Lecture No.38 PARASITOLOGY DR. Raad H.H.

**Order Diptera**

**Suborder: Brachycera**

**Infraorder: Muscomorpha (=old suborder Cyclorrhapha)**

**FAMILY: Muscidae (house flies and stable flies)**

1. small to medium sized flies
2. nearly 4,000 described species
3. most are simply annoying and may serve as mechanical vectors of many diseases
4. ***Musca domestica* (common house fly)** 
   1. dozens of species within the genus *Musca*, but *M. domestica* is very common
   2. four broad, longitudinal stripes on dorsal surface of thorax
   3. wing vein 4 bends upward and joins costa (end of wing) very near wing vein 3. This is an important diagnostic feature for the genus.
   4. females lay 5-6 batches of ca 100 eggs/batch in life
   5. maggots with 3 instars. Depending upon food and temperature, development is complete in 3-24 days
   6. similar genera include *Muscina* (Muscidae) and *Fannia* (Fanniidae)
5. **includes the stable fly, *Stomoxys calcitrans*** 
   1. looks much like a house fly, but bites and is often called the "biting-house fly"
   2. adults with 4 dark, longitudinal stripes on dark grey thorax
   3. distinct, forward projecting proboscis that is rigid
   4. both sexes feed on blood
   5. feeds during the day; bites many species of mammals
   6. breed in decaying vegetation (i.e. compost piles); sometimes manure
   7. may transmit *Trypanosoma evansi* and *Habronema microstoma*
   8. also transmit diseases phoretically, which include anthrax, brucellosis, fowl pox, and others
   9. **includes *Haematobia irritans* (horn flies)**
   10. look much like a slender house fly; tend to be about one-half size of house flies
   11. both sexes feed on blood
   12. adult flies remain on host, and female only leaves to lay eggs
   13. prefer cattle; occasionally horses and rarely humans
   14. feed on cattle 20-40 times per day
   15. females lay eggs in fresh bovine manure
   16. transmit *Stephanofilaria stilesi* to cattle; many mechanically transmit other diseases such as bovine mastitis

**FAMILY: Glossinidae (tsetses flies)**

1. only one genus, *Glossina*, with 23 spp
2. predominately sub-Saharan Africa
3. antennae small, plumose
4. generally brownish in color, with base of proboscis bulb-like
5. proboscis forward-projecting and rigid
6. wing veins 4 and 5 enclose a cell that resembles an upside down hatchet. This cell is termed the "hatchet cell" and is very distinctive for the genus
7. diurnal feeders, and like to feed every 48-72 hr if possible
8. both sexes feed on blood
9. home in on carbon dioxide
10. give birth to a single, developed 3rd stage larva; the first two larval stages molt and grow in the oviduct and are nourished by glands termed milk glands
11. females generally lay about 10-15 offspring in their life-time; immediately after birth, larvae burrow into loose, dry, sheltered soil; pupate; 2-4 weeks
12. capable of transmitting African sleeping sickness and related trypanosomes

**FAMILY: Calliphoridae (blow flies)**

1. most species metallic, and may be blue, green, tan, or other colors
2. many of these have larvae that burrow into the skin and cause destruction of dermal tissue/hides
3. most species with a load buzzing sound
4. *Cochliomyia hominivorax* (primary screwworm)
   1. occurs in the Western hemisphere, although erradicated in most areas north of Mexico by release of sterile males as females only mate once
   2. infects many types of mammals, especially cattle
   3. adults greenish-blue and metallic with several dark stripes on abdomin; face may also have a patch of color
   4. female lays egg clusters at site of wound (larvae cannot penetrate intact skin); generally dermal tissues infected although the female may lay eggs at the entrance to the nasopharyngeal region or urogenital tract, and around the ears and eyes
   5. larvae emerge from eggs, enter wound (or up nose or urogenital tract); migrate and ingest tissues that can result in deep pocketing of wound (spiracles must have contact with air); after 4-8 days and before pupation, emerge and pupate in soil
5. *Chrysomiya bezziana* (old world screw worm flies ) in Iraq.
6. Other species
   1. *Lucilia cuprina* (wool strike; in Australia; eggs layed on wet, dirty wool at posterior of sheep; maggots feed on feces, on wool, on the tail, and perianally; may cause inflammation of dermis, irritation of skin)
   2. *Lucilia bufonivor* (eggs layed on skin of amphibia, especially toads, and larvae migrate to eyes and enter through lacrimal ducts; migrate into nasopharyngeal area from lacrimal gland and feed on cartilaginous septum of nasal cavity; drop out of nostrils and pupate in soil)
   3. *Auchmeromyia senegalensis* (*=A. luteola*) (Congo floor maggot); in sub-Saharan Africa; larvae come out at night and feed on sleeping mammals, suck blood; only known genus of blood sucking maggot to target mammals (although others feed off birds). Main hosts wild pigs, warthogs, aardvark, hyena; occasionally humans. Five described species in genus.

