Subject	Adv. Medical Entomology
Lect. No.	12
Date	/ **1** / 20**24**

ORDER DIPTERA

SUBORDER : CYCLORRHAPHA: (Circular-crack)

FAMILY :. MUSCIDAE House fly)

1. **Antennal arista is plumose.**
2. **Mouthparts are sponging type.**
3. First abdominal segment is yellow in colour.
4. Terminal abdominal segments are telescopic forming a pseudo ovipositor.
5. Abdomen is not bristly on basal part.

Maggots are scavengers. Adults carry certain disease-causing microbes on its legs, body hairs and mouthparts.

Common house fly: *Musca domestica*

House flies are not the neatest of insects. They visit such places as dumps, sewers, and garbage heaps. They feed on fecal matter, discharges from wounds and sores, sputum, and all sorts of moist decaying matter such as spoiled fish, eggs and meat.

Life Cycle and Description

The house fly has a complete metamorphosis with distinct egg, larval or maggot, pupal and adult stages. As many as 10 to 12 generations may occur annually in temperate regions, while more than 20 generations may occur in subtropical and tropical regions.

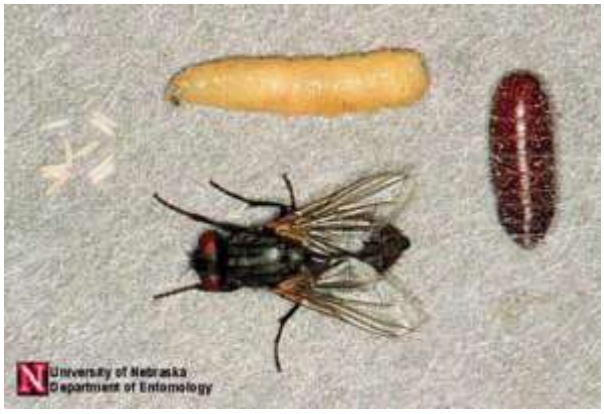


Figure 2. Life cycle of the house fly, *Musca domestica* Linnaeus.

Egg: The white egg, about 1.2 mm in length, is laid singly but eggs are piled in small groups. Each female fly can lay up to 500 eggs in several batches of 75 to 150 eggs over a three to four day period. Maximum egg production

occurs at intermediate temperatures, 25 to 30°C. Often. Eggs must remain moist or they will not hatch.

Larva: Early instar larvae are 3 to 9 mm long, typical creamy whitish in color, cylindrical but tapering toward the head. The legless maggot emerges from the egg in warm weather within eight to 20 hours. Maggots immediately begin feeding on and developing in the material in which the egg was laid.

Larvae complete their development in four to 13 days at optimal temperatures, but require 14 to 30 days at temperatures of 12 to 17°C.

Pupa: The pupal stage, about 8 mm long, is passed in a pupal case formed from the last larval skin which varies in color from yellow, red, brown, to black as the pupa ages.

Figure 4. Prepupa and sequence of puparia of, *Musca domestica*Linnaeus.

Adult: The house fly is 6 to 7 mm long, with the female usually larger than the male. The female can be distinguished from the male by the relatively wide space between the eyes (in males, the eyes almost touch). The head of the adult fly has reddish-eyes and sponging mouthparts. The thorax bears four narrow black stripes and there is a sharp upward bend in the fourth longitudinal wing vein. The abdomen is gray or yellowish with dark midline and irregular dark markings on the sides. The underside of the male is yellowish.

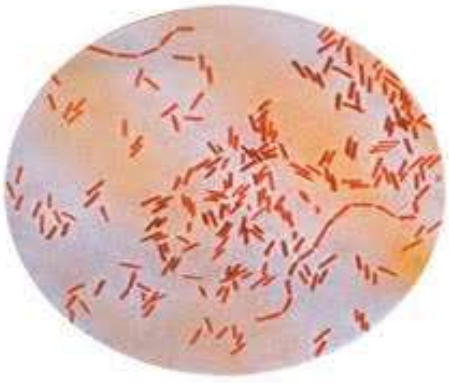
Figure 5. Adult house fly, *Musca domestica* Linnaeus

Medical Importance

1.The annoyance

2.Also the Indirect damage produced by the potential transmission of pathogens (viruses, bacteria, fungi, protozoa (*Giardidia lamblia*), and nematodes) associated with this fly.

