

INSECT MORPHOLOGY

Lab 2 - A study of segmentation, apodemes, and apophyses.

A. Body Regions and Areas

- (1) Examine the grasshopper externally in lateral view and label all the numbered structures on the following quiz sheet.

B. Sclerites, Sutures, and Apodemes

- (1) Prepare two labeled drawings (external and internal view) of the pterothoracic pleuron of a grasshopper, showing the structures described below (use the right half of the pterothorax for the internal drawing, and the left half for the external):

The surface of the insect body consists of a number of sclerotized, hardened plates or sclerites, which are separated by sutures. The internal processes, or infoldings of the body wall are the apodemes. An elongated or armlike infolding of the body wall is called an apophysis (this term is also applied to similar outgrowths of the body wall).

- a. Examine the outer surface of the pterothorax of a grasshopper. The pleural suture divides the pleuron into two pleurites, an anterior episternum and a posterior epimeron. The pleuron is slightly produced dorsally at the upper end of the pleural suture to form the pleural wing process, on which the wing pivots. Two small sclerites (epipleurites) are located between the pleuron and the base of the wing. The epipleurite above the episternum is the basalare, and that above the epimeron is the subalare.
- b. Open up and examine the inner surface of the mesopleuron. It may be necessary to heat the material in 5% KOH. Note the pleural apodeme (the ridge corresponding to the pleural suture) and the pleural apophysis (an armlike process extending inward and downward from the pleural apodeme. Note the sternal apophysis or furca, which extends upward to the pleural apophysis. The apodemes and apophyses form an internal skeleton of the thorax, providing points of attachment for certain muscles.

C. Secondary Segmentation of the Abdomen

- (1) Open up the abdomen of a grasshopper and study a cross section. It may be necessary to heat the material in 5% KOH to remove the tissues. Prepare a drawing and label the structures underlined:

At the anterior end of each sternum and tergum there is an infolding to form a sclerotized ridge, to which muscles are attached. These ridges are the antecostae. The external suture corresponding to each antecosta is the antecostal suture. The narrow sclerotized rim of the tergum in front of the antecostal suture is the acrotergite, and that of the sternum is the acrosternite. The flexible intersegmental membrane is just in front of the acrotergite and acrosternite.

HINTS FOR LABORATORY 2

1. Do the external drawing of the pterothorax first.
 - Remove the mesothoracic and metathoracic legs from the left side of the grasshopper.
 - Remove both wings from the left side of the grasshopper by cutting near base.
 - Remove posterior portion of prothorax by inserting scissors near dorsal midline, cut towards head for short distance, then cut downward to sternum, and remove.
 - Look at pterothorax before making drawing, making sure you see all of the underlined structures.
 - Note that in the grasshopper the episternum is subdivided by a longitudinal suture into 2 pleurites. The dorsal pleurite is the supraepisternum and the ventral pleurite is the infraepisternum.
2. Do the internal view of the pterothorax next.
 - Remove the head and prothorax by making a circular cut around the insect in the middle of the prothorax

(just continue the same cut you already made in the prothorax around the right side of the grasshopper).

- Insert scissors just anterior to the mesothorax near the dorsal midline and cut caudally along this midline all the way to the last segment.
- Make a similar cut the length of the body along the ventral midline.
- Cut the right side of the abdomen away from the rest of the body by making a vertical cut through the last abdominal segment.
- Place the whole right side (pterothorax and abdominal segments together) in the warm KOH for 10-15 minutes.
- Using a pair of forceps remove the dissection from the KOH, rinse with ethyl alcohol.
- Separate the abdomen from the pterothorax by cutting through the first abdominal segment (through the tympanum).
- Place dissection in the dissecting dish (one with wax in bottom) and pin down with a pin in each of the four corners.
- Gently tease away any remaining soft tissue (with forceps) so you can clearly see the body wall.
- Locate all underlined structures and draw.

3. Finally, make internal drawing of the abdomen.

- Place abdomen in petri dish and pin down edges.
- With forceps gently tease away any remaining soft tissues.
- Locate underlined structures and draw.
- Note: you will have much difficulty locating the antecosta of the tergal plates (they are very reduced and you may not be able to see them). But they are evident in the sternal plates. Look at the forked apophysis coming off the anterolateral angle of the sternite. The ventral arm of this apophysis has a distinct ridge ventrally which continues onto the sternite ventrally. This is the antecosta of the sternite. The sclerotized portion anterior to this ridge but posterior to the membranous area is the acrosternite. Draw the segments the way that you see them.