Surface structure of insect wings

Examine under high power of the dissecting scope the surface of the wing of a dragonfly or damselfly (Odonata), a vespid wasp (Hymenoptera: Vespidae), a true fly (Diptera: *Musca* or *Tabanus*), and a moth (Lepidoptera: Noctuidae and others). Note the differences in the form and distribution of the setae (macrotrichia), particularly with regard to the main veins. Take the wing from a house fly or horse fly specimen and place it on a slide with a drop of water; cover with a cover slip. Examine your slide under high power of the compound microscope and make a simple drawing (**Drawing #23**) of a few macro- and microtrichia *in situ* on the wing. Macro- and microtrichial "blooms" are even better defined on the wing surfaces of scorpionflies (order Mecoptera) and caddisflies (order Trichoptera), and in more primitive members of the order Diptera (like Tipulidae). Prepared slides of the wings of these insects are available on demonstration. The highly specialized scale-like setae of the wings of lepidopterans are also on demonstration (you've seen some of these in a previous lab).

Coupling apparatus of insect wings

The mechanism by which the fore- and hindwings are coupled during flight is diversely formed. Using the dissecting scope, examine specimens illustrating wing coupling by means of a **jugum** (supposedly found in moths of the family Hepialidae, a relatively ancient, phylogenetically basal group of Lepidoptera -- but here, the jugum does not actually function to couple the wings) or by means of a **frenulum** (choose some other relatively generalized family from Lepidoptera). Then, compare with wing coupling by means of little hooks or **hamuli**, which are best illustrated by the hind wings of certain wasps (Hymenoptera: *Polistes*, *Vespa*, *Vespula*, *Ichneumon*, etc.). To do this, prepare a slide of the hind wing of a white-faced (bald-faced) hornet, in the manner described above for the fly wing, and then use a compound microscope. Now, you have a choice: you can illustrate the wing-coupling apparatus of any one of the three mechanisms just mentioned. Make a drawing (**Drawing #24**) of the coupling apparatus you have chosen, as viewed under the high power of the compound microscope (for hamuli) or under high power of the dissecting microscope (for frenulum or jugum).

Wing Venation

Study the forewing of a mayfly (order Ephemeroptera) and determine which are main veins and which are the branches. Examination of the convexity and concavity of the veins will help, in addition to the demonstration drawings and the figures in Imms (#7) and Romoser (#2-23) (Gillott's terminology is not widely accepted, so do not use it.) Make a simplified drawing (**Drawing #25**) of the wing of your mayfly, labeling only the main veins (Note: do not remove the wing of the specimen -- pin the whole insect and its outstretched wings carefully into a suitable position).

Examine the wings, on prepared slides on demonstration, of an antlion (Neuroptera: Myrmeleontidae), noting the numerous secondary veins formed by terminal twigging and crossing. Compare this with the reduced venation pattern of the horse fly, *Tabanus* (Diptera: Tabanidae), referring to Imms figure 7 for the identity of the veins. Secondary reduction is more extreme in the wing of a pteromalid wasp (Hymenoptera: Pteromalidae), which may be compared with the more generalized condition of venation in the Hymenoptera exemplified by a sawfly (suborder Symphyta: Tenthredinidae). Finally, you should examine the elytral (forewing) modifications of Coleoptera, noting in particular the cases where elytra are locked or even fused together (*Passalus*, in the Carabidae).