Level 2: Desert Habitat

Walk to the back of the Discovering Life Hall where there are three habitats, and find the desert habitat.

Q1: What physical characteristics do you observe in the desert? What living organisms do you observe? (TEKS 3.9A)

Q2: What adaptations do these living organisms have to help them survive in the hot, dry desert environment? What inferences can you make about how these adaptations increase chances of survival?

The plants and animals in this habitat are listed on the panel in front of the prairie dogs. From this panel, you can look to the right to see a jackrabbit and a hawk. These two animals consume (eat) different organisms. A jackrabbit eats leaves from bushes like the ones you can see around it. The large ears of the jackrabbit help it to hear predators that may be nearby. The hawk has a sharp beak and sharp talons. It eats other animals, like the jackrabbit.

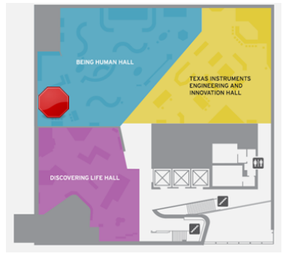
Desert plants live in a dry and sunny environment, so they don't need big, flat leaves to help capture sunlight. Instead, they need leaves that can hold in water. Leaves in desert environments are often thin and narrow or have a waxy coating. In addition to a waxy coating, a cactus has spikes that help protect itself from animals that might want to eat it. If you look at the Museum's living roof, you can see live cacti. (TEKS 3.10A, 4.10A, 5.10A)

Q3: Choose an animal you see in the desert. If this animal were moved to the Pineywoods environment, what adaptations that this animal currently has would be helpful to its survival in the new environment? What current adaptations would be useless?

Making Connections: Do the plants you see in the desert habitat look like the ones that the dinosaurs ate? How are they similar and how are they different? Before you leave the Discovering Life Hall, take a look at the cheetah on display. What adaptations does this cheetah possess and what are these adaptations useful for?

Level 2: BioLab

The BioLab is an area where you may complete a 15-20 minute experiment with your group. Hours vary, so check with a staff member at the lab for more details. The BioLab on the left as you enter the Being Human Hall.



One experiment in the BioLab is DNA Extraction which allows students to see plant DNA on a microscope.

Q1: What are some living organisms that have DNA?

Living organisms have DNA. Plants, animals (including humans), and some germs have DNA. Non-living things, such as rocks, do not have their own DNA.

Q2: What conclusions can you draw about where living organisms get their DNA?

Living organisms like plants and animals inherit DNA from their parents. This mixture of parental DNA produces inherited traits that are similar to, but different from, each parent's traits.

Q3: Based on what you have learned, what you predict would happen if part of an organism's DNA is incorrect or missing?

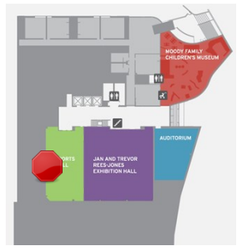
DNA contains coded information a living organism needs to function. For example, different DNA codes are the reason why one person's eye color is brown and another person's is blue. In this experiment, the wheat's DNA code provides the instructions that create structures to make the wheat have the color, shape, texture, and size it has. If organisms have different structures, like the beak of an eagle versus the beak of a pigeon, they have different DNA codes. Identical twins are two humans who would have essentially the same DNA code. . (TEKS 3.10A, 4.10A, 5.10A)

If the DNA codes change in an organism or if parts of the codes are missing, a mutation occurs. Most mutations are harmful to organisms, however a rare few help the organism survive better than other organisms without the mutation. If that mutation gets passed to offspring and becomes part of the population, that mutation is an adaptation.

AMAZING FACT: All of the DNA in a single cell, if stretched out and laid end to end, would be 6 feet long.

Lower Level: Motion Lab

As you enter the Lamar Hunt Family Sports Hall, the entrance to the Motion Lab will be about halfway back on the right side of the hall.



The motion lab takes a slow motion video of a person completing an activity. While you and your students are waiting in line for the motion lab, look at the directions above the door and ask each person in your group to decide what activity they'll do. As you are waiting to enter the lab and after filming, while each student is watching their video, discuss the following information.

Q1: What parts of your body allow you to complete your activity?

Many of the activities will have someone use both hands and feet. The tools we use for sports are crafted to fit human hands and feet, but you might notice something is too big or too small for one person. The overall structure of human hands and feet are the same, but each person has small differences.

