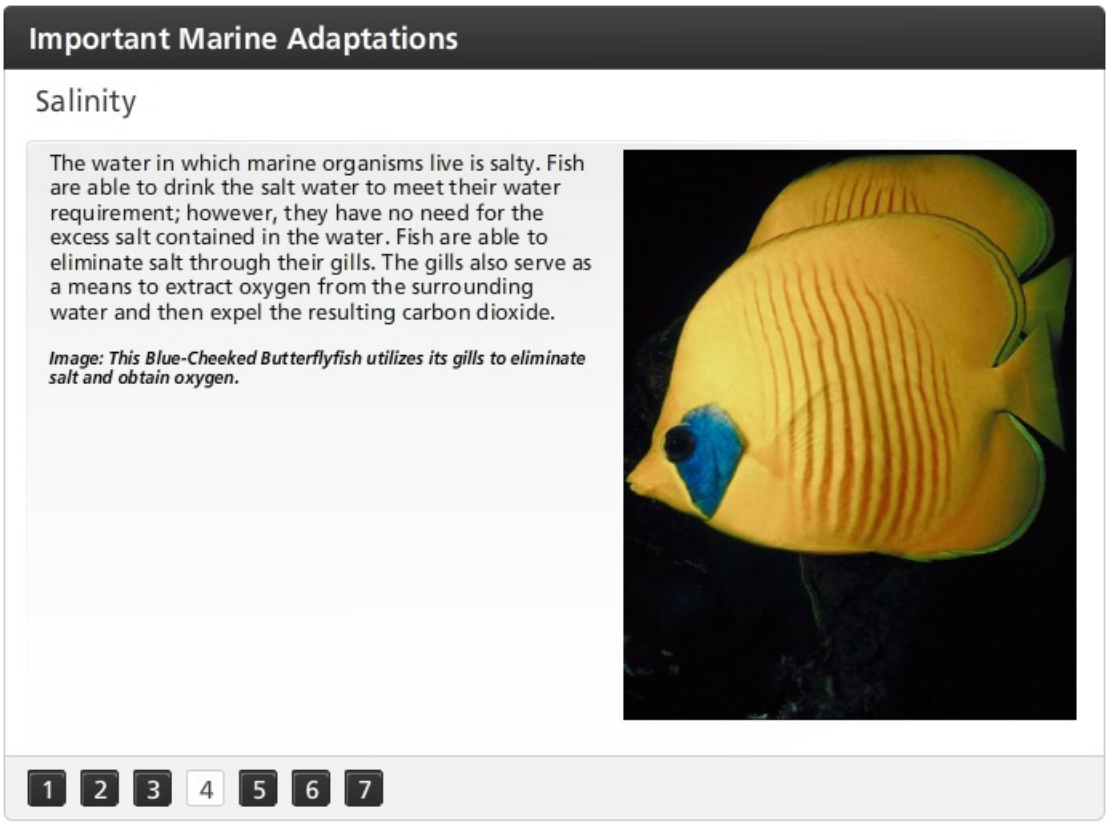


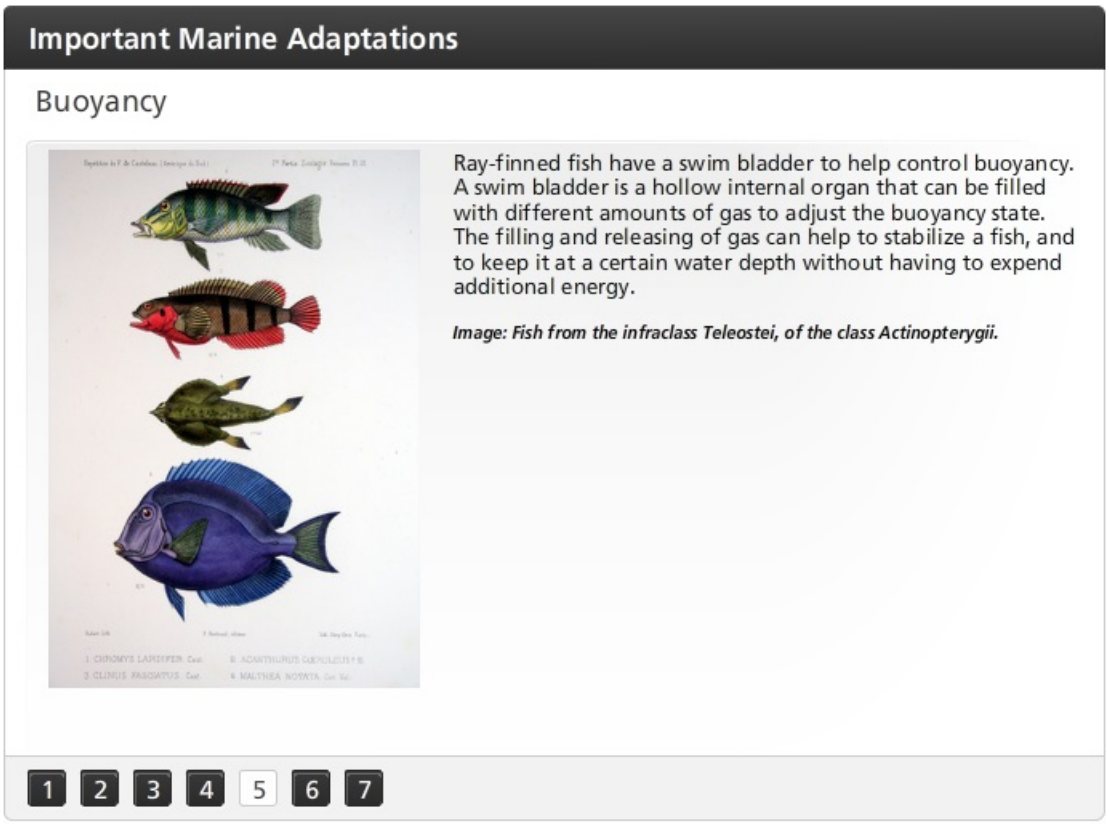
Camouflage adaptations include transparency, countershading, and disruptive coloration. In order to avoid the keen eyesight of their predators, some organisms have become nearly transparent. The jellyfish is a good example of this adaptation. Camouflage by countershading involves being light colored on the underside and darker colored on the top side. This helps the animals blend into the sunlight when viewed from below, and to hide in the dark background of the deep water when viewed from above. Marine organisms found near tropical reefs often display disruptive coloration camouflage. These organisms have brightly colored patterns that actually help them blend into the surrounding brightly-colored environment. These bright colors may also be seen as an advertisement of their defense mechanisms, like spines or poisons. Still another explanation of bright coloration is that of attracting potential mates.

Image: Countershading on this jellyfish protects it.



The water in which marine organisms live is salty. Fish are able to drink the salt water to meet their water requirement; however, they have no need for the excess salt contained in the water. Fish are able to eliminate salt through their gills. The gills also serve as a means to extract oxygen from the surrounding water and then expel the resulting carbon dioxide.

Image: This Blue-Cheeked Butterflyfish utilizes its gills to eliminate salt and obtain oxygen.



Ray-finned fish have a swim bladder to help control buoyancy. A swim bladder is a hollow internal organ that can be filled with different amounts of gas to adjust the buoyancy state. The filling and releasing of gas can help to stabilize a fish, and to keep it at a certain water depth without having to expend additional energy.

Image: Fish from the infraclass Teleostei, of the class Actinopterygii.

