Parasitology
Second-Semester 2025-2026
Entomology: Lecture: 3

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Medical entomology (Page number 1-6)

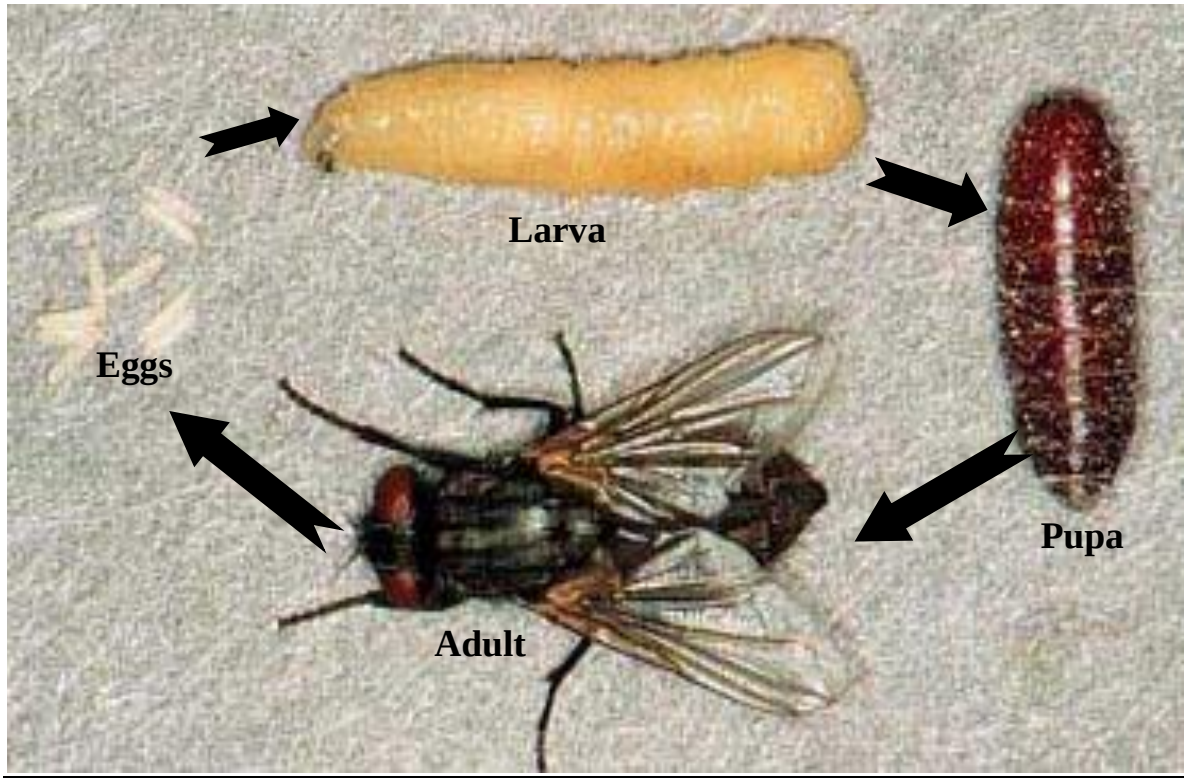
Flies

This is a large family of true flies such as housefly, stable fly, flesh fly and colored flies. All belong to a Class: Insecta, Order: Diptera, suborder: Cyclorhapha.

Characters:

1. Diptera: two wings and halters.
2. Antennae shorter than head, with 3 segments.
3. **Larvae:** are vermiform with reduced or no head. A mouth part of larvae is cephalopharyngeal skeleton inside the pharynx.
4. The adult flies are stubby; wings are wide with reduced veins. The mouth parts either:
   a. with soft, spongy and retractile mouth parts = **Family: Muscidae**…. Genera ***Musca***, ***Fannia***.
   or **b.** with rigid, no retractile, blood sucking mouth parts = **Family: Stomoxyidae**…. ***Stomoxys***. **Family: Glossinidae**…… ***Glossina***.

Biology and life cycle: Complete metamorphosis



- Females lays eggs in batches on any filthy wet or semi-liquid, fecal materials, left over decaying fruits or vegetables. They enter room, search, buzz about in any places, gather on filthy faces or cloths... etc.
- Some are viviparous flies such as ***Glossina, Oestrus***.
- Eggs are banana- shaped, white in color hatch in larvae.
- Larvae pass through two molting to give pupa. Pupa enclosed within a barrel shaped brownish cocoons.
- The life cycle may not take more than 5-6 days from eggs to egg-lying.
- Adult may live up to 25-30 days, less in hot or cold weather, longer in warm weather.