Q2: Compare and contrast how you use your hands and feet to complete activities and tasks such as sports or writing and drawing.

Our hands, in particular, are one of the tools that helps humans to survive in many situations. Humans are one of only a few types of animals that has an opposable thumb which allows us to grasp objects and securely hold them. This adaptation gives us the ability to hold onto a baseball bat or balance beam, steadies us when doing push-ups or cartwheels, or allows us to hold pencils and markers to write and draw. (TEKS 3.10A, 4.10A, 5.9A, 5.10A)

Q3: Some behaviors, such as throwing a football, kicking a soccer ball, or writing your name, are learned as you grow. Other behaviors are inherited from your parents and you are born knowing how to do them, such as sneezing. How could you use a science experiment to prove that behaviors like throwing a football, kicking a soccer ball, or writing your name are not activities you are born knowing how to do?

AMAZING FACT: The left side of your body is controlled by the right side of your brain. The right side of your body is controlled by the left side of your brain.

3rd–5th Grades Life Science

Perot Museum Chaperone Guide

Exploration Question

How do adaptations help an organism survive in its environment?

Per[ ]t
Museum of Nature and Science

Navigation & Background

Organisms are living things. All organisms on Earth, whether plant, animal, fungi, bacteria, or protist, whether single-celled or multi-celled, adapt to the environment in which they live.

Adaptations are traits that exist in a population of organisms that help those organisms survive in their environment. Survival in the natural world means an organism is able to grow to an age where they are able to reproduce and pass their DNA on to the next generation. Adaptations do not occur simply because an organism needs them. For example, a beetle will not turn blue because its environment changes to have more blue foliage.

Adaptations are important to populations as they interact in their environments. An adaptation that was once quite advantageous in a specific environment may be less advantageous if an environment changes. For example, tan colored mice may have advantage over darker brown mice in a light, sandy environment because they are better camouflaged from predators like hawks. However, if the area experiences a series of volcanic eruptions resulting in more of the ground being covered in dark colored lava flows, the tan mice will be at a disadvantage because they will be less camouflaged and more easily hunted by predators.

Adaptations may be structural features of an organism such as fur or feather color, behaviors such as nest building, or physiological such as hormones.

The Adapting Through the Ages tour of the Perot Museum will allow you and your students to explore the adaptations of plants and animals that lived long ago as well as those that are currently alive that aid them in survival in their environments.

Welcome to the Perot Museum of Nature and Science!

Use this guide to facilitate your students' educational journey through the Museum exhibits.

Each stop on your journey has probing questions, indicated in blue, that you can ask your students in order to spark their thinking.

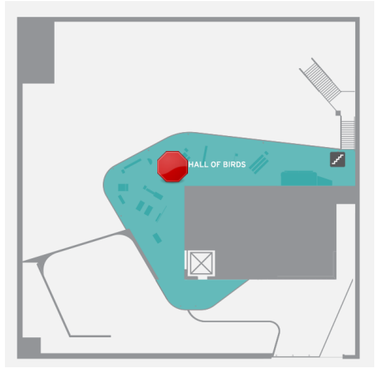
Background information, indicated in black, is provided to help you understand the science behind each exhibit.

Connections to other Museum exhibits and Amazing Facts are indicated in green.

Navigation information, indicated in red, is designed to help you locate each exhibit.

Level 4M: Eating Utensils

Move through the Rose Hall of Birds until you find the Beak Types case that has different species of taxidermy birds displayed.



Q1: Looking in the Beak Types case next to the table, what are some shapes of birds' beaks that you observe on the birds displayed here?

Birds beaks come in many shapes and sizes. Some are flat and scoop like while others are razor sharp. The Museum's exhibit called Eating Utensils simulates bird beaks that are feeding on pom-pom ball food.

After students make some observations, have them try out the Eating Utensils table activity with the tongs, the spoon, and their own hands.

Q2: Why do you think it was easier for you to use your hands than the pretend bird beak tools?

Because we are accustomed to using our hands, we are often not as comfortable using tools like these. For birds, they do not have an option other than to use their beaks. In fact, birds can actually do things with their beaks that we cannot do with our hands. Some birds, like some parrots or hornbills (which you can see a picture of on the edge of the table), use their beaks to crack hard nuts. Bird beaks are tools they take with them everywhere.

Q3: What foods would you predict that the birds who have beaks similar to tongs and spoons actually eat?

