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August 2006
Student Activity Guide
Student activities for a field trip to the National Aquarium in Baltimore

Description
Each year more than 100,000 students visit the Aquarium and encounter the unique inhabitants of our planet’s coral reefs, open oceans, rain forests, Chesapeake Bay, and other habitats. Field trips are led by teachers and chaperones at your own pace on a journey of discovery through the Aquarium.

Please use this Activity Guide to help plan your visit and prepare your students for an exciting and educational experience.

This Activity Guide provides you with:

- Suggestions for pre- and post-visit activities that meet current Maryland Voluntary Curriculum Standards.
- Activities for your students and chaperones to do during their Aquarium field trip.

Download the companion Teacher’s Curriculum Guide to the National Aquarium in Baltimore (www.aqua.org) for detailed descriptions of the major exhibits with links to the Maryland Voluntary State Curriculum.

Planning for the Field Trip
This Activity Guide is designed for 3rd through 5th grade students. Students define and apply the concepts of habitat and adaptation using the National Aquarium in Baltimore. Including your visit to the National Aquarium in Baltimore, this series of lessons is covered in three days. Please refer to your field trip planning packet for additional logistics information regarding your field trip.

Day 1
In the days leading up to your visit to the Aquarium, read the Teacher Background information and share this information with your students. The day before your visit, complete Activity 1: Habitats and Adaptations.

Day 2
At the Aquarium, have your students make observations and gather information from the exhibits using Activity 2: Aquarium Animal Investigations.

AAAS Benchmarks

5D.3-5 #1. For any particular environment, some kinds of plants and animals survive well, some survive less well, and some cannot survive well.

MD Voluntary Curriculum

Science-Life Science.
Evolution, Grade 3 #1: Describe how physical structures of plants and animals enable organisms to live in water and land environments.

Ecology, Grade 3 #1: Recognize and explain how the basic needs of organisms are provided by their habitat.

Evolution, Grade 4 #1: Recognize and explain that organisms and groups of organisms that are best suited to an environment survive and reproduce.

Ecology, Grade 5 #1: Recognize and explain that individuals and groups of organisms interact with each other and their environment.
Day 3
The day after your visit, discuss with your students what they saw and learned at the Aquarium. Complete Activity 3: Creating A Habitat.

Program Description
The lessons begin in the classroom with discussions and pre-visit activities. During the field trip, students focus on a specific Aquarium animal on which to do further research. At the Aquarium, they look for the specific physical and behavioral adaptations of the animal to its unique habitat. Following the field trip, students use their research to design habitats for their animals and present them to the class.

Teacher Background
A habitat is an area where an animal or plant lives. There are four components that make up every habitat and which all organisms need to survive. Every habitat must provide an organism with adequate food, water, shelter, and living space.

There are many types of habitats. They come in all sizes from large expansive oceans that are home to some of the largest animals on the planet, like whales, to drops of water that are home to microscopic single-celled plants and animals. Some habitats appear more hospitable than others. Plants and animals can live in lush, diverse habitats like coral reefs and rain forests, or they can live in barren deserts and polar tundras.

Consider your habitat. Your habitat includes not only your home, but the area where your home is located and everything you need to survive. A city or a suburb is a type of habitat. A grocery store (to get your food), plumbing (to get your water), protection (from the elements), and personal space (to move around) are all included in your habitat. These are all essential parts of your habitat. Other organisms have their own unique habitat requirements. A tree, for example, requires nutrients from the soil, sufficient rain water, protection from other organisms that might harm it, and space to grow and get sunlight. Regardless of their differences, all habitats still provide the organisms that live in them with food, water, shelter, and space.

An adaptation is the modification of a plant or animal that makes it more fit for existence under the conditions of its habitat. Most adaptations happen over thousands of years in response to slowly changing environmental conditions. These adaptations have come about because of competition within a habitat for necessities like food, water, shelter, space, and a mate. Organisms with characteristics that improve their ability to survive in their habitat are most likely to reproduce and pass
those beneficial characteristics on to succeeding generations. This is the process known as natural selection.

