

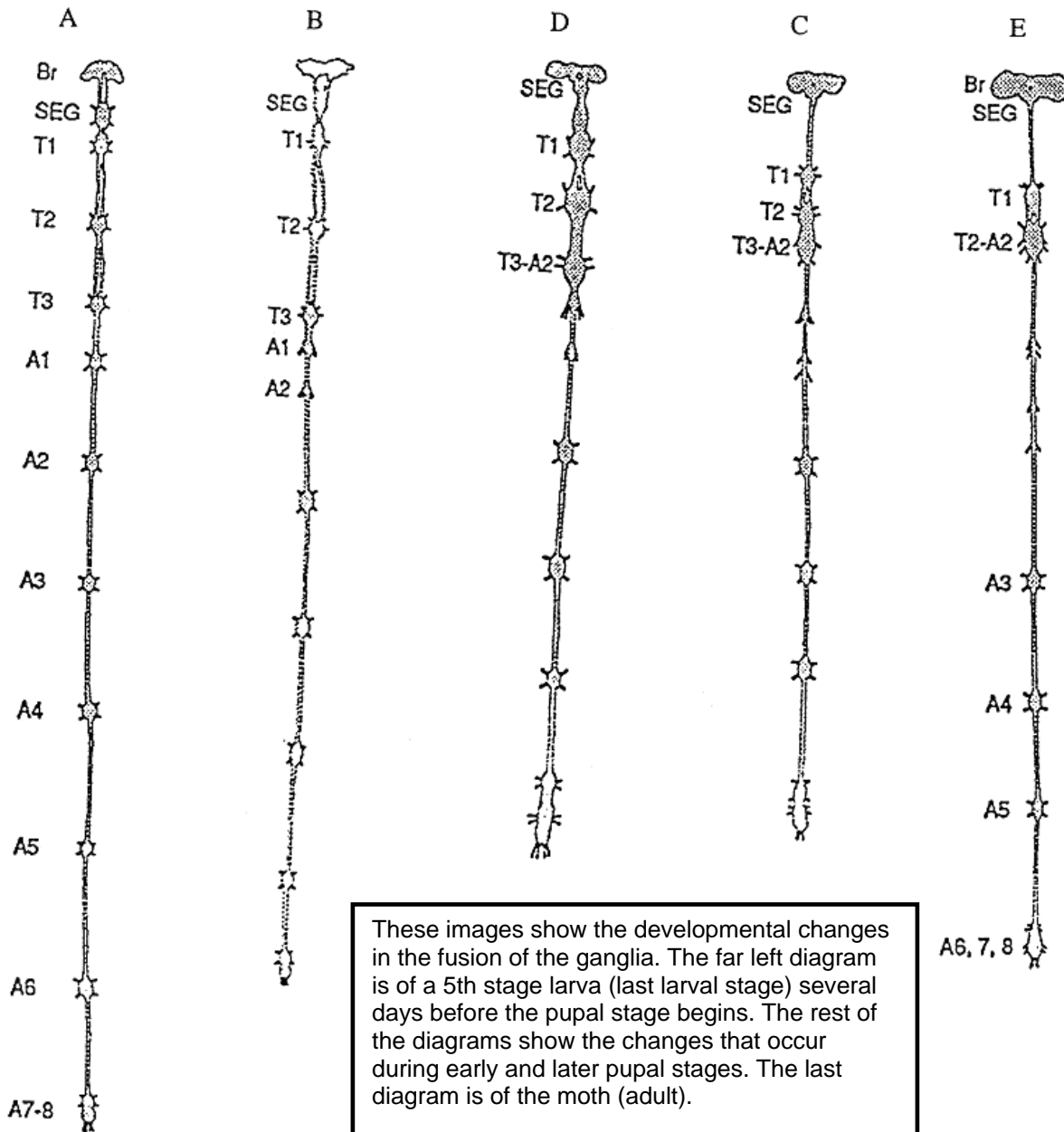


Manduca Neural Systems Puzzle

The strips below are shown in the **CORRECT** order (A-B-D-C-E) from caterpillar on the left (A) to moth on the right (E).

A companion **Student Guide** shows the images A-E from left-to-right in a larger size with dotted cut lines. If you opt to use the images below, **you must cut out the strips removing the text box below D and C** and ask your students to arrange them on their desks or on a sheet of paper. Tell them that **A** is the first stage - caterpillar - and that **E** is the last stage - moth. They must figure out the order of the other three stages in metamorphosis of the tobacco hornworm, *Manduca sexta*.

You may choose to tell them what SEG (Sub Esophageal Ganglia), T (Thoracic Ganglia), and A (Abdominal Section) stand for or tell them to ignore the meaning of the letters for now.



These images show the developmental changes in the fusion of the ganglia. The far left diagram is of a 5th stage larva (last larval stage) several days before the pupal stage begins. The rest of the diagrams show the changes that occur during early and later pupal stages. The last diagram is of the moth (adult).