The spoonbill, which is also pictured, uses a beak like the slotted spoon tool to capture insects and other small things in water. Its spoon-shaped beak allows it to hold onto an insect without too much water remaining in the beak. The sanderling has a beak similar to the tong tool. This beak allows it to dig through the sand in its environment to find small crustaceans, like crabs, and other food in the sand. They can also use their beak to open some shells. (TEKS 3.10A, 4.10A, 5.10A)

AMAZING FACT: Toucans are black and white, tropical birds that are recognized for their distinctive, large, orange beaks. Scientists have learned that toucans control their body temperature by adjusting how much blood flows through their beaks. To cool down, more blood flows into the beak.

Level 4: Sauropod Footprint

As you enter the T. Boone Pickens Life Then and Now Hall on Level 4, you will see a large fossil on the ground. Make observations about this fossil by touching the fossil with your hands and using your eyes to see the colors, textures, and details.

Q1: What do you see in this fossil?

Q2: What conclusions can you draw about the animal who made this footprint?

The animal that made this footprint was tall and must have weighed a lot because the footprint is large and deep. The dinosaur that made the footprint looked similar to the one you can see in the image on the screen behind the footprint.

Walk around the screen into the hall and look up at the tallest dinosaur in the hall. This dinosaur, named Alamosaurus, would have left footprints similar to the one you just saw.

Q3: What evidence can you collect by observing, reading, or talking to an Engagement Specialist that supports your claim about the animal that made this footprint?

Alamosaurus used their tall height to eat plants, like leaves on trees. They were consumers meaning they were dependent on other organisms for food. (TEKS 4.9A, 5.9B) In addition, their large size aided in scaring off predators, such as *T. rex*. *Alamosaurus* had adaptations other than size that helped it survive.

Q4: What other adaptations does Alamosaurus have, and how did these adaptations help it survive?

Alamosaurus had flat teeth made for chewing. This indicates that Alamosaurus was an herbivore and ate plants. (TEKS 3.10A, 4.10A, 5.10A)

To examine Alamosaurus' head and teeth more closely, visit the Bird Hall on Level 4M and look through one of the portholes in the wall .

Next to the *Alamosaurus* is a *Tyrannosaurus rex*. *T. rex* was also a consumer and would have eaten other dinosaurs including the *Alamosaurus*. Take a moment to identify the adaptations that *T. rex* had that helped it survive.

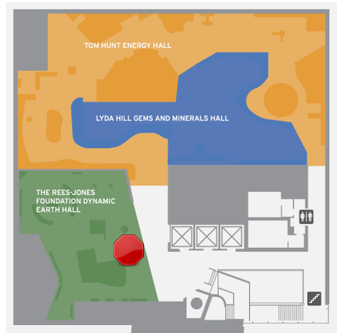
Q5: Compare and contrast the adaptations of *Alamosaurus* to those of *T. rex*.

T. rex was a carnivore as indicated by the sharp teeth, massive jaws, and claws it used to bite and tear the meat from the other dinosaurs it consumed.

AMAZING FACT: The *Alamosaurus* neck fossils that are exhibited in this hall next to the model of the *Alamosaurus* were excavated by Perot staff. They are so large and weigh so much, they had to be moved from where they were found by helicopter.

Level 3: Fossilized Plant Impressions

As you walk from the elevator landing into The Rees-Jones Foundation Dynamic Earth Hall, you'll see several fossils. Stop here before walking onto the earthquake shake.



Q1: What do you observe in this fossil?

These fossils are impressions of plant leaves.

Q2: Compare and contrast this fossil to plants we see outside. Have you seen plants like these in Texas?

These fossils are from two places that are currently colder than Texas – Alaska and Antarctica. For the plants with leaves, like the ones that made these fossils, to produce food, they need a relatively warm and sunny environment. Organisms that produce their own food using sunlight, water, and carbon dioxide are called producers. (TEKS 4.9A, 5.9B)

Q3: What conclusions can you draw about the climate of Alaska and Antarctica during the time when plants like those shown in this fossil were alive?

During the time of the dinosaurs, when the plants that made these fossil impressions were alive, both of these areas were warmer than they are today. (3.9C, 5.9D)

Making Connections: Of the consumers you've seen today, which one would have more likely eaten plants similar to those that made these fossils? What adaptation provides evidence for your statement?

Look for plants like these on the Perot Museum's living roof. You can view the roof at different places, including the corner on Level 3 by the stairs, or outside the Museum around the plaza.