**The Houston Museum of Natural Science**

**Morian Hall of Paleontology**

Knowledge Hunt

Kindergarten – 2nd Grade

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Thank you again, and we hope you enjoy your field trip to HMNS!

### How to use this guide:

1. Feel free to edit the questions to suit your student group.
2. The Knowledge Hunt is specifically for the Morian Hall of Paleontology.
3. Visitor services and security staff are posted around the Museum and will be happy to assist you in finding any of the locations or objects mentioned.
4. Please ensure that one chaperone is with every group of ten students at all times as they complete these activities.

If you have any questions, please contact **curriculum@hmns.org**

**Knowledge Hunt**

Instructions: As you explore the Morian Hall of Paleontology, you will journey from the beginning of time to modern times. Use the following questions to lead students through the hall and direct their learning.

**Precambrian Era**

**Stromatolites**

Instruct the students to observe the four stromatolites on the right side of the display as they enter the Hall of Paleontology. Ask the students to describe the colors and shapes they see in the first four stromatolite specimens. Explain that almost all rocks contain iron minerals.

Next, move to the fifth stromatolite on display, titled “Banded Iron.” Have the students compare this specimen to the previous four. Ask them how they are similar and different and what colors are present. Ask the students what happens to iron when exposed to oxygen for an extended period. They should say that it will rust. Then, ask them to describe the color of rust.

Finally, see if the students can determine what this can tell us about the atmosphere when this specimen formed. Explain that this banded iron is significant because it indicates plenty of oxygen in the air when this specimen formed. Plenty of oxygen means that more complex life forms could live on Earth.

**Paleozoic Era: Cambrian – Devonian Period**

**Naming Periods**

As you move through time, have students notice the names of each period written on the walls. Explain that a period is a division of time used to keep track of ancient history. Many periods are named after specific locations where fossils from that time can be found. For example, the Devonian Period was named after a town in England called Devon. How many years ago was the Devonian period?

**Trilobites**

Starting from the Cambrian period, ask the students to walk down and observe the row of trilobites. As they observe the specimens on display, prompt the following discussions:

The word “trilobite” comes from the Greek root words tri, lobos, and lithos, meaning three-lobed rock. Ask the students if they can tell why the people who found these fossils named them trilobites.

Ask students to describe the different trilobites on display (big, bumpy, spiky, big eyes, small eyes, antennae, etc.). Do the trilobites resemble anything living today? Trilobites are cousins of today’s insects. Notice the hard outer shell on the large trilobite model.

Looking at the name panels next to the trilobites, you will notice that many of them were donated by Samuel E. Stubbs. Sam Stubbs is a local Houstonian who has a great interest in trilobites. Can you find a trilobite named after him? (Hint: the name ends in stubbsi)

**Early Permian Period**

**Dimetrodon**

Lead students to the model of the Dimetrodon on display. Explain that the most famous Dimetrodon fossils were found by paleontologists here in Texas. Have students describe the Dimetrodon in detail. What is unique about it?

Ask students to suggest why these creatures have such a tall back. Explain that some scientists believed they used the sail on their back as a solar panel to warm their bodies. More recent discoveries suggest they used their sails to attract a mate. This would be very important to help the species survive. Another use of the large sail may have been to discourage predators in the area from bothering them. Ask the students which hypothesis they like best and why.

**Mesozoic Era: Triassic Period**

**Coprolites**

Take some time to observe the coprolites on display with the students. Can they figure out what a coprolite is? Let them know that coprolites are fossilized poop - not the most pleasant thought! Coprolites no longer have a smell or texture because, over millions of years, plant and animal matter have been replaced by rock through a process called permineralization. During permineralization, the material changes, but the shape of the fossilized object remains the same. Compare and contrast the shape and texture of coprolites from plant-eaters and meat-eaters. Which one has a smoother texture?

**Jurassic Period**

**Mural: The Early Jurassic Ocean**

Tell the students to look at the mural “The Early Jurassic Ocean”. Ask the students if they can find any food chains represented in the picture. After they have had a few minutes to discuss their ideas, point out that the sunlight helps the plants, the plants are eaten by the cephalopod and the Ichthyosaur eats the cephalopod.

**Horseshoe Crab**

Show students the sand imprints of the horseshoe crab left behind. Notice that as you look at the imprints close to the horseshoe crab, they become closer together until the crab finally stops.

Ask the students to consider the role of oxygen in the life of this horseshoe crab. Once a few of them have guessed, stress that the horseshoe crab's journey was a response to changing oxygen levels. The horseshoe crab's survival ability was severely impacted as the oxygen levels decreased.

