

GENERAL INSECT MORPHOLOGY

Lab 8 - A study of some specialized abdominal structures

A. The Grasshopper Abdomen

- 1) Prepare a lateral view (left side) drawing of the female grasshopper (*Romalea* sp.) abdomen, labeling the following structures:

Grasshoppers have eleven segmented abdomen. The sternum of the first segment is fused with the sternum of the metathorax; the tergum is enlarged and bears a large auditory organ called the **tympanum**. The second to seventh segments are without modification. The sternum of the eighth is elongate. The most prominent feature of the female abdomen at its caudal end is the **ovipositor** which consists of four visible valves that are considered to be modified appendages of eighth and ninth segments. The ventral pair of valves belong to the eighth; the dorsal pair to the ninth.

The sterna of the ninth and tenth segments are lost while the tergites are reduced in size and are partially fused. The large pointed plate above the ovipositor is the **epiproct**; the lateral plates beneath the epiproct are the **paraprocts**. The **cerci** extending from the caudal margins of the tenth abdominal segment are greatly reduced.

The sternum of the eighth segment is prolonged into an **egg-guide** extending caudad between the ventral valves of the ovipositor. Above the egg-guide, between the dorsal and ventral valves is a forked organ that is also used in placing the eggs. This organ can be seen in those specimens with the ovipositor in an extended position.

Notice that the **pleural fold** is present between the tergum and sternum of each segment. Also **spiracles** are present. Note their number. The **antecostal groove** and the **intersegmental membrane** between segments are both covered by the overlapping margin of the preceding segment.

The **anal opening** lies beneath the epiproct. If the ovipositor is open in the specimen being examined, find the **genital opening** with the forked egg-guide.

- 2) Prepare a lateral view drawing of abdominal segments 8-10 of the male grasshopper (*Romalea* sp.), labeling the following structures:

The first to eighth segments of the abdomen of the male are similar to each other, the 9th and 10th are reduced in size and partially fused. The 9th sternum is well developed and bears caudally a hood-shaped lobe, the **subgenital plate (hypandrium)**. This shuts close against the **paraprocts** and the **epiproct** so that the end of the abdomen has a truncate appearance.

B. Abdominal Appendages of Collembola

1. Prepare a lateral view drawing of the abdomen of a Collembola (slide mount or alcohol specimen) and locate the following structures:
 - a. The ventral tube, or **collophore**, located on the first abdominal segment. It may function as an adhesive organ for walking, or it may aid in the uptake of water.
 - b. The clasp, or **tenaculum** on the sternum of the third abdominal segment. It is a structure for holding the furcula in place.
 - c. The spring, or **furcula** which apparently arises from the fifth abdominal segment, even though it is probably an appendage of the fourth segment (its muscles are inserted on the fourth segment). It functions as a spring which the Collembolan uses to jump.

C. Modification of the First Abdominal Sternite in Coleoptera

1. Prepare a drawing of the ventral view of the abdomen of both a Carabidae beetle and a Scarabaeidae beetle (pinned specimens) on the same sheet of paper. Compare the first abdominal segment of both. It is divided in the carabid and not in the scarabaeid.

D. Cerci in the Dermaptera

1. Prepare 2 drawings of the Dermapteran abdomen on the same sheet of paper. The first drawing should show the entire abdomen from lateral view. The second should show the terminal 2 segments and the cerci from dorsal view.

E. Petiolated Abdomen of Hymenoptera

1. Prepare a drawing of the lateral view of the abdomen of an Ichneumonidae - wasp. Label the following structures:
 - a. The first abdominal segment, or **propodeum**, which is fused with the thorax. The remainder of the abdomen is the **gaster**.
 - b. The second abdominal segment, or **petiole**, which is narrowed anteriorly.
 - c. The 8th and 9th abdominal segments, which are modified into a **sting**.

F. Abdominal Appendages in Ephemeroptera

1. Examine a slide mount of the abdomen of an immature mayfly, Heptageniidae species. Note the **cerci**, **median caudal filament**, and **abdominal gills**.

G. Abdominal Appendages in Protura

1. Examine a slide mount of a Protura and locate the eversible appendages on the basal abdominal segments.

H. Abdominal Appendages in Plecoptera

1. Examine a slide mount of an immature stonefly, Plecoptera species and locate the cerci.

I. Abdominal Appendages in Diplura

1. Examine a slide mount of a Japygidae, Diplura and note the pincer-like cerci and the annular ring type 10th abdominal segment.

J. Abdominal Appendages in Thysanura

1. Examine a slide mount of a Machilidae, Thysanura and note the abdominal styli.