**Adaptation and Behavior**

**Lesson #2:** **Inherited Traits of Living Things**

**Time Frame:** 1 hour

**Learning Standards:**

*Science*

Life Science: Plant (and Animal) Structures and Functions;

1. Differentiate between observed characteristics of plants and animals that are fully inherited (e.g., color of flower, shape of leaves, color of eyes, number of appendages) and characteristics that are affected by the climate or environment (e.g., browning of leaves due to too much sun, language spoken).

**Student will be able to:**

1. Through observations, outside knowledge, and group discussions, explain if the different traits of plants and animals are inherited or affected by the environment (or both).
2. Understand that all living things have traits that are inherited and variable.

**Resources and Materials:**

|  |  |
| --- | --- |
| **Item** | **Amount** |
| Living thing such as a plant | NOT PROVIDED |
| Science notebooks |  |
| Pictures of living things with questions about inherited versus environmentally affected traits(color) | 3 class sets (in bin) |
| 5 x 8 index cards | 500 (total) (in bin) |

**General Teacher Background Information:**

Every living thing has a set of genetic instructions that specify its traits. These instructions are passed on from one generation to the next through packets of information called genes. Genes are found on chromosomes in cells. Living things also have characteristics that are a result of their environment and experiences and characteristics that are a result of a combination of genetic and environmental factors. The nature vs. nurture debate still occurs in scientific circles. What plays a greater role in the characteristics of a living thing: inherited material (genes) or the environment?

**Focus Activity:** Place a plant of some type in the front of the classroom. Ask students to make observations about this living thing and then (in their science notebook) make a list of traits that are inherited and traits that are affected by the environment. Discuss the student lists as a class and review ideas about inheritance from the last science lesson.

**Introduction:** Where do living things get their inherited characteristics? Try to direct the responses to point out that parents pass these characteristics to their offspring (children) and then the offspring pass these characteristics to their offspring. Through sexual reproduction, living things are all unique because they have a combination of inherited traits from each parent.

**Activity:**

1. Write inherited trait on the board. Ask students to give definitions, discuss, and then write the definition provided.

**Inherited traits:** variable characteristics that are passed down from parents to their offspring

*Advanced:* traits are determined by tiny packets of information called genes (present in every living cell) and offspring are a combination of their parent’s genes

Discuss this definition as a class and relate it to the definitions that the students gave. Also, you may need to discuss or demonstrate the meaning of the word variable (relate to the differences observed in the human traits).

1. Pass out the 5 x 8 note cards to each student. Ask the students to fold them into fourths (so that each note card is folded into 4 evenly sized rectangles). Diagram what will go in each square on the board:
   * 1. Word – inherited trait
     2. Defintion – variable characteristics that are passed down from parents to their offspring
     3. Examples of inherited traits in a plant – list
     4. A drawing that represents an inherited trait (personalized to each student)
2. Ask each student to complete their 4-square vocabulary for inherited traits. Work on furthering understanding with students individually.
3. Collect the cards from each student and save them to be used as a reference and resource throughout the unit. They can also be placed in the student science notebooks.
4. Break the class up into science groups of 3-4 students. Each group will get a picture that asks a question about the traits of a living thing (Remind the students that traits could be inherited, affected by the environment, or a combination of both.) Students will work on one picture at a time. For each picture students will do the following:
   1. Make and discuss observations about the picture
   2. Read the description and question and discuss as necessary
   3. Write down their response in their science notebooks (using details from their observations to support their conclusions.
5. Assign one role to each student (and this role can change with each picture).
   1. Student #1: Lead discussion of observations
   2. Student #2: Read the description and discuss it with the group
   3. Student #3: Write down the response of the group in the science notebook.
6. Give each group one picture (each group should start with a different picture). When students have completed the tasks outlined above give the group a new picture, switch the assigned roles, and repeat as necessary. This allows groups to work at their pace. Do as many as time permits.
7. Then, ask the groups to re-examine the first picture and their responses and prepare a brief presentation to the class explain their ideas. After each group presents their picture and ideas lead a discussion with the whole class to get other ideas and insights. Students may disagree and this is good as long as they can back up their ideas with evidence.

**Closure:** Discuss the following questions as a class. What are some of the inherited traits of plants? What are some of the inherited traits of frogs? What does inheritance explain? (Answer: why parents and their offspring share similarities)

**Additional materials:** If time permits, utilize familiar cartoons or clips to reinforce ideas of inherited versus environmentally affected/acquired traits. Examples of Disney clips to use are:

1. Popeye eating spinach (youtube.com/watch?v=ny1I3kFM7iI) where the *inherited trait* is Popeye’s cleft chin and the *acquired trait* is Popeye’s extreme muscle when eating spinach.
2. Scar and Mufasa from *The Lion King* (youtube.com/watch?v=-8wgXRNYcPM) where Scar’s inherited traits are his black mane and green eyes and his acquired trait is his scar.

Feel free to use other examples if you can think of any, or describe other applicable traits as the inherited or acquired traits depicted by the characters of the clips.

**Assessment:** Science notebooks with observations, lists, and explanation about the pictures, class presentations and discussions, and inherited traits 4-square vocabulary cards

**Teacher Information:**

For each card with pictures there are multiple correct answers. Here are few ideas about each image.

*Human hand with an extra digit* – something that people are born with, an inherited trait (but students may also discuss that exposure to a harmful chemical in the womb may lead to a baby with an extra finger or thumb)

*Green tree snake* – the color of the snake is an inherited trait (students may relate coloring to camouflage or chameleons that can change their color depending on the environment, these are all examples of inherited traits)

*Deformed frogs* – deformations of this type of usually caused by harmful chemicals present in the aquatic environment of a frog while it develops from an egg to a tadpole to a frog (it is possible that something like this could be inherited but unlikely because most frogs with deformed limbs would probably die before they could reproduce)

*Soybean plant* – the yellow soybean plant is unable to fix nitrogen because it did not come into contact with the correct type of fungus in the soil so this is an environmental trait (however, students may relate this to leaves turning different colors and falling off and this is an inherited trait)

*Dog with 3 legs* – this is a characteristic affected by the environment, most dogs lose their legs because of accidents or fights (it is possible that this could be an inherited trait but unlikely)

*Folded over, brown plants* – this is a characteristic affected by the environment, the soil is dry and the climate looks warm and this can lead to plant death. This might also be an inherited trait because these plants may not be drought resistant.

*Bee orchid* – this is an inherited characteristic (individual plants are not capable of creating different flowers depending on their environment)

*Albino penguin* – this is an inherited characteristic (students may notice that being white will allow a penguin more camouflage in the snow but individual penguins are not capable of changing their feathers to suit their environment)

*Redwood trees* – these trees are tall because of a combination of inherited traits and environmental causes. These trees have the capability and strength to grow tall but they will only do so in the right environment with suitable temperature, water, and nutrients.

**Characteristics of Living Things:**

**Are they Inherited, Affected by the Environment, or Both?**

Complete the following for each picture:

1. Make observations about the picture and discuss as a group.
2. Read the description and question and discuss as a group.
3. Write down your response to your question in your science notebooks. Use details from your observations to support your conclusions.

Assign one role to each person in your group. Change the roles for each picture.

* 1. Student #1: Lead a discussion of your observations.
  2. Student #2: Read the description and discuss it with the group.
  3. Student #3: Write down the response of the group in your science notebook.

















