FUTURE CREATURE CHALLENGE

BRAINSTORM & DESIGN LESSON

ADAPATIONS

It's brainstorm time! Select an animal for your challenge, research its present-day anatomical adaptations and brainstorm how it might evolve over time. Dive into the factors that influence selection of future adaptations.

FOR THE CLASSROOM

POSSIBLE APPROACH FOR THE CLASSROOM

LESSON LENGTH

1, 30-60 MINUTES

OBJECTIVE

LEARN ABOUT DIFFERENT KINDS OF ANATOMICAL ADAPTATIONS

MATERIALS

PEN, PAPER, COMPUTER, INTERNET

VOCABULARY:

- Vertebrate
- Adaptations
- Physical/Structural
- Physiological
- Behavioral
- Camouflage
- Forage
- Locomotion
- Defense Structures
- Habitat

PROCEDURE

1) DOWNLOAD AND TEACH THE BRAINSTORM ADAPTATIONS Slide Deck. Feel free to customize it to suit your teaching needs.

2) ACTVITY #1: PICK YOUR ANIMAL & RESEARCH

Have your students select one non-human vertebrate animal from a tropical rainforest to research.

Students should research the animal's:

- Present day anatomical description.
- Distribution, habitat and behavior.
- How climate change (ex. temperature increase and sea level rise) will change its habitat.

3) ACTVITY #2: BRAINSTORM TYPES OF ANATOMICAL ADAPTATIONS

Put your students in groups and have them brainstorm the following categories to help them decide the adaptations their future creature will have.

- Habitat: How will climate change effect your creature's habitat? How will it adapt to its new surroundings. What kind of shelter will it seek? What traits will be selected in order for it to survive?
- Camouflage: Camouflage is an adaptation that allows animals to blend in with some part of their environment. It increases their survival by not allowing predators to see them. Think of different examples of camouflage. Would camouflage benefit your future creature?

LESSON PLAN CONTINUED
ADAPTATIONS

PROCEDURE (CONTINUED)

- Temperature: Temperature regulation is vital to an animals survival. How will your creature adapt to higher temperatures? Will its structures change to need less insulation? Will it need protection from the sun? Be sure to consider if your animal is warm or cold blooded.
- Defense: Body structures like spikes, horns or sharp claws, help protect and defend animals against any creature that threatens them. What kinds of defensive body structures will help your creature look tough? How will your animal use these structures to fight off another animals?
- Locomotion: Animals need to be able to get from place to place to find shelter, food and friends. Depending on where they live, they can develop structures to help them get around. Will your creatures limbs get longer or shorter? Will it have a tail, wings or fins?
- Forage: When an environment changes, the ability to find food can also change. Whether your animal eats veggies or meat it has specialized structures for obtaining food and eating food. What anatomy changes will your creature evolve to help it find food? Will your creature change its diet, if so, why? Temperature: How will your creature adapt to higher temperatures? Will it's structures change to need less insulation to cool it down? Or will it need more protection from the hot sun? Be sure to consider if your animal is cold or warm blooded.

4) ACTVITY #3: CREATE YOUR CREATURE ILLUSTRATIONS

Have your students use the information they gathered from the brainstorming session to sketch out rough designs of their creature in its habitat in the present and future and then create their final illustrations.

BACKROUND INFORMATION

ADAPTATIONS

All animals live in habitats because they provide what is needed for survival; water, food and shelter. But, there is more to survival than just the habitat. Animals also depend on their behavoir, physical and physiological features to help them become successful in their natural habitats.

ADAPTATIONS

Body features that help animals survive are called anatomical adaptations. Anatomical adaptations do not develop during an individual animal's life, but over many generations. These adaptations are broken up into physical/structural and physiological. Examples of structual adaptations are the color of a mammal's fur, length of a reptile's neck, shape of a birds beak, or size of a nose or ears. Physiological adaptations are internal like producing venom, milk, or mucus.

Animals also have behavioral adaptations. Like physical and physiological adaptations, they help an animal survive and suceed in its habitat. Hunting in groups, bird calls and migration are all examples of behavioral adaptations.

LESSON PLAN CONTINUED
ADAPTATIONS

BACKGROUND INFORMATION

Reasons for Adaptations:

- Forage (finding food)
- Defense
- Escape from predators and other dangers
- Adjust to the temperature of their environment
- Adjust to change in habitat (ex. loss or change of habitat)
- Find a mate

An animal's habitat can change due to climate fluctuations or the influence of humans. If populations of animals cannot adapt to the changes in their environments, they can become extinct.

VERTEBRATES

Vertebrates are animals with backbones. Currently there are around 65,000 known species of vertebrate animals. Although this seems like a lot, it is only about 3% of all the animals on Earth. The other 97% are invertebrates.

What are the different types of vertebrate animals?

Vertebrates are broken up into five classes:

- Mammals: Warm-blooded animals that nurse their young with milk and have fur or hair. Some examples include humans, chimpanzees, lions, horses, giraffes and whales.
- Birds: Warm-blooded animals with feathers, wings and lay eggs. Some examples of birds include the bald eagle, turkey, ostrich, flamingo and humming bird.
- Reptiles: Cold-blooded animals that lay eggs. Their skin is covered with hard dry scales. Examples include alligators, crocodiles, snakes, lizards and turtles.
- Amphibians: Cold-blooded animals that start off their lives living in the water with gills just like fish. Later, they develop lung and can move to dry land. Examples include toads, frogs, newts, and salamanders.
- Fish: Animals that live in the water. They have gills that allow them to breathe underwater. Examples include sharks, bass, trout, tuna and swordfish.

LESSON PLAN CONTINUED

ADAPTATIONS

NEXT GENERATION SCIENCE STANDARDS

MS-LS4-4 Biological Evolution: Unity & Diversity

- Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment. [Clarification Statement: Emphasis is on using simple probability statements and proportional reasoning to construct explanations.]
- LS4.B Natural Selection: Natural selection leads to the predominance of certain traits in a population, and the suppression of others.
- Cause and Effect: Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability.

MS-LS4-6

- Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time. [Clarification Statement: Emphasis is on using mathematical models, probability statements, and proportional reasoning to support explanations of trends in changes to populations over time.]
- LS4.C: Adaptation: Adaptation by natural selection acting over generations is one important process by which species change over time in response to changes in environmental conditions. Traits that support successful survival and reproduction in the new environment become more common; those that do not become less common. Thus, the distribution of traits in a population changes.