Habits of feedings: feed on filthy or semi-liquid materials; liquefy solid sugar or chocolate, by Vomiting and then absorb the liquefied.

Medical importance of flies:

I. Blood loss: Some flies parasitic as adults on blood. So they are annoying and cause blood loss, ex: Stomoxydinae…. ***Stomoxys*** spp. Glossinidae…. ***Glossina*** spp.

II. Transmitters of some pathogens:

A. Mechanical transmitters: Due to their living on the filth, stool, vomit, all adult flies are mechanical transmitter through their legs, hair, regorgitation, fecal. The adults transmit:

1. Virus….. eye Trachoma. **2.** reckettsia…..Q fever. **3.** bacteria…… Typhoid and paratyphoid. **4.** protozoa….. ***Entamoebia histolytica***. **5.** helminthes eggs…. ***Ascaris*** .

B. The adults are propagative and developmental transmitters of important blood parasitic disease, such as:

1. African sleeping sickness… transmitted by ***Glossina*** spp, and caused by ***Trypanosoma rhodesiense*** & ***T. gambiense*****.** Mode of infection with saliva. Found only in Africa.

2. Surra disease: transmitted by ***Stomoxys***, and caused by ***Trypanosoma evansi*** in cattle and camals.

III. Myiasis: The larval stage causes important diseases called myiasis

Myiasis

Myiasis is infection with the larval stage (maggots or bots) of various flies. Myiasis is a general term for infection by parasitic fly larvae feeding on the host's necrotic or living tissue. In Greek myia meaning fly. Although infestation by fly larvae is much more prevalent in animals, it is a relatively frequent occurrence in humans in rural, tropical and subtropical regions.

Myiasis producing families are:

1. **Family: Calliphoridae**: blow flies, screw worms, ***Chrysomya bezziana*** (Old World screwworm), ***Cordylobia anthropaphaga*** (tumbu fly), ***Cochliomyia hominovorax*** is the primary screwworm fly in the New World ***Auchmeromyia letula***.

2. **Family: Sarcophagidae**: flesh fly, ***Sarcophaga***. ***Wohlfobria*** is animal parasites that also occasionally infect humans.
3. **Family: Mucidae**: ***Musca*** (common house fly) can produce false intestinal myiasis.
4. **Family**: **Psychodae**: ***Psycho*** (moth fly) and ***Fannia*** spp. (little house fly).
5. Mouth parts absent or vestigial; **Family: Oestridae**….produce Dermal, Nasopharyngeal & ophthalmomyiasis. ***Dermatobia hominis*** is the primary human bot fly and ***Oestrus ovius*** sheep bot fly (animal parasites that also occasionally infect humans).

Human myiasis:

1. **Gastrointestinal myiasis:** can result from oviposition on wet foods and clothes.
   I. **Accidental or false intestinal myiasis** cuased by ***Musca domastica***.
   II. **True intestinal myiasis** cuased by ***Sarcophaga*** spp.
2. **Saguinus myiasis**: **facultative myiasis**: On blood. The larvae live in the soil and visit periodically. Caused by ***Auclmerosnyia letula*** , the Congo floor larvae.
3. **Dermal myiasis:** cuased by family calliphoridae**.** Flies belong this family all produce obligatory myiasis.
   a. Creeping irretation: ***Hypoderma*** spp.
   b. Furnucular myiasis: the most common form of myiasis, due to infestation by the lavae of: ***Cordylobia anthrapophaga***, the tumbo fly in west Africa and west Arabia. ***Chrysomyia bezziana***, old world screwworm and ***Cochliomyia hominivorax***, new world screwworm. Discovered in Iraq, adult by J. Abul—hab.
4. **A. Nasophayngeal myiasis**: ***Oesteris ovis***, sheep bot fly, ophthalmomyiasis in man due toinfection by human bot fly: ***Dermatobia hominis***.
5. **Urogenitalia myiasis**: *Psycho* spp. (Moth fly); ***Fannia*** spp. (little house fly).

Treatment: Treatment is usually limited to the physical removal of the larvae from tissue. Antibiotic treatment of secondary bacterial infections may be necessary.

Maggot therapy

- ✓ **Maggot therapy** used in a small wound. Certain live maggots have been employed as

an economical, safe and effective type of wound debridement (cleaning.)

- ✓ In controlled and sterile settings by licensed **medical practitioners.**
- ✓ maggot therapy introduces **live disinfected** maggots into non-healing skin or soft wound of a human or other animal.specially against diabetic foot ulcers unresponsive to conventional Therapy
- ✓ They eat the dead old tissue, leaving the live tissue alone .

