

Genetic Basis of Butterflies

By ReadWorks



If you've ever been in a park during the summer, you may have seen butterflies flitting from flower to flower. They are quite beautiful, and like humans, seem to have individual traits. There are orange butterflies with big brown eyes, blue butterflies with black markings on their wings, and white butterflies with small black antennae. According to some butterfly experts, there are approximately 20,000 kinds of butterflies in the world. Each species (or type) of butterfly has its own genetic information that dictates what characteristics it will have and distinguishes it from other butterflies.

Inherited genetic information explains why certain species look different from others. Monarch butterflies, orange butterflies with black markings and white spots on their wings, are most common in Mexico and the United States. Their bright color makes them easily noticeable to predators, but also acts as a warning that they are poisonous if eaten.

How do we know that their bright and beautiful coloring reveals that they are poisonous? Well, what we think of as butterflies are the adult versions of caterpillars. As caterpillars, monarchs feed on milkweed, which contains a toxin that is poisonous to most vertebrates but not to monarch caterpillars. When the caterpillars become adult monarch butterflies, the milkweed in their bodies is poisonous to any predators that might try to eat them.

An unsuspecting predator that did not know the monarch butterfly was poisonous would soon realize its mistake. After tasting the poisonous bug, most predators quickly spit out the monarch and learn not to eat them again. Unlike other butterflies, whose

genetic information (and therefore their coloration) helps them blend into their habitats in order to defend themselves from predators, monarch butterflies rely on their bright coloration to keep them safe. An interesting fact: another species of butterfly, the viceroy, mimics the coloration of the monarch in order to keep predators from eating it!

Even though there are many kinds of butterflies that look very different, all butterflies share a certain number of traits, which are also determined by their genetic information. They all have the same lifecycle: they are born from eggs, then hatch into caterpillars that eat plants, then transform in a chrysalis called a *pupa*. Inside the pupa, the caterpillars grow the legs, wings, eyes, and other parts of the adult butterfly. Once they are fully developed, the pupa falls away, and the butterfly is released. As we have seen with the monarch butterfly, sometimes a caterpillar's diet will affect whether it is poisonous or not. All butterflies have four wings—two upper, two lower—that are covered in tiny colored scales. A butterfly's genes determine the color of its scales, and more—they dictate the insect's diet, size, and shape as well.

Colorful decorations are key to the survival of the monarch butterfly. Vivid colors signal danger to the predators which might otherwise eat the butterfly. Other species of butterfly, with different genes, rely on different survival strategies, and have their own distinctive designs. But no matter the pattern, the blueprints for each of the 20,000 different species' development are written in their genetic codes.

Teacher Guide & Answers

Passage Reading Level: Lexile 1200

1. What does genetic information dictate, or control?
 - A **what characteristics an organism will have**
 - B where an organism will live and die
 - C which predators will eat the organism
 - D who the organism's parents were

2. The passage describes the sequence of a butterfly's life. Which of the following shows the life cycle of a butterfly in the correct order?
 - A egg, pupa, adult, caterpillar
 - B pupa, egg, caterpillar, adult
 - C **egg, caterpillar, pupa, adult**
 - D egg, pupa, caterpillar, adult

3. Monarch butterflies are protected by their bright coloration. What evidence from the passage supports this conclusion?
 - A Their bright coloration makes monarch butterflies easily noticeable to predators.
 - B **The monarch's color warns predators that they are poisonous, so they don't get eaten.**
 - C Unlike other butterflies, monarchs do not blend into their surroundings to protect themselves.
 - D If a predator eats a monarch, it can taste the poison and will spit the butterfly out.

4. Butterfly A is blue with black markings. Butterfly B is green with brown spots. What conclusion can you make about these two butterflies?
 - A Both butterflies protect themselves by blending into their surroundings.
 - B The two butterflies have different life cycles.
 - C Both butterflies have the same genetic information.
 - D **The two butterflies have different genetic information.**

5. What is this passage mostly about?
 - A **monarch butterflies**
 - B viceroy butterflies
 - C milkweed toxins
 - D caterpillars and pupae

6. Read the following sentences: "They all have the same lifecycle: they are born from eggs, then hatch into caterpillars that eat plants, then transform in a chrysalis called a *pupa*. Inside the pupa, the caterpillars grow the legs, wings, eyes, and other parts of the adult butterfly. Once they are fully **developed**, the pupa falls away, and the butterfly is released."

What does the word "**developed**" mean?

- A young and small
- B changed and grown**
- C safe and protected
- D soft and vulnerable

7. Choose the answer that best completes the sentence below.

Monarch butterflies are brightly colored; _____, they are highly visible to predators.

- A however
- B for example
- C as a result**
- D initially

8. Why are monarch butterflies poisonous?

Suggested answer: Monarch butterflies are poisonous because as caterpillars they eat a plant called milkweed, which is poisonous to most vertebrates (but not to monarchs).

9. How do predators know that monarch butterflies are poisonous?

Suggested answer: Predators know that monarch butterflies are poisonous because of their bright coloration, which acts as a warning that they are poisonous.

10. How does the monarch's coloration help both the butterfly and its predators?

Suggested answer: The monarch's coloration helps the butterfly, because it protects the butterfly from predators. The butterfly's coloration helps predators, because it warns them that the butterfly is poisonous to eat.

Name: _____ Date: _____

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