

# INSECT MORPHOLOGY

## Lab 7 - A study of insect legs

**Introduction:** Insect legs serve a multitude of functions. In some insects the legs are adapted for walking, running, jumping, grasping, digging, or swimming. In this lab you will examine a number of different insects with legs modified for various functions. You will also prepare drawings for some of them. For each drawing you should label all of the typical leg structures: **coxa, trochanter, femur, tibia, each tarsal segment (ex. tarsus 1, tarsus 2, etc.), and any pretarsal structures such as tarsal claws, arolium, etc.** Any other modifications or structures that should be labeled will be discussed under each insect below.

### A. WALKING LEGS

1. Prepare a drawing of the mesothoracic leg of an ichneumon wasp. Note that the trochanter has been divided into 2 segments called **trochanter 1 and trochanter 2**.
2. Prepare a drawing of the metathoracic leg of a carabid beetle. Note that the trochanter still originates from between the coxa and the femur, but now it actually protrudes out to the side. This is called a **displaced trochanter**.
3. On one sheet of paper prepare the following drawings: 1) The dorsal surface of the tarsal segments of a wood-boring beetle (Coleoptera: Cerambycidae). There are five tarsal segments, but the fourth is very small and is hidden in notch in third segment. Also, note the pads of hairs on the ventral surfaces of the tarsal segments. 2) The dorsal view of the tarsal segments of a robber fly (Diptera: Asilidae). Notice the long **empodium**. 3) The lateral view of the tarsal segments of a plant bug (Hemiptera: Miridae).

### B. JUMPING LEGS

1. Prepare a drawing of the metathoracic leg of the grasshopper, *Romalea microptera*. The basal portion of the **coxa** is divided by a suture called the **basicoxal suture**. The small basal sclerite separated by this suture is called the **basicoxite**. Note that there is a membranous area between the **trochanter** and the **femur**, especially dorsally; this is called the **articular membrane**. The femur is quite large to accommodate the large tibial extensor muscles which are used in jumping. Note the large spines at the apex of the **tibia** which are useful in getting a better grip on the surface while jumping. There are 3 **tarsal segments**, each with **tarsal pads** on their ventral surface. The pretarsus includes a pair of **tarsal claws** and a large flap-like **arolium**.

### D. DIGGING LEGS

1. Prepare a drawing of the prothoracic leg of a mole cricket, *Gryllotalpa* sp. These legs are highly modified for digging. The trochanter is produced into an elongate spade-like structure. The femur is very stout and strong, and the tibia bears two strong flattened and pointed distal tines; it also bears a round flattened area near the base which functions as an **ear**. The first two segments of the tarsus are also produced into strong tines, and the tine of the first segment can work against one of the tibial tines to function as shears in cutting through fine rootlets.
2. Examine the foreleg of a burrowing bug, Cydnidae. The coxa and trochanter are small; the femur is large and stout. The tibia is broad and flattened and has a row of stout spines on outer margin for digging. There are 3 tarsal segments. The pretarsus consists of a pair of claws and two bristle-like empodia.

### E. RAPTORIAL LEGS

1. Examine the forelegs of an ambush bug, *Phymata* sp. The coxa is fairly large and is constricted near the base, then it is swollen again in socket. The trochanter is small. The femur is very large with a large medial spine and a row of smaller spines. The tibia is pincer shaped with a row of small spines which oppose the row of spines on the femur. There is a small groove on the outer surface of the tibia in which the tarsal segments lay.

2. Examine the forelegs of a predacious water bug, Belostomatidae. The femur is much enlarged to accommodate the flexor muscles of the tibia, which is strongly flexed against the femur when holding the prey. Note that the entire leg is strongly sclerotized, that the pretarsus consists of a single curved claw, and that the tibia, tarsus, and pretarsus are consolidated to give strength and rigidity.
3. Prepare a drawing of the foreleg of a preying mantis. The foreleg is raptorial, but the tarsus and pretarsus take no part in the grasping action. The **coxa** is much elongate. The **tibia** ends in a sharp curved spine and the opposing edges of the femur and tibia are provided with long sharp spines.

#### F. NATATORIAL LEGS

1. Prepare a drawing of the hind leg of a diving water beetle, Dytiscidae. The **coxa** is very small and hidden under a projection of the sternum. The **trochanter**, **femur**, and **tibia** are broad and flattened. There are two large spines at the apex of the tibia. The five **tarsal segments** are broad and flattened and are closely joined together to work as a unit for swimming. There is a row of hairs on both margins of the tarsal segments with those on the inner margin quite long. The pretarsus consists of a single claw.
2. Examine the hind legs of a predacious water bug, Belostomatidae. The coxa, trochanter, and femur are all stout. The tibia and tarsal segments are broad and flat, somewhat oar-like. There are only two tarsal segments which have long hairs along both margins. The pretarsus includes a pair of tarsal claws.

#### G. SPECIAL MODIFICATIONS

1. Prepare a drawing of the hind leg of the honey bee, *Apis mellifera*. The outer surface of the **tibia** is smooth and flattened with long hairs along its outer margins which curve back over the surface of the tibia. This forms the corbicula or **pollen basket**. [Note - see display of pinned bee with pollen basket full of pollen]. The first tarsal segment is very large and flattened and has a small basal projection called the **auricle**. The auricle together with the distal edge of the tibia forms a pincer-like mechanism known as wasp pincers. [Also, look at the inner surface of the first tarsal segment. It has a series of rows of stiff hairs called the pollen brush. Also, on the inner surface, the distal margin of the tibia bears a row of stiff hairs called the pollen rake].