3.Among the pathogens commonly transmitted by house flies are *Salmonella, Shigella, Campylobacter, Escherichia, Enterococcus, Chlamydia*, and many other species that cause illness. These flies are most commonly linked to outbreaks of diarrhea and shigellosis, but also are implicated in transmission of food poisoning, typhoid fever, dysentery, tuberculosis, anthrax, ophthalmia, and parasitic worms.



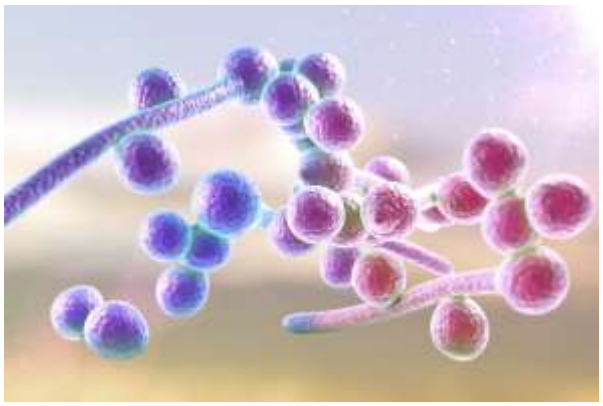


Fig. a. Bacteria , *Salmonella typhi* b.Fungi, ***Candida albicans***

4. Houseflies can fly for several kilometers from their breeding placescarrying a wide variety of organisms on their hairs, mouthparts, vomitus, and feces.

2. Houseflies are very dangerous and transmit organisms which cause human intestinal disorders, such as typhoid, paratyphoid, diarrhoea, bacillary and amoebic dysentery,(*Entamoeba histolytica*) and cholera.

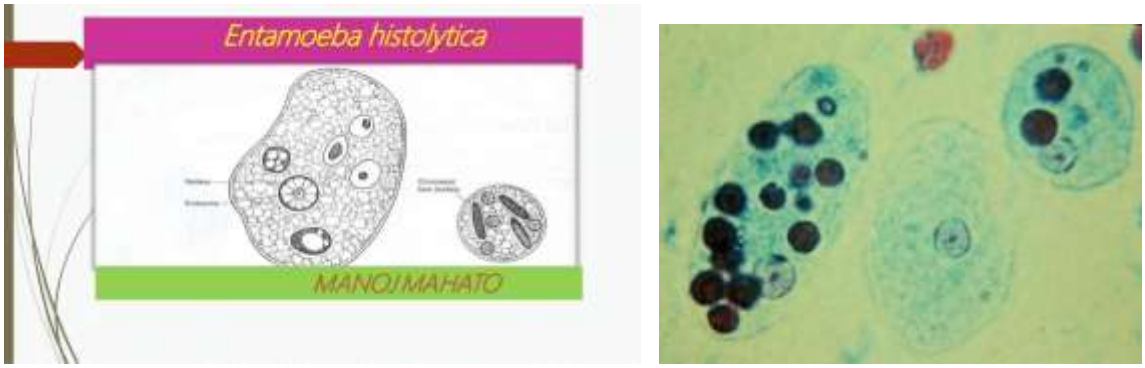


Fig. *Entamoeba histolytica* , Trophozoite and Cyst

5. Houseflies can fly for several kilometers from their breeding places,[43] carrying a wide variety of organisms on their hairs, mouthparts, vomitus, and feces. Parasites carried include cysts of protozoa, e.g. *Entamoeba histolytica* and *Giardia lamblia* and eggs of helminths; e.g., *Ascaris lumbricoides*, *Trichuris trichiura*, *Hymenolepis nana*, and *Enterobius vermicularis*