**FAMILY: Hippoboscidae (louse flies)**

1. about 100 species
2. look much like ticks, however, only 6 legs
3. wings have been lost by females of most species, whereas males have usually retained wings; some where both sexes have wings
4. both males and females feed on blood
5. larvae retained in female and larvae ingest secretions from inside female somewhat similar to the tsetses; larvae are born and ready to pupate
6. *Melophagus ovinus* (sheep ked)
   1. cosmopolitan, although not in tropics
   2. females produce about 1 offspring per week
   3. glues puparium to wool (females produce about a dozen offspring in their lives); lives entire life on host similar to a louse
   4. normally reside on surface of fleece, not directly on skin except when feeding (may not be able to tolerate temperature at dermis); transmitted directly from animal to animal
   5. painful bite; heavy infestations may result in emaciation, scarring, anemia; occasionally bite humans
7. *Pseudolynchia canariensis*
   1. found commonly on pigeons
   2. temperate regions
   3. both sexes with wings
   4. can transmit *Haemoproteus columbae* (pigeon malaria)
8. *Lipoptena depressa*
   1. on deer in the western US
   2. pupae fall to ground; hatch and juveniles fly off
   3. flying juveniles locate deer, crawl between hair fibers to skin to suck blood; become sexually mature in about 12 days
   4. males and females mate on the host
   5. females produce offspring every 3 days; about 30-35 offspring produced per female
   6. some will even feed through the abdomin of other feeding adults

**FAMILY: Sarcophagidae (flesh flies)**

1. related to Calliphoridae
2. checkered gray and black abdomin; non-metallic
3. most species produce live larvae in wounds or on carcasses; many species infest invertebrates; all parasitic stages during larval period
4. *Sarcophaga haemorrhoidalis*
   1. cosmopolitan
   2. end of abdomin of adult tipped in red
   3. larvae can sometimes be found contaminating wounds of mammals
5. *Sarcophaga cistudinis*
   1. chelonians
   2. often found embedded in dermis around neck region
6. *Wohlfahrtia vigil*
   1. North America
   2. larvae deposited on dermis of many mammals; larvae burrow into skin
7. *Emblemasoma erro*
   1. North America
   2. larvae parasitize body cavity of various cicadas

**FAMILY: Oestridae (bots)**

1. this family is composed of several different taxa that were once families on their own; these families are now relegated to subfamilies
2. **4 major subfamilies** 
   1. **Cuterebrinae** (rodent or skin bots)
      1. large dark flies that lay eggs near orifices
      2. larvae enter orifice, tunnel under skin, cut out an air hole, and ingest live tissues
      3. many different species in mammals
      4. representative species
         1. *Cephenemyia* spp. (myiasis in cervids, especially around head and neck;
         2. *Cuterebra* spp. (infest many species of mammals; often in the skin of rodents, rabbits, and many other mammals
         3. *Dermatobia hominis* ("Torsalo;" in skin of mammals and birds; female uses arthropod phoretic carrier for eggs)
   2. **Gasterophilinae** (stomach bots)
      1. females lay eggs to hair; species in horses, elephants, and rhinoceroses; 3 species introduced into the US with equids
      2. *Gastrophilus intestinalis* (horse bot)
         1. some eggs enter mouth after being licked off
         2. larvae hatch quickly; penetrate tongue epithelium; tunnel to stomach through epithelium; emerge and attach with hooks
         3. after 2 molts, detach in spirng and early summer, passed in feces, and pupae in soil
      3. *Gastrophilus nasalis* (throat bot; eggs attached to hairs under jaw; lavae hatch and migrate to lips and into mouth)
      4. *Gastrophilus haemorrhidalis* (nose bot; eggs attached to lips; last stage larvae attach for a time in rectal area)
      5. other members of the genus, and other genera, in other countries
   3. **Hypodermatinae** (warbles or heel flies)
      1. most species in Northern hemisphere
      2. most species infest cattle, deer, horses; occasional infections in humans
      3. *Hypoderma lineatum* (gadfly)
         1. light and dark bands on body
         2. females lay eggs on hair, usually on hind legs
         3. larvae penetrate skin; migrate anteriorly, then migrate back to lumbar region
         4. cut air hole in skin in lumbar region; feed on tissues; eventually rupture out of air hole and pupate
   4. **Oestrinae** (nose and pharyngeal bots; head maggots)
      1. adults large but do not feed
      2. eggs layed in or near nostrils
      3. *Oestrus ovis* (sheep nasal bot)
         1. targets sheep and goats worldwide
         2. eggs layed in late Summer and Fall
         3. larvae crawl up into sinuses
         4. attached and feed on sinus mucosa
         5. eventually larvae migrate back down, drop to ground, and pupate in Spring
         6. occasionally infections in humans
      4. sneezing, shaking of the head, nasal discharge

