

6.1: Other Animals Reading

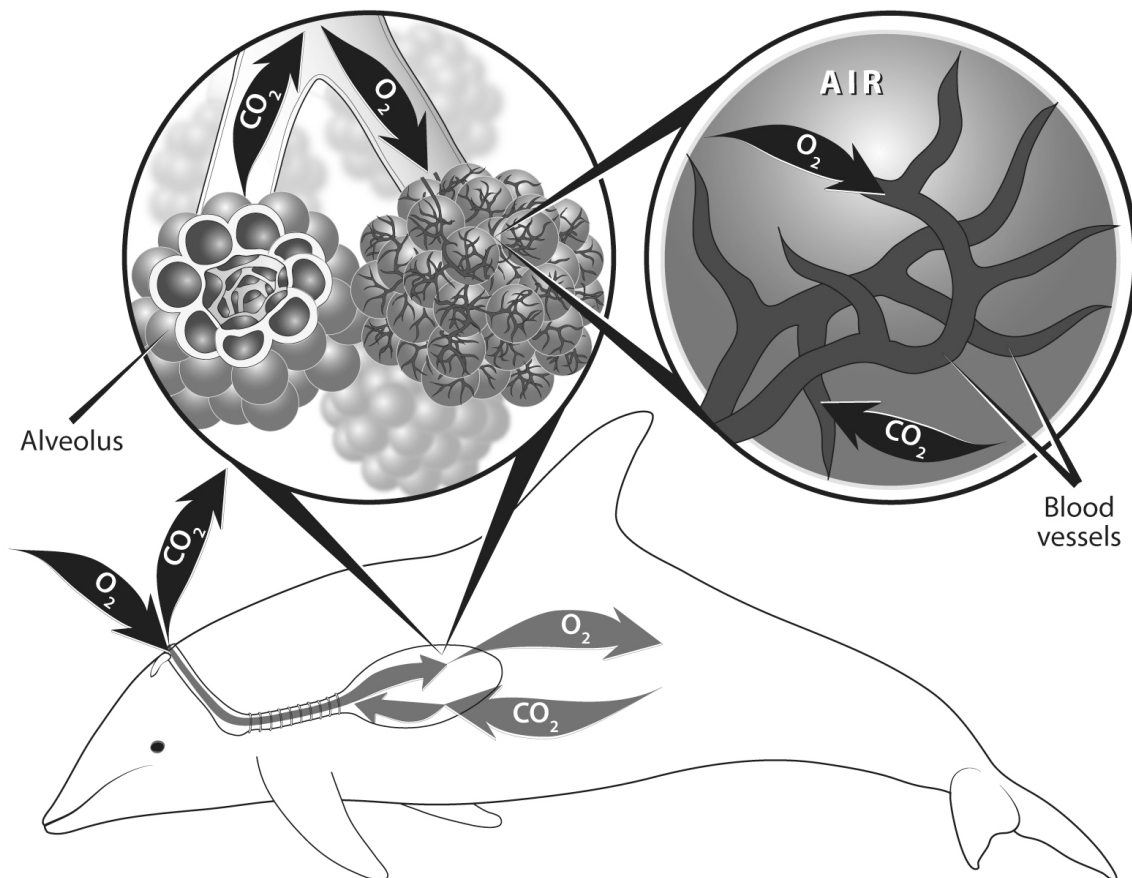
Dolphins: Mammals Living Underwater

Dolphins are a unique group of mammals that live exclusively in the water and have captivated humans since ancient times. The most recognizable dolphins are the bottlenose (think *Flipper* from the 1960's TV show) and the orca or killer whale (starring in *Free Willy* and *Blackfish*) but there are 40 species around the world, including some that live in freshwater rivers. Dolphins are highly social and very intelligent; they cooperate to hunt fish and often travel in family groups. Recent research shows that they even have names for each other!¹

How Do Dolphins Breathe?

Though they may look like fish, dolphins are mammals—just like cows, dogs, and people. Genetic studies find that among mammals, dolphins and other members of the whale order are most closely related to hippopotamus! As mammals, dolphins have lungs and must breathe in air to live. How is it that dolphins can live underwater lives without drowning?

