

LABORATORY EXERCISE 4: The Nature of Insect Integument, Part One.

External Skeleton.

Preserved specimens of large cockroaches (order **Dictyoptera**, suborder Blattodea: *Blaberus* spp., *Nauphaeta cinerea*, *Periplaneta americana*, *Gromphadorhina portentosa*) and grasshoppers (order **Orthoptera**, suborder Caelifera, family Acrididae, *Romalea microptera*) will be provided. Examine a specimen of each group and note the tagmata (functional groupings of body segments) and the nature of the segmentation of thorax and abdomen. Make note of the various features, mentioned in lecture, that define these arthropod specimens as true insects. Study a thoracic segment of each species and distinguish the tergum, pleura (singular = pleuron) and sternum, and locate a tergite, pleurite and sternite (see Gillott, fig. 3.2, and handout). Also, distinguish the prothoracic, mesothoracic and metathoracic segments from one another. Compare the thoracic segments with an abdominal segment -- the latter is generally much simpler and shows primary and secondary segmentation more clearly. From the dorsal view, draw (Drawing #5-a) segments 5, 6, and 7 of the abdomen of either a cockroach or *Romalea*, showing the primary and secondary segmentation defined by the intersegmental membrane (= conjunctiva), the antecostal suture, the main tergites and the acrotergites (see Gillott, fig. 3.2). Interpreting these structures will probably be easier if you first perform the dissection described below. Then turn the insect on its side and draw the same abdominal segments from lateral view (**Drawing #5-b**), labeling the tergites, pleurites and sternites together with the spiracles. Spiracles are also located in the thoracic region; these should be identified before returning your roach and grasshopper to its original jar.

Segmentation: Secure a piece of the dorsal abdominal integument as follows: Insert the scissors beneath the posterior edge of the 7th abdominal tergum of *Romalea*, close to one side of the abdomen, and cut the terga anteriorly to about the 3rd abdominal segment. Repeat on the opposite side of the body and then make two transverse cuts so as to free the rectangular piece of integument. This you can now remove from the body by carefully lifting it with the forceps.

Examine the inner surface of this piece of integument under the dissecting microscope. Carefully remove with forceps or probes (or insect pins) the fragments of tracheae, Malpighian tubules or fat body that may be sticking to it (tracheae are whitish or silvery threads; Malpighian tubules are more yellow or brown, as are fatty deposits). Note the dorsal longitudinal muscles attached to the regions of intersegmental folds (see Gillott, figs. 3.2, 14.7 & 14.8).

Beetles (Coleoptera), caterpillars (larvae of Lepidoptera) and other insects are available on demonstration to permit you to compare extremes of sclerotization of cuticle within the Insecta.