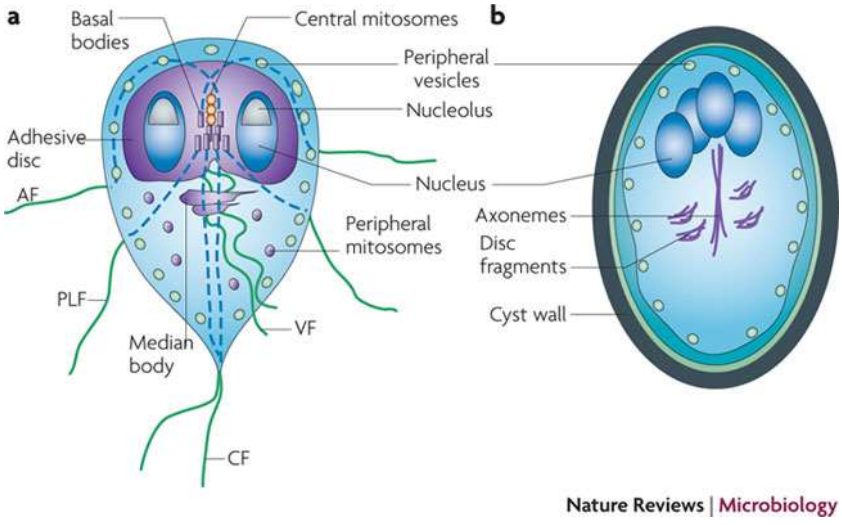


Fig. *Giardidia lamblia*, Trophozoite and Cyst

Fig. Egg of a.*Ascaris lumbricoides* *b. Enterobius vermicularis* *c.Hymenolepis nana*,

6.Besides these dangerous diseases they also play a part in the transmission of **tuberculosis,** *Mycobacterium tuberculosis* and **virus of poliomyelitis,** and cause food poisoning.

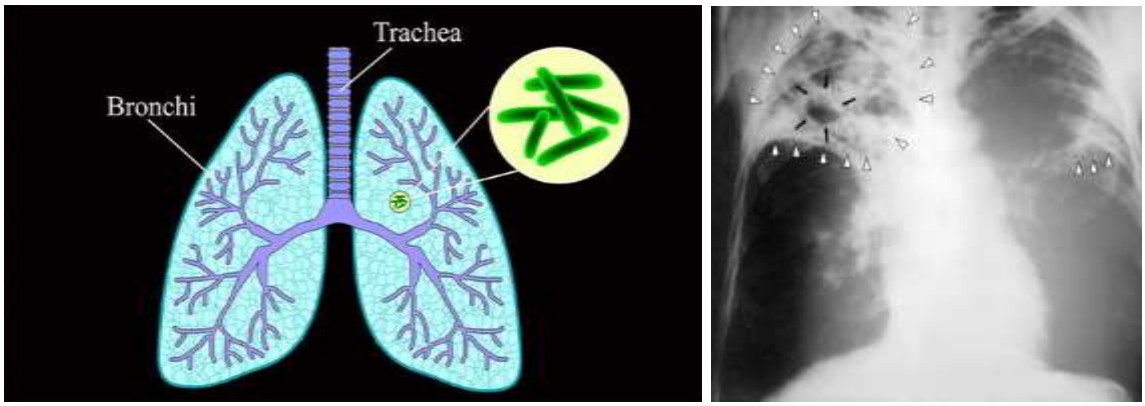


Fig. a.*Mycobacterium tuberculosis* , b.Tuberculosis (Lung)

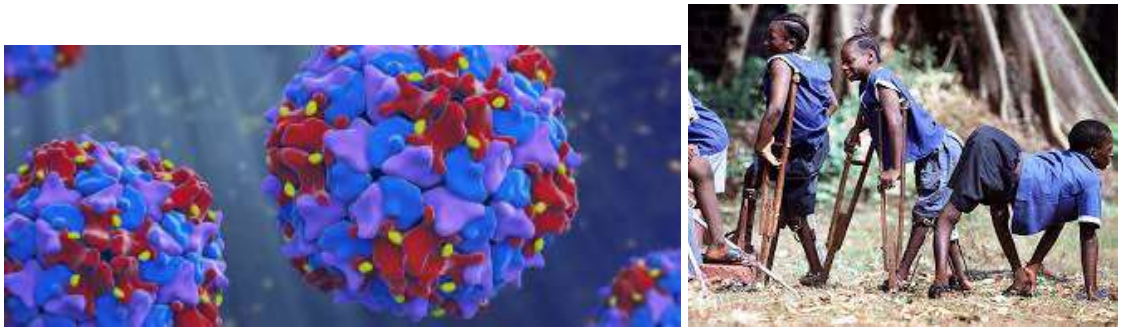


Fig. **a.Virus of poliomyelitis** **b. poliomyelitis**

6.Houseflies also feed on discharges from eyes and wounds, thus, they have been known to cause ophthalmia . **Ophthalmia** (also called ophthalmitis) is inflammation of the eye. It results in congestion of the eyeball, often eye-watering, redness and swelling, itching and burning, and a general feeling of

irritation under the eyelids. Ophthalmia can have different causes, such as infection from bacteria, viruses, fungi, or may result from a physical trauma to the eye, chemical irritation, and allergies. A bacteria infection can result in a mucus and [pus] secretion.