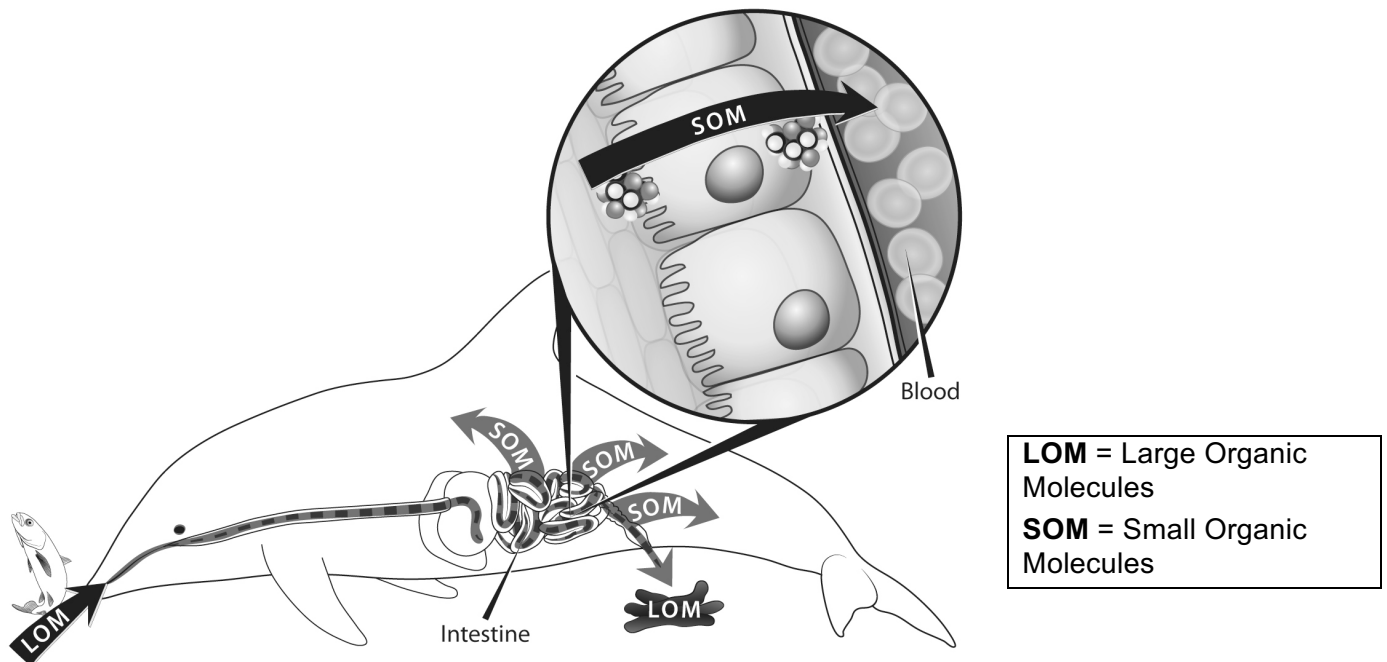
As shown in the illustration below, dolphins (and whales) have an amazing feature to help them live underwater, the blowhole. This is an opening on the top of the animal that connects directly to the lungs. The blowhole allows dolphins to breathe at the surface of the water without having to lift their heads. Just as with other animals, dolphins breathe in oxygen and exhale carbon dioxide to undergo cellular respiration. You can trace the path of O_2 and CO_2 through a dolphin's blowhole and lungs in the illustration below.



How Do Dolphins Live and Grow?

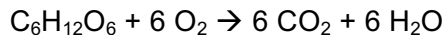
Like other animals dolphins eat and digest food that contains large organic molecules. Dolphins eat a variety of aquatic creatures. Most eat small fish and squid but the large orcas, weighing up to 11 tons, will eat just about anything they can catch, including seals and sharks. Dolphins use this food and oxygen breathed through their blowholes to live, move, and grow. We can explain how a dolphin does this in four steps.

Step 1: Dolphins make the large organic molecules in food into small organic molecules through the process of digestion. Dolphins are like cows and humans in that they have a digestive system with a stomach and intestines containing enzymes that break the large organic molecules in their food—mostly fats and proteins—into small organic molecules that can leave the intestine. Then the dolphin's blood carries those small organic molecules to all the cells in the dolphin's body, as you can see in the illustration below.

