***Manduca sexta* Caterpillar Dissection - KEY**

GOALS

1. To practice observation and dissection skills using the *Manduca sexta.*
2. To learn about changes in human adolescent behaviors by investigating an invertebrate model system.

Behavior Observations – Describe what you see the caterpillar doing

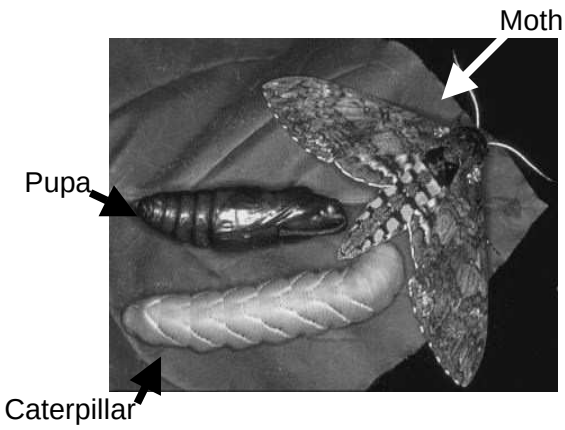
Some caterpillars may be submerged into icy cold water at this point

List reasons why a caterpillar needs a nervous system.

respiration, movement, feeding, reproduction, sensing

What do you think the caterpillar's nervous system might look like based on your observations?

When a caterpillar undergoes metamorphosis (or changes from a caterpillar into a pupa into a moth), what changes do you expect to happen?



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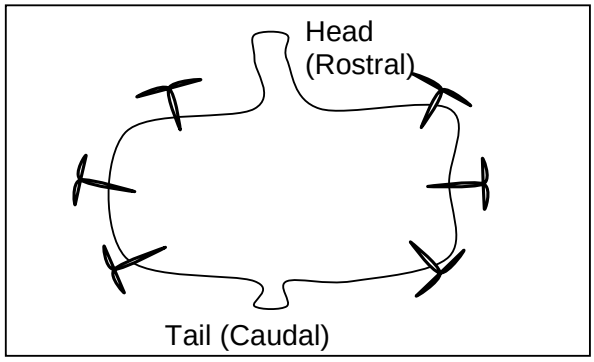
Dissection Instructions

1. Take the caterpillar out of the water; cut off the horn located on the caterpillar's caudal (tail) end. Insert scissors into the hole from the cut-off horn and cut through the skin and body muscle along a line down the center of the caterpillar's dorsal end (their back). Cut from caudal (tail) to rostral (head) end.
2. Pull open the skin. Use dissecting pins to hold the skin and body muscles open by pinning through the body wall.

Diagram 1



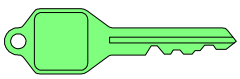
3. Use tweezers to lift out the gut, which is the long, brownish cylinder that fills up the body cavity.
4. Use the magnifying glass or dissecting microscope to examine the insides of the caterpillar. Describe and draw what you see underneath the gut.

5. Locate the caterpillar's nervous system. You may need to gently scrape away fat to see the nervous system.
   a. Find the ganglia (groupings of neuronal cell bodies).
   b. How many ganglia can you see?
   c. Locate nerves connecting the ganglia to the muscle and skin.
   d. Locate the ganglion connectives, which connect different ganglia.
   e. Draw the caterpillar's nervous system.

For discussion

1. How does the caterpillar's nervous system compare with what you thought its nervous system would be like?

2. When a caterpillar goes through metamorphosis to become a moth, how does its body change?



Can prompt students to look at the picture and make measurements of the length of the body.

1. ***physical changes – caterpillar: has legs, antennae are not salient, has 8 legs; moth: has proboscis, has wings, shorter body length***
2. ***behavioral changes – caterpillar: senses environment, eats, defecates; moth: reproduces, senses environment primarily to mate***

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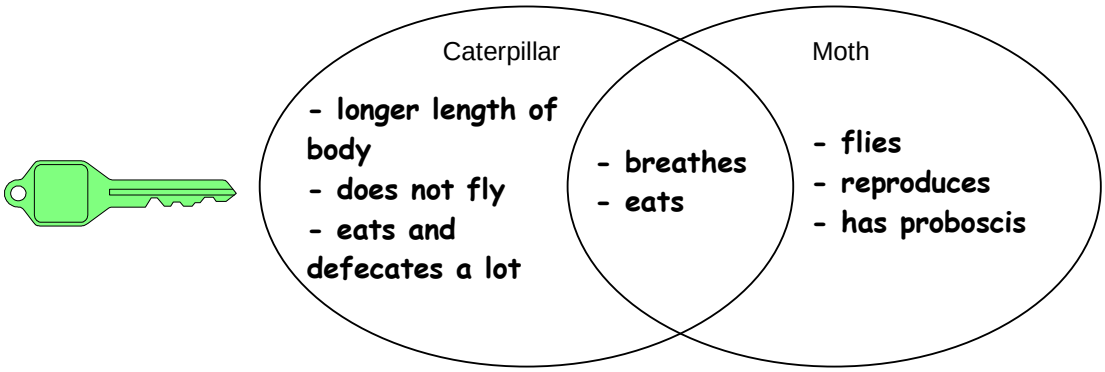
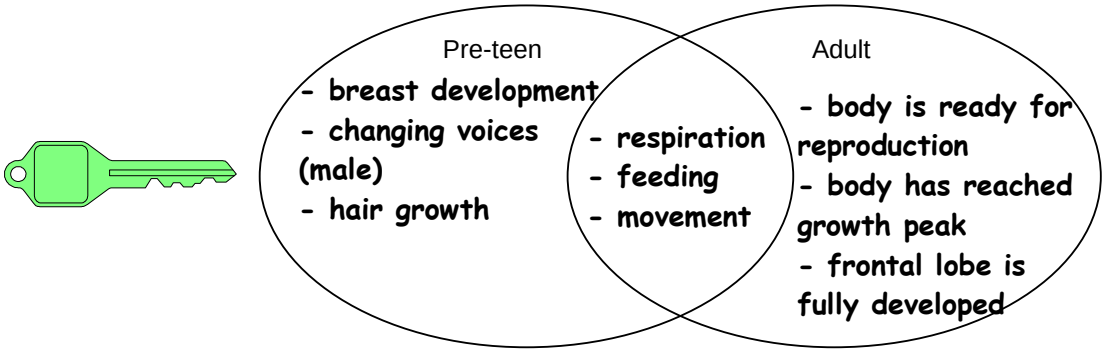
3. How would you expect the nervous system to change when a caterpillar becomes a moth?

shrinkage of the moth's nervous system compared to the caterpillar, presence of hormones that trigger reproductive behavior

4. How does the behavior of a caterpillar compare to the behavior of a moth?



5. How does a pre-teen human compare to an adult human?



6. What do you think cause the changes that happen from a caterpillar to moth and/or pre-teen to adult?

modulation of hormones such as testosterone and estrogen initiates the development of breasts, larger hips