Fig. **a.Ophthalmia** b.

7.The larvae of housefly ingest eggs of a nematode Habronema, the infection is passed to the pupae and to the adult flies which transmit the parasite to horses, but often the housefly deposits the nematode larva into eyes of children and, thus, causes conjunctivitis.

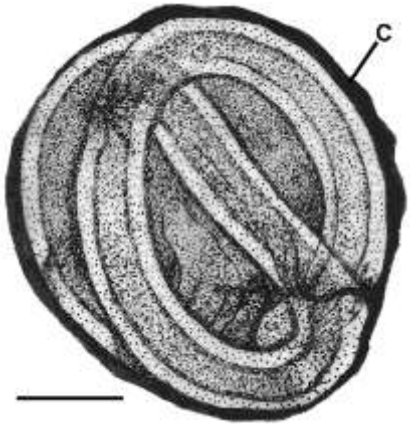



Fig. Nematode, *Habronema* sp. b.Egg

7.Often the eggs of helminth parasites of man have been found in the alimentary canal or faeces of houseflies and they transmit two such parasites, the **eggs of *Hymenolepis*** (a tapeworm) are transferred from the faeces of one person to infect another. Secondly, the **eggs of another tapeworm *Echinococcus*** found in dogs are transferred to human beings where they develop to form huge and often fatal cysts.

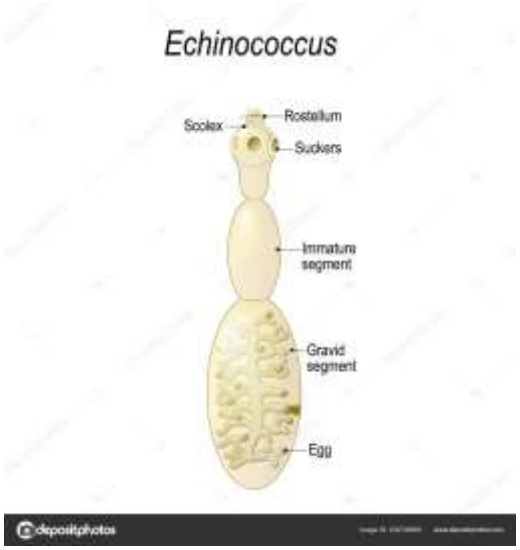


Fig. *Echinococcus granulosus* b.**Hydatid** cysts located most often in the **liver**

Various parasites/number encountered (%)				
Parasites	**Foregut**	**Midgut**	**Hind gut**	**Total (%**
Entamoeba histolytica	16 (8.25)	22 (11.34)	36 18.56	74(38.14)
Gairdia lamblia	4 (2.06)	2 (1.03)	10 (5.15)	16 (8.25)
Taenia species	8 (4.12)	12 (6.19)	16 (8.25)	36 (18.56
Ascaris lumbricoides	8 (4.12)	12 (6.19)	22 (11.34)	42 (21.65
Trichuris trichiura	4 (2.06)	4 (2.06)	10 (5.15)	18 (9.28)
Hymenolepsis nana	6 (3.09)	2 (1.03)	0 (0.00)	8 (4.12)
Total	46(23.71)	54(27.84)	94(48.45)	194(100)

Table. Prevalence of internal parasites in the gut of houseflies

Control

Three types of control methods are used to suppress houseflies: cultural, biological and chemical. It is best to use all three methods.

a.Sanitation – 1.Flies cannot breed in large numbers if their food sources are limited.

2.Do not allow such materials as manure, garbage, grass clippings, weed piles or other decaying organic matter to accumulate.

3. Keep trash cans clean and tightly covered.

4.Be careful not to wash garbage cans where the rinse water might drain into the soil; flies can breed in soil full of organic matter.

