Order Diptera - The True Flies
Suborder Nematocera ("long-horned" flies)

Mosquitoes (family Culicidae)
Note the long multi-segmented antennae that place these flies in the Nematocera.

Mosquito life stages
Like all members of the Diptera, mosquitoes have the following stages in their life cycle:
Egg, larva, pupa and adult. However, the larva and pupa of the mosquito are aquatic and thus look much different than those of other flies.

Order Diptera
Suborder Nematocera ("long-horned flies")

Black flies (family Simuliidae)
Note the long multi-segmented antennae that place these flies in the Nematocera.

Order Diptera - The True Flies
Suborder Brachycera ("short-horned flies")

Deer and horse flies (family Tabanidae)
Note the size and shape of the adult. Also note the antenna sticking straight out from the center of the anterior of the head.

Zanclus sp. (Horse Fly)
Note the size and shape of the adult. These are robust, large-headed flies.
Also note the antenna sticking straight out from the center of the anterior of the head.
Order Diptera - Muscidae
The "Muscoid" Flies (suborder Cyclorrhapha)

[Cyclorrhapha diagram]

- Note the typical club shaped antenna laying in the groove between the eyes.

Lucilia, Sarcophaga and Calliphora adults

See lab handout.

suborder Cyclorrhapha

- the adile to identify in the suborder Cyclorrhapha - The muscoid flies

Luciniphaga - sheep loof
(Fam. Calliphoridae)

Celobius Fenniae at New Beulah Center

Note:
1. This is a maggot fly family - Diptera
2. strong fly
3. see the infestation

The adult lives in the wind of sheep. The female lays eggs inside the skin of the host. The eggs are separated by the mother. The adult can fly away if they have enough energy to fly. The adult is damaged when the sheep scratch and eat the eggs.

The life cycle of a muscoid fly.

Gasterophilus intestinalis and G. nasalis

Specialists can use the rows of spines on the segments to key these bots to species (see Figure 4B). You will not have to do this; just know that these are "bots" and by their location in the stomach of a horse, they are members of the genus Gasterophilus.

Gasterophilus intestinalis

Larvae attached to the mucosa of the stomach of a horse. You can see lesions where the larvae have detached. Note the ring of inflammatory thickening with an eroded center where the larvae were attached.
**Gasterophilus sp.**

Egg on the hair of a horse.

**Gasterophilus sp.**

Note the comma-shaped eggs on this hair from a horse's leg. These are a key diagnostic stage indicating possible infection. They should be removed whenever they are found (i.e., short, forelegs depending on fly species). Horses owners will know to do this. Note that linear eggs will be found on the hair from all areas of the horse, not just the feet.

**Hypoderma sp. - NATURE LARVAE**

An expert entomologist can identify these larvae to species using their size, shape and the characteristics of the spiracle plates.

- *H. bovis*
  - (identify as a bot)

- *H. lineatum*
  - (identify as a bot)

**Leather damage due to Hypoderma**

This piece of leather shows the healed lesions following the emergence of *Hypoderma* sp. larvae from the back of a bovine. The light spots are the scars. The scars lower the price received for the hide.

**Cuterebra larva**

This is a mature larva which would be found in a dermal pocket in the host. Found in rodents and rabbits and inquisitive dogs and cats that stick their nose into rodent burrows.

- (identify as a bot)
Order Phthiraptera - Lice
Suborder Mallophaga
The Chewing Lice
The Amblycera:
These chewing lice have their antennae recessed into grooves on the side of their head. Many of the chewing lice of birds fall into this group.

Menopon gallinarum - The Shunt Louse
This chewing louse of poultry is an example of the Amblycera. Note that the antennae lie in grooves on the side of the head.

Order Phthiraptera - Lice
Suborder Mallophaga
The Chewing Lice
The Ischnocera
These chewing lice have antennae that stick out from the side of the head.

Tickhodeles sp. - The chewing louse of dogs
Note:
1. General structure - head, thorax, abdomen
2. Three pairs of strong legs each with a claw
3. Antenna extend beyond head
4. Loprop - pointed head with prominent stylets (adapted for sucking). These are visible within the head of the isolated specimen.

Linognathus sp.
Sucking lice of this genus are found on cattle, goats, sheep and dogs.

(as belonging to the Amblycera group of chewing lice)

(as belonging to the Ischnocera group of chewing lice)

(as belonging to the Anoplura - sucking louse)
Linognathus setosus - Nit (egg)

Egg cemented to the hair of a dog. All louse eggs are similar to this one.

Pediculus humanus - head or body louse of humans - a sucking louse (Auchenorhyncha)

This is an adult, the nymphs are smaller but have a very similar structure. This louse is a parasite of humans and does not have a reservoir in domestic animals (remember the host specificity of lice!)

Pthirius pubis - crab or pubic louse of humans - a sucking louse (Phthiraptera)

This louse is a parasite of humans and does not have a reservoir in domestic animals (remember the host specificity of lice!)

Otocephalides cati

Host: General structure - head, thorax, abdomen and 3 pairs of legs
1. Presence of both genital and proventral setae (combs)
2. The head is more rounded than that of C. felis
3. Short first teeth on the genital setalium

Otocephalides felis - larva

These larvae are free-living. Live larvae may have a red color from feeding on the adult flea's feces and dried blood.
Flea larvae feed on the blood of adult fleas that fall off the host. Therefore you will find fleas when the pet is spending a lot of time. After all, the larvae are how they are that is where the eggs fall off the host and they enter your house that is where they live. 

To get rid of fleas you need to clean your house thoroughly. First, vacuum all the carpets and rugs. Then, wash all the bedding and clothes that have been exposed to the pet. Flea eggs can also be killed by the pets themselves. Store flea powder in a way that the environment is dry and the powder is not damp. Flea eggs can also be killed by heat.”

- Flea Life Cycle

  Egg - Larva - Pupa - Adult