

# AMAZING ADAPTATIONS

## TIME & AUDIENCE LEVEL

- All audiences
- Grades 2-5
- 30-35 Minutes

## MATERIALS

- Loggerhead carapace
- Loggerhead skull
- Rhamphotheca
- Esophageal papillae
- Knobbed Whelk
- Blue crab
- Epibiota carapace
- Gopher tortoise shell
- Kemp's Ridley carapace/plastron
- Dress-up kit

## SET-UP

- Arrange specimens on table in following order: Kemps carapace and plastron, gopher tortoise shell, epibiota carapace, adult loggerhead carapace, loggerhead skull and rhamphotheca, knobbed whelk and blue crab, esophageal papillae
- Place Word Wall words with appropriate specimen
- Place dress-up items under tablecloth.

## VOCABULARY

- Adaptation
- Behavioral adaptation
- Camouflage
- Carapace
- Epibiota
- Esophageal papillae
- Hydrodynamic
- Keratin
- Morphological adaptation
- Nictitating Membrane
- Plastron
- Rhamphotheca
- Salt Glands
- Magnetite Crystals
- Scute
- Flippers

## OBJECTIVES

- 1) Explain adaptation and differentiate between morphological and behavioral.
- 2) Identify morphological and behavioral adaptations in sea turtles.
- 3) Infer how each adaptation is advantageous to sea turtle survival.

## SUMMARY

Adaptations are changes in the structure or function of an animal that allow it to survive in its environment. Sea turtles have many physical and behavioral adaptations that allow them to survive in their marine environment.

## PROGRAM

Sea turtles are marine reptiles that have a number of special adaptations that allow them to live in a salt water environment. Adaptations can be behavioral or morphological. A **behavioral adaptation** is something a living organism does (ex: migration) as opposed to a **morphological adaptation** which is a physical characteristic an organism has developed (ex: esophageal papillae) for survival.

### **Morphological Adaptations**

The sea turtle's **carapace** (top shell) and **plastron** (bottom shell) are hard and made of bone. The vertebrae and ribs are fused into the carapace providing external protection from natural predators (sharks, orca whales) as well as structural support.

## CRITICAL THINKING QUESTIONS

- 1) COMPARE AND CONTRAST ADAPTATIONS OF A SEA TURTLE, AND TORTOISE SHELL. HOW EACH WOULD BEST SURVIVE IN THEIR HABITAT?
- 2) WHAT 'ADAPTATIONS' WOULD HUMANS NEED TO SURVIVE IN A SEA TURTLE'S HABITAT?
- 3) DESCRIBE HUMAN FEATURES THAT ARE SIMILAR TO TURTLE ADAPTATIONS.
- 4) DESCRIBE AN ADAPTATION THAT HELPS SEA TURTLE SURVIVE IN GEORGIA'S COASTAL WATERS.

## GEORGIA PERFORMANCE/ COMMON CORE STANDARDS

S2CS1  
S2CS4  
ELA2R1  
ELA2LSV1  
S3CS8  
S3L1  
S3L2  
ELA3R2  
LEA3LSV1  
S4CS1  
S4L1  
S4L2  
ELA4LSV1  
S5L1  
S5L2  
ELA5LSV1

**Scutes** (modified scales made of **keratin**, like human fingernails) cover the carapace and provide **camouflage**. Each species' scutes are colored according to their habitat. A Kemp's Ridley's scutes are dark brown, dark green, or gray. This helps them camouflage, or blend in with the muddy bottoms in dark, murky waters.

The carapace and plastron are **hydrodynamic**, designed to allow sea turtles to swim away from predators at speeds of 20 mph. Unlike sea turtles, land dwelling turtles (like terrapins and tortoises) have round, dome shaped shells, allowing them to pull their head and limbs inside the shell for protection.

Sea turtles have two pairs of flippers. Two long, paddle-like front flippers and large muscle groups that help propel them through the water. Their two rear flippers are shorter and stubbier, acting as rudders like on a boat to steer the turtle through the water.

Loggerheads shells are often covered with a community of living organisms known as **epibiota**. Many animals such as sponges, leeches, barnacles, anemones, and crabs are found living on the carapace of a sea turtle and may help camouflage the animal in its natural environment. An overload may weigh or slow the animal down, and epibiota growing into the skin often indicates an unhealthy turtle. Some to a moderate level of epibiota is normal for loggerhead sea turtles.



A common misconception is that sea turtles breathe underwater like fish. Turtles are reptiles and have lungs just like humans. Fortunately, they are designed with very large lungs that run the nearly the length of their carapace, a virtual set of scuba tanks. So how long can a sea turtle hold its breath? Depending on their body size and activity level, they can hold their breath from a few seconds to a few hours!

Loggerhead sea turtles are named for their large skulls. They have strong jaws lined with flat crushing plates (beak), known as a **rhamphotheca**, for eating hard-shelled prey like whelks and crabs. They do not have teeth; instead, their beak acts like a human molar for crushing and grinding. All sea turtles have a unique throat lining of keratinized thorn-like projections. These **esophageal papillae** not only protect the sea turtle's throat from sharp objects, but also push food towards the stomach as the turtle expels excess salt water.

**NEXT GENERATION SCIENCE**  
**STANDARDS**

2-LS4-1

3-LS4-3

3-LS4-4

3-LS1-1

3-LS3-1

3-LS3-2

3-LS4-2

3-ESS2-2

4-LS1-1

4-LS1-2

**RESOURCES**

Gulko, D. (2004). *Sea turtles: an ecological guide*. Honolulu, HI: Mutual Pub.

The inside of a Loggerhead skull features several interior cavities. The two large spaces at the top of the skull house **salt glands**. Sea turtles must rid their bodies of excess salt. The salt glands sit directly behind the eyes and concentrate the salt which is secreted in a thick, mucous tear.

Sea turtles are nearsighted on land, but have great vision in the water. To aid in clear vision, they have a clear third eyelid called a **nictitating membrane**. This allows them to see without the burn of saltwater that humans experience when opening their eyes underwater.

**Behavioral Adaptations**

Sea turtles use many cues to **migrate** the oceans; from mating and foraging grounds offshore, to coastal nesting beaches. Some cues they may use include: current patterns, seasonal changes in ambient light and temperature, and the earth's magnetic field. Scientists believe that **magnetite crystals** located in the sea turtles' brain may also help the sea turtles navigate.

**Activity**

The students will assist the educator in turning one individual into a sea turtle! Review and reinforce each adaptation as you build the sea turtle.

**Carapace/plastron.**

**Fins**-Represent flippers, small fins go on feet, large fins go on hands

**Beak**— Represents the rhamphotheca.

**Goggles**- Represent a sea turtle's nictitating membrane and heir ability to see underwater.

**Epibiota**—columbus crabs, sea anemones, barnacles and leeches represent a number of organisms that can be found on a sea turtle's shell.

