

## LABORATORY EXERCISE 13: Wing Articulation

### Wing Base

Study the wing **articulation** of a dragonfly or damselfly (Odonata, s.o.'s Anisoptera and Zygoptera), using specimens preserved in alcohol. Here the wing base is more or less continuous with the notum thus restricting the number of “degrees of freedom” of the wing (refer to Snodgrass, figure 123-B). Next examine the mesotergum (**mesonotum**) of an adult scorpionfly (Mecoptera: *Panorpa*), stonefly (Plecoptera: *Pteronarcys*), or dobsonfly (Neuroptera: *Corydalus*). Find the anterior notal process and posterior notal process. Study carefully the forewing of the insect from above, pinned out in “flying” position, and find the **three axillary sclerites**; peek under the wing and see if you can locate the **basalare** and **subalare** sclerites as well. These five sclerites, together with the two semi-triangular **median plates** (visible dorsally), determine the wing movements of extension, flexion and folding that are characteristic of the neopterous wing. The first axillary sclerite articulates with the anterior notal process and with the second axillary sclerite, and abuts anteriorly against the head (origin) of the subcostal vein (**Sc**). The second axillary sclerite is an elongate structure of variable size that articulates mesially (in the middle) with the first axillary, anteriorly with the median plate [the one that is located at the base of the medial and cubital veins (**MA, MP; CuA, CuP**) and base of the radial vein **R**], and laterally with the anterior arm of the third axillary sclerite, which in turn articulates with the posterior notal process and is extended laterally into an anterior and posterior arm. The anterior arm articulates with the second axillary sclerite and with the median plate and the posterior arm is associated with the anal veins. Find, if you can, the attachments of the flexor muscle of the wing on the third axillary sclerite. Also, manipulate the wing carefully and non-destructively to see how it folds near its base. Make a diagram (**Drawing #21**) of the wing base of a scorpionfly, stonefly, or dobsonfly, **dorsal** view, showing the axillary sclerites and plates and their relationships to the main veins, and indicate by means of dotted lines the upward and downward folds which make possible the folding of the wing back over the body (refer to Romoser, fig. 6-10, and Gillott, figs. 2.2 and 2.3).

### General Wing Form

Note the differences in the shapes of the wings of a dragonfly vs. those of *Panorpa* or a perlid stonefly. Those of the former are paleopterous and homonomous (or nearly so); those of the perlid or *Panorpa* are neopterous and heteronomous. Make a drawing (**Drawing #22**) of the outline of the forewing of the stonefly or scorpionfly, labeling the remigium, axillary area, anal or vannal area, jugum, vannal fold, and jugal fold. Compare the structure and texture of the forewings of a dragonfly, cockroach, true bug, and beetle, noting elytral or tegminal modifications. If you have time, carefully cut off the hindwing of a cockroach and spread it out on a glass plate; compare its area with that of the forewing. Similarly study the fore- and hindwings of an acridid (Orthoptera: short-horned grasshopper). Determine the major wing regions in these insects.