

GRADE LEVEL: 3-5

DURATION:

60 minutes

NGSS STANDARDS:

3-LS4-2. Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment.

3-LS4-1. Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.

NE STANDARDS:

SC2.3.1

Investigate and compare the characteristics of living things

SC5.3.1b

Identify how parts of plants and animals function to meet basic needs

MATERIALS:

- Insect breathing chart
- Insect pictures
- Insect preserved in amber
- Plastic insects
- Play-doh
- Salt dough recipe

INSECT ADAPTATION

BACKGROUND:

In this lesson, students will learn about insect adaptations in regards to how insects differ from humans, how they differ from each other, and how that can change over time.

OBJECTIVES:

- Students will create their own “fossil” that they can use to compare different insects
- Students will be able to discuss how insects differ from each other

METHODS:

- Begin by asking students “how do insects and humans differ?” If possible, write answers down. Students will likely say that humans are bigger than insects, insects have more legs, insects have wings and that insects have antennae.
- Inform students that one way in which insects and humans differ is how they breathe. Insects breathe via spiracles, whereas humans breathe via lungs. Use the poster to help explain.
- Ask students to define the term adaptation. What are different ways that insects can adapt?
- Show students pictures of the different insect mouth parts, legs, wings, and mimics. Have students guess what they think the purpose is of the different adaptations.
 - Insect mouthparts are often adapted to allow insects to more easily eat their food/prey. Legs are adapted to their environment (soil, water, trees, etc.). Wings are an insect adaptation that allows the insects to travel more easily. Different types of wings may indicate other adaptations. For example: beetles first pair of wings are a hard out covering that protect their second pair of wings. Mimics are insects that look like a different species as a way to protect themselves from harm.
- Students can also play the insect guessing game, where they have to guess which order an insect belongs to. Ask students to discuss similarities between the orders, and what the benefits are of the different adaptations.

GAME: Modified Extreme Rock Paper Scissors

- Have students pair together. This game involves four rounds of rock, paper, scissors. The premise of the game is that students begin as an insect egg, and must compete with each other to survive to adulthood.
- Round 1: Read: “As an egg, many insects have some form of adaptation to prevent them from outside harm. Compete with your fellow eggs to see who can adapt to win a game of rock, paper, scissors.” Have all the students squat down and face off against their partner in one round of rock, paper, scissors. Whoever wins has to hold their hands above their head because they successfully grew into a larva. The students who loses is out.
- Round 2: Have the students who became larvae pair off again. Read: “Some plants produce chemicals to deter insects from eating their leaves. However, larvae require a lot of food to grow! This means that larvae have to adapt to be able to eat the plant. Compete with your fellow larvae to see who can adapt to win a game of rock, paper, scissors.” The new pairs should now compete in a round of rock, paper, scissors. Whoever wins should hug themselves because they successfully grew into a pupa.

VOCABULARY:

- Adaptation
- Mimic
- Fossil

- Round 3: Have students who became pupae pair off. Read: “Congratulations on making it to the pupal stage! During this stage, insects are very still, and often cover themselves in an outer covering, think of a butterfly in its chrysalis. This hard, outer casing protects the insects from many different things, such as predators or weather. Compete with your fellow pupae to see who can adapt to win a game of rock, paper, scissors.” The new pairs should now compete in a round of rock, paper, scissors. Whoever wins should now flap their arms as if they have wings.
- Round 4: Have students pair off one last time. Read: “Congratulations on making it to adulthood! You are now one of the thousands of insects we see flying around, like butterflies, bees, or beetles. Adult insects face many problems: they have to defend themselves from predators, from being stepped on, and they have to compete with other insects for food. Compete with your fellow adults to see who can adapt to win a game of rock, paper, scissors.” The new pairs should now compete in a round of rock, paper, scissors. Whoever wins is now the most successfully adapted insect!
- Now ask students what different sorts of adaptations insects might have at different stages?
 - Eggs might have different casings to protect them. Larvae may be adapted to feed on a certain plant. Pupae have different pupal casings to protect them, as during the pupal stages the insects are drastically changing their bodies. Adults are often adapted to their environment with different body parts as a way to outcompete other organisms.

ACTIVITY: Insect fossils

- One way that we know about insect adaptations is through fossils. Ask students if any of them know what a fossil is. A fossil is something that was preserved from a long time ago. Some insects were preserved as fossils, or preserved in amber (show students the amber insect).
- When we see fossils or insects preserved in amber, we can see how insects are similar to their ancestors, such as being small or having wings, and how they are different. Some insects, the Meganeura, used to be over two feet long! They existed over 300 million years ago. For some reason, they were unable to adapt and no longer exist. (Show pictures of Meganeura)
- Now we are going to make our own insect fossils.
- Students can either make temporary “fossils” by pressing the plastic insects into the play doh provided. If students want to take their “fossils” home, salt dough can be made (recipe provided) and baked.