Turtles

Anatomy

Sea turtles are adapted to live in the ocean, with some unique features that help them to survive in the marine environment. As reptiles, they require air to breathe and land to lay their eggs. However, the majority of their lives are spent underwater.

Unlike their freshwater relatives, the head and limbs of sea turtles are fixed outside the shell and cannot retract into the shell. This distinctive feature, along with a streamlined shell, makes them more hydrodynamic in the water than their land-based counterparts, allowing them to maneuver easily through their saltwater habitat.

Sea turtles are generally not extremely fast swimmers. Usually, they cruise at around 0.9 to 5.8 mph (1.4 to 9.3 km/h), but have been found to swim up to 22 mph (35 km/hr) when frightened. To help them efficiently power their bodies through water, sea turtles have long flippers instead of the webbed feet of their freshwater counterparts. The large and strong front flippers act like paddles to propel them through the water, while the smaller back flippers function as rudders to help them steer. In females, the hind flippers have another purpose as well—they are used to dig an egg chamber in the sand when they come ashore to nest.

The seven sea turtle species are part of a group of about 100 living marine reptile species in the world. Living in salty ocean water is not easy and many marine organisms have special adaptations in order to survive in the excessive salt of their environment. If sea turtles had a salt concentration in their body the same as their seawater surroundings, it would be lethal. When eating, they ingest a large amount of salty seawater. To get rid of this excess salt, sea turtles have large glands by their eyes that release salt in higher concentrations than the surrounding ocean water. These salt glands are why many people who observe sea turtles on land believe that the animals are crying. The leatherback sea turtle has extremely large salt glands compared to other species; their glands are more than twice the size of their brains. They require such large salt glands because of their preferred diet of jellyfish. Since jellies are composed of mostly seawater, the leatherback ingests much more salt while feeding than any other sea turtle species.

Sea turtles cannot breathe underwater, but they can hold their breath for long periods of time—between 4 to 7 hours when resting. While holding their breath, their heart rate slows significantly to conserve oxygen—up to nine minutes can pass between heartbeats. Because of this, sea turtles can stay underwater for an extended period of time when not stressed.

Their breath-holding abilities allow them to dive deep in the ocean to find food. Most turtles can dive to depths of up to 290 m (960 ft). However, one species of sea turtle—the leatherback—can dive over 1,000 m (3,000 ft)! The maximum depth ever recorded for a sea turtle dive was a leatherback that dove 1,200 m (3937 ft). Leatherbacks are able to do this because of their adaptations for deep diving. Unlike the other species of sea turtles, leatherbacks have a flexible shell that absorbs nitrogen and collapsible lungs that allow them to compress themselves while diving to cope with the pressure change. The turtles have large stores of oxygen in their blood and muscles and a drastically slowed heart rate to conserve oxygen while diving.

Reptiles are ectothermic, meaning they rely on the environment to regulate their body temperature, and sea turtles are no exception. It is therefore surprising that unlike other sea turtles, leatherbacks are cold-adapted. They can migrate to cold water to hunt their prey without getting cold-stunned. The leatherback achieves this feat with counter-current heat exchange. This system runs warm blood from their inner bodies out to their extremities next to the cold blood running back inwards. The two blood temperatures participate in heat exchange and, therefore, the cold blood is warmed before re-entering the body core. Leatherbacks also retain warmth

because of their dark color and layers of fatty tissue and oil that act as heat absorbers and insulation. The leatherback has a much higher metabolism than other sea turtles; their huge muscles create a lot of heat when they are active.

The abilities to function in cold water and to make every breath taken as efficient as possible, allow the leatherback to dive to very great depths. They can carry twice the amount of oxygen in their blood as other sea turtles and can redirect blood to the brain and heart to make sure their vital organs always have oxygen on deep, cold dives.

Researchers don't know exactly why leatherback sea turtles dive to such depths, but a 2008 study suggested that the dives function as a sort of reconnaissance mission. The turtles primarily eat jellyfish that migrate to the deep ocean during the day. Leatherbacks could be using deep dives to scout out where the jellies are in order to be in the right spot at nightfall when the jellyfish return to the surface and make for a tasty meal for the waiting leatherback.

In the Food Web

Most sea turtles are omnivores, meaning they eat both plants and animals. The only herbivorous sea turtle is the green sea turtle, but they do not start out as herbivores. As hatchlings, green sea turtles eat fish eggs, mollusks, and crustaceans. It is not until adulthood that their diet switches exclusively to algae, seaweed, and seagrasses.

The leatherback sea turtle is another specialist, a carnivorous one. Leatherbacks are known for preying on jellyfish, though they will also eat squid and other jellyfish-like invertebrates. The rest of the sea turtle species eat a more varied diet, though most do have a favorite meal. Hawksbill sea turtles have diets that are up to 95 percent sea sponges. Though they are sponge specialists, they also eat squid, shrimp, and algae. Loggerheads have the widest variety in their diet of any sea turtle. They eat sponges, corals, barnacles, sea cucumbers, jellyfish, sand dollars, and many other marine organisms. Their large jaws are very strong and allow them to crush and eat all kinds of prey. The Kemp's ridley's favored food is crabs, but they also eat fish, jellyfish, and other mollusks. Olive ridleys also eat a variety of species—they munch on crabs, shrimp, lobster, urchins, jellies, algae, and fish. The flatback diet is mostly carnivorous, consisting of sea cucumbers, soft corals, jellyfish, shrimp and occasionally seagrass.

Sea turtles do not have teeth to grasp their prey with, but instead, have very sharp beaks and strong jaws they use to crush their food. Every sea turtle also has stiff downward projections in their throats called papillae that prevent their meals from slipping back out of their mouth. Green sea turtles, due to their specialized diet of marine plants, have evolved serrated jaws to help them tear and munch their fibrous meals. Leatherbacks have no distinct beak like other sea turtle species; instead, their mouths function like scissors to grasp and swallow their jellyfish prey.

Sea turtles can also be prey—especially as hatchlings. As the tiny turtles make their way down the beach from the nest to the ocean, they are susceptible to raccoons, foxes, seabirds, and crabs. Once in the water, they can be eaten by seabirds, large fish or sharks. More than 90 percent of hatchlings are eaten by predators—meaning in a nest of 110 eggs, only about 11 will grow to be adults.

There are also many dangers that threaten sea turtle eggs. Predators on the beach can locate and dig up the nest to eat the eggs. The nests are also susceptible to damage by erosion, rain, flooding, or even other nesting sea turtles.

Adult sea turtles do not have much to fear but can be eaten by orcas, sharks, seals, or crocodiles. Some nesting females have been attacked by jaguars, as well. However, a sea turtle's most dangerous predator is actually humans.

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