5.Dry out maggoty garbage or dispose of it in fly proof containers or landfills.

b.Cultural control

1.Cultural control means changing the environment to prevent houseflies from developing. The best cultural method is to properly dispose of any organic matter, such as vegetable or other food by-products, where houseflies might lay eggs. Place these materials in garbage bags and tie the bags securely. Remove all food residues and clean your garbage cans weekly.Another cultural method is to keep houseflies out of homes and businesses by :

2.keeping windows screened and doors closed,

3.placing exhaust (blower) systems above doors.

4.installing doors that open and close mechanically.

5.Sticky traps and ultraviolet light traps placed around a home or business also can reduce housefly populations.

6. Install light traps where they cannot be seen by flies outdoors to avoid attracting more insects to the building.

c.Biological control

Biological control. With the increasing incidence of insecticide resistant house fly populations, rising costs of insecticides and a growing public concern about actual or potential problems associated with insecticides, interest in alternative house fly control strategies has increased.

Natural biological suppression of the house fly results primarily from the actions of certain **chalcidoid wasps (Hymenoptera: Pteromalidae),** of which many species have been associated with house fly around the world. Among the more important are ***Muscidifurax*** **and** ***Sphalangia*** **spp.** Ichneumonids and other parasitoids, as well as some predatory insects (especially histerids [Coleoptera: Histeridae] and staphylinids [Coleoptera: Staphylinidae]), also contribute to fly mortality, but under optimal fly breeding conditions the house fly quickly builds to high numbers. The more important in poultry facilities are the wasps , ***Muscidifurax raptor*** and ***Sphalangia cameroni*****.** Leaving a layer of old manure in the pits when manure is removed might enhance or stabilize the suppression of the house flies densities by parasitoids and predators.

Fig. ***Muscidifurax raptor***

b. Staphylinids(Coleoptera)

d.Chemical control

When necessary, insecticides can help suppress housefly populations. Fly **baits, such as QuickBayt®** and Golden Malrin®, are usually sugar-based and contain a compound that attracts the adult flies. Flies that feed on these baits are killed by the insecticide they digest.

Many **spray pyrethroid-**based insecticides can suppress houseflies in and around homes. These products can be purchased at grocery and hardware stores. Be sure to read and follow the instructions on all insecticide labels.

Chemical Control - Exterior applications of insecticides may offer some relief from infestations where the task of completely sealing the exterior is difficult or impossible. Applications should consist of a synthetic pyrethroid (i.e. deltamethrin, cyfluthrin, lambda-cyhalothrin, **cypermethrin,** sumithrin

or tralomethrin) and should be applied by a licensed pest control operator when flies begin to appear.

Family : Hippoboscidae , horse louse flies , the louse flies or keds,

1.Body flattened , dark -colored, obligate hematophagous viviparid flies of 2 to 10 mm in length
2.They are usually setolse.
3.The wing well developed , some are are wingless.
4.All possess beaklile mouthparts. Mouthparts piercing–sucking
Hippoboscidae, obligate parasites of mammals and birds. adults are blood-feeding ectoparasites of birds and mammals. e.g. ***Ornithomya avicularia*** L.(Fig.318)

Fig.. *Ornithomya avicularia*
Their larval development takes place in the uterus and the female gives birth to fully developed larvae ready to pupate.
These flies can be mistaken for large lice or ticks because of their sedentary feeding habits on their hosts.
The best known are *Crataerina hirundinis*, parasites of swallows and martins; *C. acutipennis*, *C. melbae*, *C. pacifica*, and *C. pallida*, parasites of swifts; and the pigeon louse fly, *Pseudolynchia canariensis*

Fig. Flightless *Crataerina pallida* , winged *Pseudolynchia canariensis*

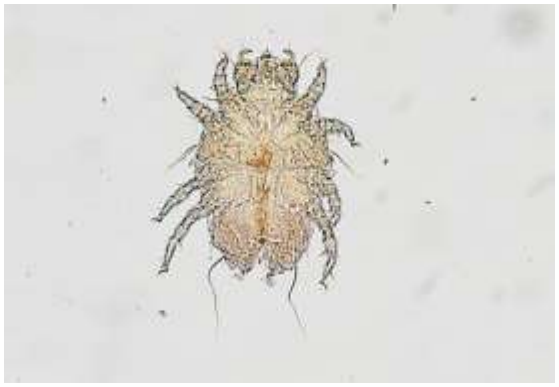
Medical importance

The most common and obvious parasites of tawny frogmouths are two species of flat fly in the family Hippoboscidae: *Ornithoica podargi* and *Ornithomya fuscipennis* (Fig .) These are biting flies known to transmit *Haemoproteus* in other avian species. They may be controlled with topical permethrin sprays or carbaryl powder. Heavy burdens may be debilitating.