Adaptations can be physical or behavioral. The following are types of marine animal adaptations that you might find while visiting the National Aquarium in Baltimore.

Color adaptations provide protection by helping animals hide from predators and prey or allowing them to disguise their shape. This is called camouflage. Bright colors can also advertise an animal’s poisonous nature. Not only do color adaptations provide protection, they also help animals distinguish their own species and allow them to find a mate more easily.

Organisms have different body shape adaptations. Tubular bodies, specialized tail shapes, and a variety of fins help animals move easily through different kinds of water environments. Water birds have feet, legs, and wings adapted for fishing, diving, and landing on the water.

Open ocean or pelagic fish have a streamlined body and fins. Coral reef fish have thin bodies that allow them to maneuver through the corals and rock crevices in the reef. Their tails and fins are fan shaped to help with sudden stops and quick changes. Crabs, rays, flounders, and other bottom dwellers have flattened body shapes. These animals crawl or swim along the ocean bottom.

Often animals that are poor swimmers have unique ways of protecting themselves. Burrfish, pufferfish, and porcupinetfish have a special method of defense. They inflate themselves when threatened. In addition, porcupinetfish and burrfish have sharp spines that stand out when the fish expands. This makes it very difficult for a predator to eat these large, oddly shaped, and spiny fish. The lionfish has sharp poisonous spines on its back. This fish, like the scorpionfish, is not a speedy swimmer. Both fish are protected by their spines and cryptic color patterns.

Some animals have specialized appendages or other adaptations that help marine animals catch and hold food.

Parrotfish and wrasses have beaks that allow them to bite into hard coral so they can eat the tiny coral polyps. They also have grinding teeth in their throats.

The anglerfish is a deep sea ‘fisherman’ that has a built-in pole and lure. The fish has a rod that protrudes from its back and has lures attached that shine in the dark. As fish are attracted to the light, the anglerfish opens its huge mouth and eats a meal. (Note: there are no live anglerfish on exhibit at the Aquarium.)
Whelks use their muscular foot to pry open the shells of bivalves like clams and mussels. After the shell is open, the whelk uses its rasping tongue, called a radula, to eat the gooey animal inside.

Since there are many predators that eat eggs, larvac, and small juveniles, the chance of many animals reaching adulthood in an aquatic habitat is slim. Marine animals have adapted several ways to assure that some eggs will survive.

To assure that some baby fish will survive to adulthood, many fish lay thousands of tiny eggs at a time. Some fish, including many sharks, produce fewer, larger offspring to give them a protective size advantage at birth.

Fish called skates and some species of sharks produce cases to protect their offspring. Often called “mermaids’ purses,” egg cases are about 2 - 3 inches in length. The skate lays its eggs in these cases in grassy areas that act as nurseries. When the skate is ready to hatch, it pushes itself out of the end of the egg case and swims away.

Whelks also produce egg cases, but they look like a string of large buttons. When each section of the case is broken open, dozens of tiny whelks are visible.

In some animal species, the males actually take care of the young. Some male fish, like the damselfish called the sergeant major, care for nests of eggs; some, like the jawfish, carry their eggs around in their mouths to protect them. Seahorses have a curious reproductive adaptation. It is actually the males that become pregnant! Female seahorses lay eggs in the male’s pouch where they are fertilized. The male carries the eggs around in his pouch until they hatch. However, after the baby seahorses hatch, they are completely independent.

Some adaptations involve how the animal behaves instead of how it looks. Animals have different behaviors for defending their territories, protecting themselves from predators, or finding a mate.

Damselfish are very territorial. Some species of damselfish tend algae gardens on coral reefs and chase away fish - even those much larger than themselves - that try to enter their territory.