**Mural: The Early Jurassic Ocean**

Invite the students to observe the “Early Jurassic Ocean” mural. Ask the students if they can find any food chains represented in the picture. After a few minutes of discussing their ideas, tell them that sunlight helps the plants grow, the cephalopod eats the plants, and the Ichthyosaur preys on the cephalopod.

**Late Jurassic Period**

**Allosaurus, Stegosaurus, and Diplodocus**

In the Late Jurassic period, you will encounter an Allosaurus, a Stegosaurus, and a Diplodocus. You can ask students the following questions:

* Which one has the longest tail?
* Which dinosaur has the most spikes?
* Which dinosaur has the sharpest claws?

Interestingly, these physical traits were not just for display. Still, they played a vital role in the survival of these magnificent creatures. What was each feature used for? The answer: All three were used for protection.

**Pinecone**

Immediately after passing the Allosaurus, students will see a pinecone sliced in half. Point out the similarity to pinecones today and the symmetry between the two halves. Can they explain why the pinecone structure is still the same today?

**Late Cretaceous Period**

**Lane the Triceratops**

Instruct the students to observe the Triceratops named “Lane.” Explain that all of Lane’s bones are supported by metal rods and ask the students why they think this is the case. Tell them that the metal rods help hold the bones in place and support the fossil, indicating that it is a genuine dinosaur fossil, not a replica.

Engage the students by asking them to estimate how many of them it would take to stretch from Lane’s nose to the tip of his tail. Instruct the students to measure this distance by standing shoulder to shoulder. If you have a small group, you should have the kids count as they move along, then ask the person at the front to move to the end and count again. Repeat this process until you have counted across Lane’s body.

**Wyrex and the Denversaurus**

Invite the students to observe "Wyrex," the bobtailed Tyrannosaurus rex across the hall from Lane. Instruct the students to examine Wyrex's teeth and then ask whether they are pointed or flat. Next, have the students observe the Denversaurus' teeth and ask the same question.

Encourage the students to predict the diet of each animal. Explain that most meat eaters, or carnivores, have sharp teeth to tear meat from their prey, while herbivores, or plant eaters, have flat teeth for grinding leaves and other plant matter. Finally, ask the students to determine which animal ate meat and which ate plants.

**Wide-Snouted Duck-billed Dinosaur**

Take a moment to observe the two duck-billed dinosaurs on display. Encourage the students to discuss the similarities and differences between the two dinosaurs. They should note that one of the dinosaurs is larger than the other. Ask them to consider why this difference in size might exist. Explain to them that they are looking at an adult and a juvenile of the same species. Discuss with the students what this might indicate about the offspring of this particular dinosaur.

**Cenozoic Era: Paleogene Period, Eocene Epoch**

**Leaves**

Several fossilized leaf specimens may be observed on the wall after the ammonites. Students should immediately identify these as leaves. Highlight the fact that they are over 40 million years old. That’s an old leaf! Can students identify the types of trees they come from by looking at them?

Explain that scientists use unique names for different species of both plants and animals. Often, these scientific names are long and complicated, but they are very helpful in identifying the species. Try to pronounce the names of the leaves with students. Would these names be appropriate for use in everyday life?

**Neogene Period: Miocene Epoch**

**Mural: Danger in the Miocene Sea**

Tell the students to look at the Megalodon and the mastodon mural. Ask the students which animal was more equipped to swim in the sea. How do they know? Which body part would help the Megalodon swim faster than the mastodon? Explain that the Megalodon had large fins, allowing it to swim quickly and cover large distances.

**Megalodon Jaw**

Invite the students to observe the Megalodon's teeth from both the front and back of the jaw. Next, ask the students to predict what happens when a shark loses its tooth. Explain to the students that when a shark loses its teeth, the row behind moves forward to fill the gap. Sharks continuously grow new rows of teeth throughout their lifetime. How many teeth does this Megalodon have?

**Pliocene and Pleistocene Epochs: Human Evolution**

**Mammut Americanum: Mastodons vs. Humans**

Point out the interaction between mastodons and humans. Ask students whether the mastodon was a carnivore or an herbivore. The mastodon's flat teeth indicate that it primarily ate plants. Ask the students whether the mastodon is hunting humans or if the humans are hunting the mastodon. What clues can you identify as evidence? Explain to the students that humans hunted mastodons for food, fur for clothing, and bones for tools, contributing to their eventual extinction.

Ask the students why mastodons might have migrated from their original location in modern-day Africa. Students should consider climate change and the need for these animals to consume large amounts of food. Mammoths and mastodons were large, furry, herbivorous animals that required cool temperatures and ample plant and tree bark to survive. They had to move from place to place as the environment changed.

**Stone Tools**

Ask the students to examine the stone tools from left to right and consider how they have evolved. They should observe that the tools appear sharper and more similar to actual weapons as they progress from left to right. Explain that as