**FAMILY Anthomyiidae:**

Anthomyiidae is a large and diverse [family](http://en.wikipedia.org/wiki/Family_(biology)) of [Muscoidea](http://en.wikipedia.org/wiki/Muscoidea) [flies](http://en.wikipedia.org/wiki/Fly). Name came from Greek "anthos" (flower) + "myia" (a fly). Some species are commonly called "root-maggots", as the [larvae](http://en.wikipedia.org/wiki/Larva) are found in the stems and roots of various plants. As larvae, some also feed on decaying plant material, and some are [leaf miners](http://en.wikipedia.org/wiki/Leaf_miner); the family also includes [inquilines](http://en.wikipedia.org/wiki/Inquiline), [commensals](http://en.wikipedia.org/wiki/Commensal), and [parasitic](http://en.wikipedia.org/wiki/Parasite) larvae.

Some species in the family are significant agricultural pests, particularly some from the genus [*Delia*](http://en.wikipedia.org/wiki/Delia_(genus)), which includes the onion fly ([*Delia antiqua*](http://en.wikipedia.org/w/index.php?title=Delia_antiqua&action=edit&redlink=1)), the wheat bulb fly ([*Delia coarctata*](http://en.wikipedia.org/w/index.php?title=Delia_coarctata&action=edit&redlink=1)), the turnip root fly ([*Delia floralis*](http://en.wikipedia.org/w/index.php?title=Delia_floralis&action=edit&redlink=1)), the bean seed fly ([*Delia platura*](http://en.wikipedia.org/w/index.php?title=Delia_platura&action=edit&redlink=1)) and the cabbage root fly ([*Delia radicum*](http://en.wikipedia.org/wiki/Delia_radicum)).

**FAMILY: Chloropidae (eye gnats) (you will not be tested over this taxon)**

1. tiny flies that look much like minitature house flies
2. feed off secretions from body, opportunistically on blood if available
3. vomit stomach secretions onto food to begin digestion
4. common species include *Hippolates* spp.
5. may be involved in mechanical transmission of several bacterial diseases into wounds. These include *Treponema pertenue* (yaws) and bovine mastitis on teats. Pinkeye in humans has been shown to be transmitted by these flies as well (among other ways)

* **Myiasis**

It is an infestation of the Man & vertebrates by the" Larvae " of flies of certain families belongs to the order Diptera which are feeds on fluids & tissues of host by obligatory or facultative ways.

Types of Myiasis disease

1. Specific Myiasis : which caused by larvae flies of different genera by obligatory way on wounds & tissues of the host . e.g.:
2. *Dermatobia hominis*
3. *Chrysomia bezziana* ( old world screw worm fly)
4. *Osterus ovis* ( sheep ).
5. Non specific : which caused by larvae flies of different genera by facultative way on wounds &dead or life tissues of the host . e.g.:

Lucilia ; Caliphora.

1. Accidental Myiasis : caused by ingestion of fluids or food contaminated by e.g. Musca flies .
2. Noso comical Myiasis :

Medically using of maggot ( Larvae) to treating putrefied wounds as used with soldier's injuries in I & II wars.