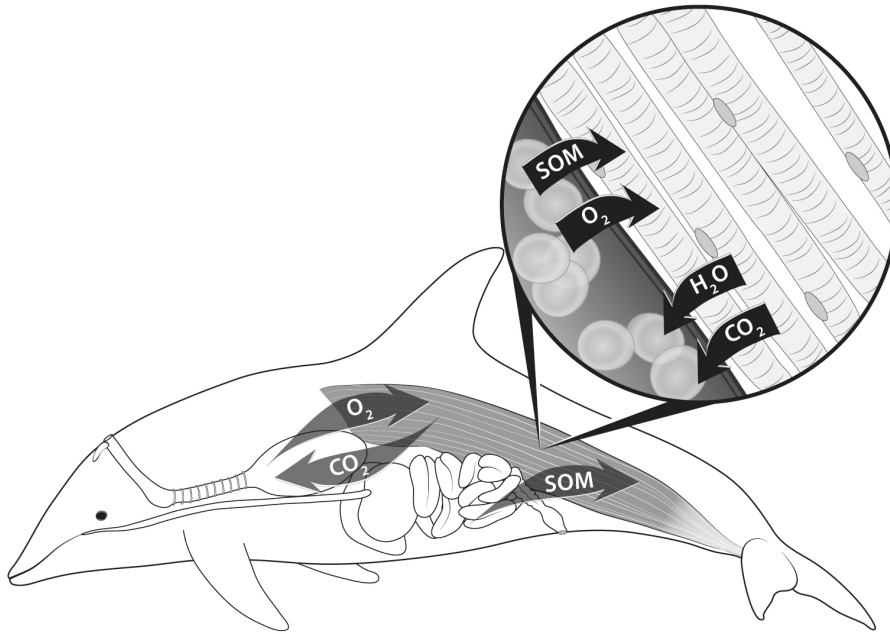


Step 2: Blood carries food and oxygen to all the cells in the dolphin. The dolphin's circulatory system has small blood vessels near the intestines. Small organic molecules, like sugars, from digested food can enter the blood there. There are also small blood vessels in the dolphin's lungs. Oxygen molecules that enter the lungs through the blowhole can enter the blood there. The blood carries food and oxygen to every cell in the dolphin's body.

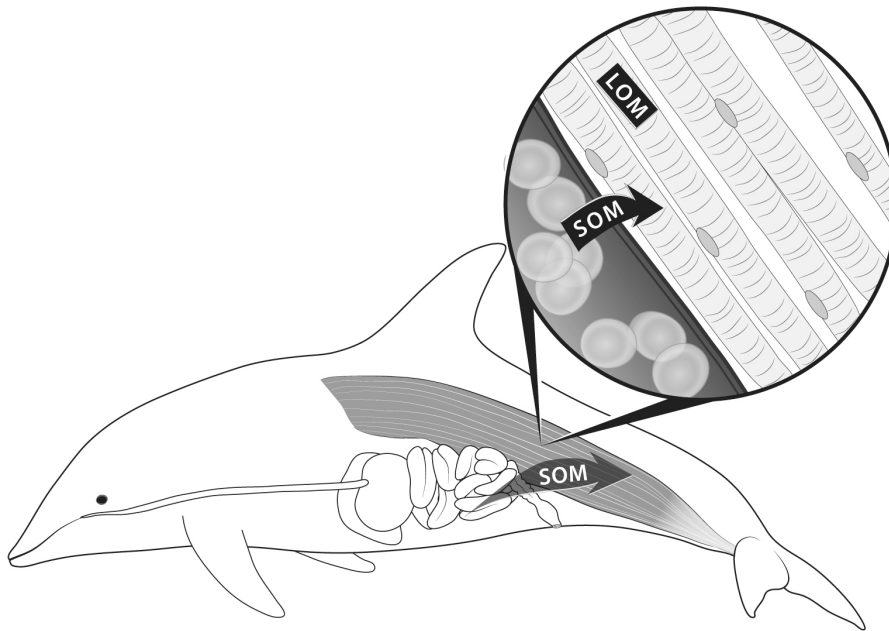
Step 3: All the cells get energy by combining small organic molecules with oxygen in the process of cellular respiration. All the cells need energy to carry out their life functions, and they get that energy by combining glucose and other small organic molecules with oxygen. You are familiar with the chemical equation for cellular respiration:



The waste products from cellular respiration, CO_2 and H_2O , go back into the blood. The CO_2 goes back into the dolphin's lungs and leaves the body when the dolphin exhales through its blowhole. The H_2O leaves the dolphin through urine.



Step 4: Cells grow by making large organic molecules from small organic molecules in the process of biosynthesis. Dolphins grow when their cells grow and divide. In order to grow and divide the cells need to make large organic molecules such as fats and proteins. So each cell combines the small organic molecules from the blood into the large organic molecules that make up the cell and carry out its functions.



Digging Deeper

Here are some more places that you can go to learn about dolphins:

- ¹Read more about how dolphins give each other names:
<http://news.nationalgeographic.com/news/2013/07/130722-dolphins-whistle-names-identity-animals-science/>

- Read more about dolphin intelligence:
<https://www.theguardian.com/science/2003/jul/03/research.science>
 - Read more about efforts to protect dolphins around the world: <http://www.dolphins-world.com/dolphin-conservation-efforts/>
 - Read about a new species of dolphin discovered in the Amazon in 2014:
<http://news.nationalgeographic.com/news/2014/01/140124-river-dolphin-new-species-brazil-araguaian-boto-science/>
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