1. Horse louse flies are seldom a problem, where they occur, affected animals suffer considerable itching and react by scratching, rubbing and biting the infected areas. This can cause self-injuries that may become infected or attract screwworm flies.

2. ***Bartonella* spp**. are intracellular small gram-negative bacteria transmitted by blood-sucking arthropods including Horse louse flies and considered to be emerging pathogens in humans and animals

2.Hippobosca longipennis (the 'dog louse fly') is a blood sucking ectoparasite found on wild carnivores such as cheetahs and lions and domesticated and feral dogs , this Known as an intermediate host for nematoda, *Acanthocheilonema dracunculoides* and a transport host for the mite, *Cheyletiella yasguri*, it has also been suggested that *H. longipennis* may be a vector for other pathogens, including *Acanthocheilonema* sp.



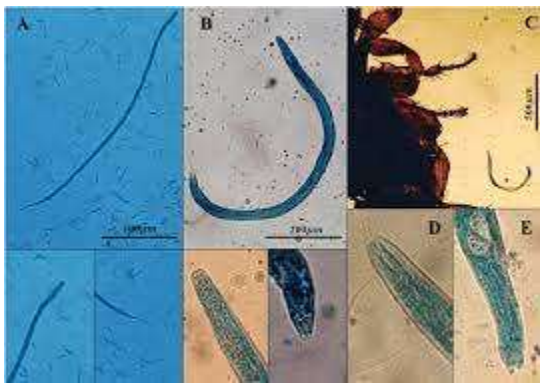


Fig. *Cheyletiella yasguri* *b. Acanthocheilonema dracunculoides*

3.Hippoboscid flies move about quickly on their avian hosts and bite and suck blood from parts that are not well feathered.

4. They may serve as intermediate hosts for many avian blood protozoans of the genus ***Haemoproteus***. Pigeon flies readily attack people who handle

adult birds; the bite is said to be as painful as a bee sting, and its effects may persist for ≥5 days. ***Haemoproteus*** is a genus of alveolates that are parasitic in birds, reptiles and amphibians. The protozoa are intracellular parasites that infect the erythrocytes.

Fig. *Haemoproteus syrnii* in blood smear

5. Both sexes of the hippoboscid ***Ornithophila metallica*** are hematophagous ectoparasites and ingest blood from a wide variety of birds.

6. *Pseudolynchia canariensis* is commonly found on pigeons and doves, and can serve as the vector of pigeon malaria. Some evidence indicates that other Hippoboscidae can serve as vectors of disease agents to mammals.

Fig. *Pseudolynchia canariensis* b.Doves

Treatment and Control:

Any flies on the birds can be killed by spraying the birds with permethrin. Thorough cleaning of the premises and destruction of the debris are essential

for control. Spraying the loft with permethrin, when coupled with cleaning, will alleviate the infestation.

Prevention and control of infestations with louse flies

1. **Chemical control**

There is very little information on **chemical control** of louse flies. The reason is that being a minor parasite, almost no insecticide approved for use on horses or livestock includes a claim for louse fly control. It can be assumed that concentrates for spraying or dipping horses and/or cattle will provide some control. They contain mainly organophosphates (e.g. coumaphos, chlorfenvinphos, etc.), synthetic pyrethroids (e.g. cypermethrin, deltamethrin, permethrin, etc.) or mixtures. Based on the preference of louse flies for unhaired body parts it is unlikely that ready-to-use pour-ons will provide sufficient control.

There are no true vaccines against louse flies.

2.There are also no **repellents** to prevent louse fly infestations.

3. **Biological control** of louse flies (i.e. using its natural enemies) is currently not possible. Learn more about biological control of flies and other insects