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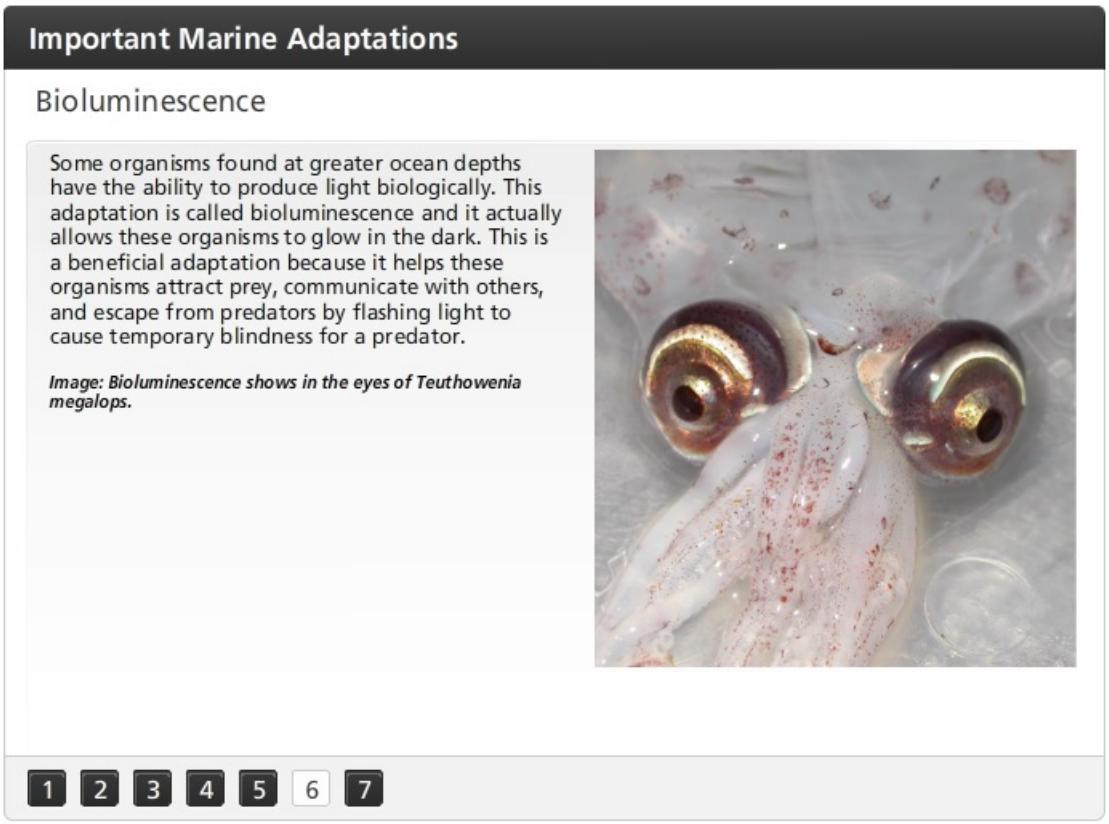
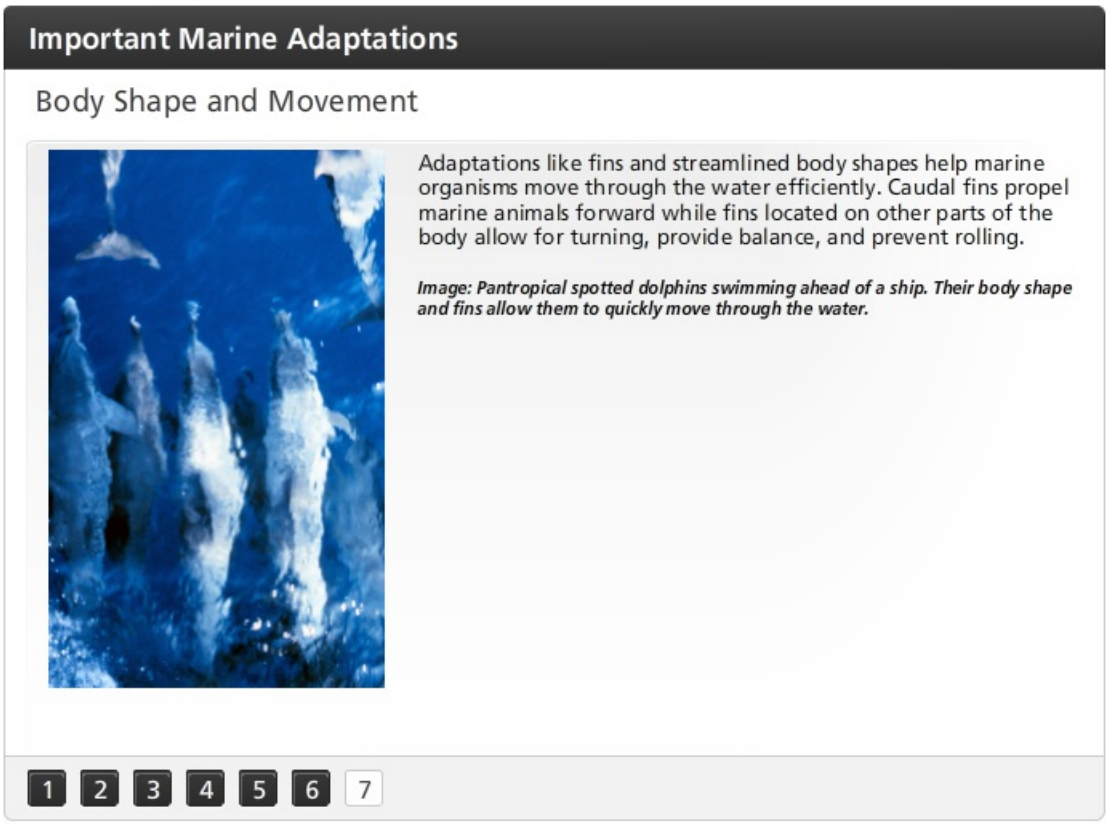


Some organisms found at greater ocean depths have the ability to produce light biologically. This adaptation is called bioluminescence and it actually allows these organisms to glow in the dark. This is a beneficial adaptation because it helps these organisms attract prey, communicate with others, and escape from predators by flashing light to cause temporary blindness for a predator.

Image: Bioluminescence shows in the eyes of Teuthowenia megalops.



Adaptations like fins and streamlined body shapes help marine organisms move through the water efficiently. Caudal fins propel marine animals forward while fins located on other parts of the body allow for turning, provide balance, and prevent rolling.

Image: Pantropical spotted dolphins swimming ahead of a ship. Their body shape and fins allow them to quickly move through the water.