



**FACULTY OF AGRICULTURAL SCIENCES & ALLIED INDUSTRIES**

# ENT-121: Fundamentals of Entomology

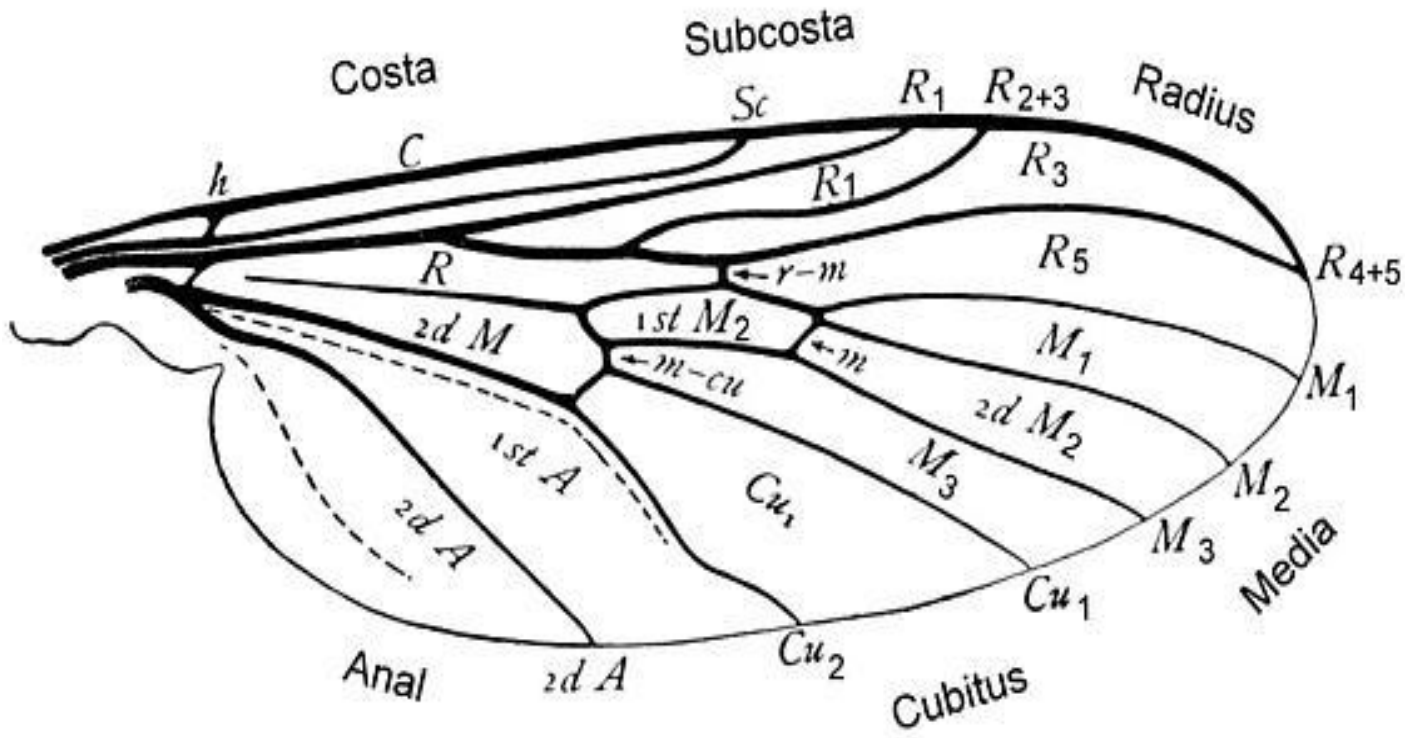
## Lecture 13: Insect Wings:

- 1. Tegmina:** (Singular : Tegmen) Wings are leathery or parchment like. e.g. Forewings of cockroach and grasshopper.
- 2. Elytra:** (Singular : Elytron) The wing is heavily sclerotised. Wing venation is lost. Wing is tough and it is protective in function. e.g. Fore wings of beetles and weevils.
- 3. Hemelytra:** (Singular: Hemelytron) the basal half of the wing is thick and leathery and distal half is membranous. e.g. Fore wing of heteropteran bugs.
- 4. Halteres:** (Singular: Haltere) In true flies the hind wings are modified into small knobbed vibrating organs called haltere. Each haltere is a slender rod clubbed at the free end (capitellum) and enlarged at the base (scabellum). e.g. true flies, mosquito, male scale insect.
- 5. Fringed wings:** Wings are usually reduced in size. Wing margins are fringed with long setae.. e.g. Thrips.
- 6. Scaly wings:** Wings of butterfly and moths
- 7. Membranous wings:** Thin, transparent wings. In many insects either forewings (true flies) or hind wings (grass hopper, cockroach, beetles and earwig) or both fore wings and hind wings (wasp, bees, dragonfly and damselfly) are membranous.

### Wing coupling:

- 1. Hamulate:** A row of small hooks is present on the costal margin of the hind wing which is known as hamuli. Eg. Bees
- 2. Amplexiform:** It is the simplest form of wing coupling. A linking structure is absent. Coupling is achieved by broad overlapping of adjacent margins. e.g. butterflies.
- 3. Frenate:** Hindwing bears a stout bristle called frenulum which is normally held by a curved process to attach with fore wing. Eg fruit sucking moth.
- 4. Jugate:** Jugam of the forewings are lobe like and it is locked to the costal margin of the hind wings. E.g. Hepialid moths.

The arrangement of veins on the wings is called venation which is extensively used in insect classification. The principal longitudinal veins arranged in order from the anterior margin are costa (C), sub costa (Sc), radius (R), median (M), cubitus (Cu) and anal veins (A). Small veins often found inter connecting the longitudinal veins are called cross veins.



Typical Wing Venation