The yellowhead jawfish digs a burrow which it lines with bits of shell and rock. It backs into the burrow tail first and feeds on zooplankton floating by in the water.
Grunts show aggression by opening their mouths and pushing each other. After a short shoving match, they separate and each goes its own way.

Symbiosis is a Greek term meaning “living together” and is another type of behavioral adaptation. It is an association between organisms of different species. Mutualism is a symbiotic relationship that benefits both animals. For example, some fish often make a living by cleaning parasites off larger fish.

Cleaner fish are identified by other fish by bright colors, color patterns, and behaviors. A fish being cleaned often rolls over on its side or floats passively near the cleaner fish. The cleaner fish is very careful as it bites off and eats fungus and parasites. It even cleans out the inside of the other fish’s mouth. Although the cleaner fish is often much smaller than the fish it cleans, the cleaner fish is seldom eaten by its customer. This mutualistic relationship provides the cleaner fish with a tasty meal, and the customer with the comfort and health of a parasite free body.

Look for an example of this type of mutualistic relationship at the Aquarium in the open end of the Coral Reef exhibit where you may see large fish clustering around a small brightly colored cleaning fish such as juvenile porkfish.
Resources

The National Aquarium in Baltimore
Besides providing general information about the Aquarium, this website provides information regarding your field trip and downloadable Teacher Resources, including Education Fact Sheets and additional Teacher Booklets.

The Animal Planet website
This website contains a great list of web links to information about ocean animal facts and conservation.

The Shape of Life website
This revolutionary eight-part television series reveals the dramatic rise of the animal kingdom through the breakthroughs of scientific discovery. The Shape of Life website features activities and resources, animal facts, and scientist biographies.
Activity 1 -
Habitats and Adaptations

Description
All animals live in habitats and have specific physical and behavioral adaptations to those habitats. Your schoolyard is comprised of multiple habitats for animals. It is even a part of your habitat!

In this activity, your students describe the habitat in which they live, what they need to survive, and specific adaptations to their habitat. Also, they choose an animal that can be found in your schoolyard. They describe its habitat, what it needs to survive, and specific adaptations to its habitat. Your students compare and contrast their habitat and adaptations with those of the animals they have chosen. This activity is designed to be completed prior to your field trip to the National Aquarium in Baltimore.

Materials
Copies of Activity 1 - Habitats and Adaptations Student Pages (1 per student).

Procedure
1. Review the concepts of “habitat” and “adaptations.”
2. Ask the students to complete Activity 1 Student Pages.
3. After completion, review the results with the class. Compare and contrast the habitats of people and various plants and animals.
Activity 1 - Habitats and Adaptations

Part A
1. What is a habitat?

2. What are the four things that any habitat must provide for the organisms that live there?
   A. ______________________
   B. ______________________
   C. ______________________
   D. ______________________

Part B
1. On the chart provided, describe the habitat in which you live. List the things that you need to survive in your habitat. Be specific.
2. Choose an animal or a plant that you might see in your schoolyard. On the chart provided, describe the habitat of that organism. List the things that the organism needs to survive in its habitat. Be specific.

Part C
1. What is an adaptation?

Part D
1. On the chart provided, describe some adaptations that make you well-suited to your habitat.
2. On the chart provided, describe some adaptations that make the organism that you chose in Part B well-suited to its habitat.
**Activity 1 - Habitats and Adaptations**

**Part B**

Complete the chart as directed.

<table>
<thead>
<tr>
<th>1. Describe your habitat.</th>
<th>1. Choose an animal that you might find in your schoolyard:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>____________________________________________________________</td>
</tr>
<tr>
<td>2. What do you need to survive in your habitat?</td>
<td>2. Describe its habitat.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. What does it need to survive in its habitat?</td>
</tr>
</tbody>
</table>
Activity 1 - Habitats and Adaptations
Part D

List some of your adaptations to your habitat.

