

Unit Handout
2 8

Lesson 4: Observing the Adult Cabbage White Butterfly

Purpose: Make observations observations of the adult cabbage white butterfly, relate functions to its structures, and describe adaptations it has to its environment.

Guiding Questions: How is the body of the adult cabbage white butterfly adapted to survival?

Part One. Obtain a preserved cabbage white butterfly. Create a general drawing of its body (and label it with the diagram provided on your table). Then, create a detailed drawing of the head (use the microscope) and label the parts as needed.

See the info sheet for a labeled diagram of the cabbage white butterfly.

See 7bscience.com for a 40X view of the butterfly's head.

Part Two. Answer the following questions about the adult butterfly. Use the handout on your table to assist you in defining the structures and providing functions for these structures.

Definition. One characteristic of life we have not talked about is adaptations. All organisms have adaptations that help them survive. Adaptations are inheritable (i.e. genetic) traits that increase an organism's chance of survival. An example of this would be the rough texture of a cat's tongue which makes it easier to pull meat from its prey. Another example is how our pupils expand in a dark room to help us see.

1. What are the 3 body sections of the cabbage white butterfly (SDRO p.60)?

The three body sections are the head, thorax, and abdomen.

2. How can you identify the sex of a cabbage white butterfly? What is the sex of the butterfly in your drawing?

The sex of the cabbage white butterfly can be identified by observing the spots on the wings: one spot usually indicates male while two spots usually indicates female.

3. Similarly, how can you identify the sex of a cabbage white larva?

The sex of the larva can be determined by looking on the dorsal side of the larva. Males have visible testes, which appear as two dark, bean-shaped spots.

4. Describe how the cabbage white butterfly is able to locate food sources.

The cabbage white butterfly's antennae are covered with small pits that are organs for smell. These organs enable the butterfly to locate food sources by their scent.

5. How are the legs adapted to helping the cabbage white butterfly survive?

Each leg has a pair of claws that have dual functions: the claws help grip allowing the cabbage white butterfly to cling to surfaces and the claws contain hairlike structures for its sense of taste.

6. How are the wings adapted to helping the cabbage white butterfly survive?

The wings are covered in scales which serve as insulation and, since they readily detach from the wing, act as an escape mechanism from predators that may grip them by the wing.

7. What is the function of the spiracle?

The spiracles are small openings in the abdomen that are used for gas exchange (breathing).

Part Three. All arthropods (e.g. insects, arachnids, crustaceans, etc.) go through metamorphosis. There are two types of metamorphosis: complete and incomplete. Find an online resource that describes the differences between the two types of metamorphosis and write a CEA/R argument for which type the cabbage white butterfly goes through.

Claim: Do the CWB go through complete or incomplete metamorphosis?

The cabbage white butterfly undergoes complete metamorphosis.

Evidence: What evidence (e.g. citations) do you have to support your answer?

We observed our butterfly go through four distinct stages in its life cycle. The butterfly was first laid as an egg. Then, it hatched as a larva. It then formed a chrysalis for its this stage: a pupa. When it emerged from its pupal stage, the butterfly was an adult.

Analysis: How does the evidence connect back to your claim?

Counterevidence: This is a good place to discuss how it isn't the other type of metamorphosis.

These same four stages (egg, larva, pupa, adult) match the stages of complete metamorphosis. The butterfly does not go through incomplete metamorphosis. Although incomplete metamorphosis also has four stages, they are different. In incomplete metamorphosis, the organism starts as an egg but then emerges as a nymph. A nymph is similar to a miniature form of the adult. The organism then molts into the larger nymph before becoming an adult. Our butterfly did not emerge from the egg as a smaller version of the adult butterfly. Instead, it emerged as a larva which is markedly different from the adult.