Animal you chose from Part B:

List some of its adaptations to its habitat.
Activity 2 - Aquarium Animal Investigations

Description
During your field trip to the National Aquarium in Baltimore, you and your students will see more than 14,000 animals representing almost 600 different species! Each exhibit is carefully designed and cared for to replicate the animal’s natural habitat. That means providing for each animal’s individual behavioral, dietary, water, shelter, and space requirements.

In Activity 1, students identified some adaptations of schoolyard animals that make them well-suited to their individual habitats. They also identified some of our own adaptations to our habitat. During this activity, students observe Aquarium animals in order to determine some of their unique adaptations to their various habitats.

Materials
Copies of Activity 2 - Aquarium Animal Investigations Student Page (1 per student or group)
Clipboards (1 per student or group)*
*Clipboards are recommended so that students have a hard writing surface.
Leaning and writing on the tank glass are not permitted.
### Activity 2 - Aquarium Animal Investigations

Observe one member of each of the animal groups listed below as you travel through the Aquarium. Complete the chart. You may use the exhibit graphics and ask the Aquarium’s volunteer exhibit guides to help you.

<table>
<thead>
<tr>
<th>Group</th>
<th>Name of animal and Name of exhibit</th>
<th>Describe the habitat</th>
<th>What does it eat?</th>
<th>How does it protect itself?</th>
<th>How does it move?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reptile (examples: lizard, snake, or turtle)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amphibian (examples: frog or toad)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Activity 2 - Aquarium Animal Investigations**

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<th>What does it eat?</th>
<th>How does it protect itself?</th>
<th>How does it move?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bird</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mammal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Invertebrate (animal without a backbone)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Activity 3 - Creating A Habitat

Description
You just experienced an exciting and educational field trip to the National Aquarium in Baltimore. Now it is time to bring the Aquarium to your classroom!

Aquarium exhibit designers must thoroughly research an animal and its habitat in order to create the most natural exhibit possible. A natural exhibit reduces stress on an animal and encourages natural behaviors.

This is a chance for your students to design a habitat for an Aquarium animal. After further researching one of the Aquarium animals that they observed in Activity 2, students create a habitat poster or diorama, depending on what you choose to assign. In creating these habitats, your students take into consideration the four requirements for any habitat: food, water, shelter, and space. Most Aquarium exhibits include more than one species of animal. Have the students think about other animals that might also be included in their exhibits. Possible resources include magazines, newspapers, and the internet. Reputable sites are listed on the Resources page.

Students write a description of the animal they chose and explain their habitat design. There is a list of questions that students can use as a guide on the Activity 3 - Creating A Habitat Student Page. Students present their habitats to the rest of the class.

Materials*
*Materials may vary depending on the project but may include:
- Copies of Activity 3 - Creating a Habitat Student Page (1 per student).
- Shoe box or other cardboard box
- Poster board
- Construction paper
- Scissors
- Glue
- Arts and crafts materials
Activity 3 - Creating A Habitat

You just experienced an exciting and educational field trip to the National Aquarium in Baltimore. Now it’s time to bring the Aquarium to your classroom!

This is a chance for you to design a habitat for an Aquarium animal. Aquarium exhibit designers must thoroughly research an animal and its habitat in order to create the most natural exhibit possible. Choose an animal that you saw during your trip to the National Aquarium in Baltimore on which you would like to do further research. Use your library, internet, or other resources. Create a diorama or a poster of that habitat. In creating this habitat, consider the four requirements for any habitat: food, water, shelter, and space.

After you have completed your animal habitat, write a description of the animal you chose and explain your habitat design. You may use the following questions as a guide.

- What animal did you choose?
- What type of animal is it?
- How big does it get?
- How long does it live?
- How does it move?
- Where can your animal be found?
- What type of habitat(s) does it live in?
- What does it eat?
- Where does it get its water?
- Does it have any predators?
- How does it protect itself?
- What kind of shelter does your animal need?
- Does it live in groups or alone?
- How much space does it need?
- Is it active during the day or at night?
- What other plants and animals can be found in this habitat?