- ✓ The most commonly used larvae belong to the family Calliphoridae, specifically ***Lucilia sericata*** (greenbottle blowfly) and ***Phormia regina*** (blackbottle blowfly) which will only feed on necrotic tissue.
- ✓ It is uncertain if maggot secretions have any effect on bacterial growth, since different studies have produced contradictory results and some species of bacteria may be naturally resistant to maggot secretions .
- ✓ As of 2008 maggot therapy was being used in around 1000 medical centers in Europe and over 800 medical centers in the United State

Lice

Class: Insecta, Order: Anoplura [sucking lice, Causative agents of pediculosis and phthiriosis (louse infestations)].

- ➲ Two genes of lice infest humans: ***Pediculus humanus capitis*** (head louse), ***Pediculus humanus corporis*** (body louse) and ***Phthirus pubis*** (crab louse, pubic louse).
- ➲ Lice are dorsoventrally flattened insects, about 1.5–4mm in length, wingless, with reduced eyes,
- ➲ Short (five-segmented) antennae, piercing and sucking mouthparts, and strong claws designed to cling to hairs.
- ➲ The legs are adapted for clinging to the host's hair.
- ➲ Eggs (called nits) are laid on hair shafts and are held tightly by cement like substance, making them difficult to remove.
- ➲ The hatched louse grows and molts through three larval stages to become an adult.
- ➲ Lice remain on a host permanently;
- ➲ Both males and females are hematophagous and require frequent blood meals.
- ➲ Lice are highly host-specific, so that animals cannot be a source of infestation for humans.

Life cycle:

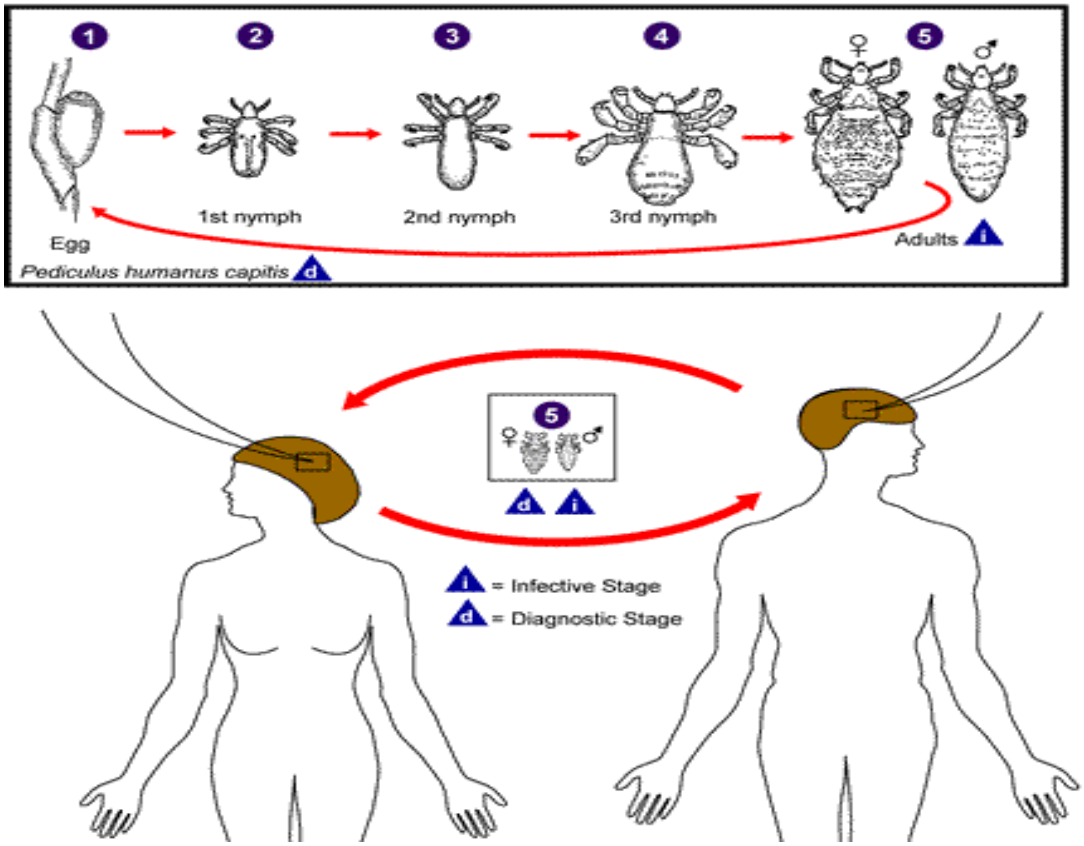
The life cycle of the **head louse** has three stages: **egg, nymph, and adult.**

Eggs: Nits are head lice eggs. They are hard to see and are often confused for dandruff or hair spray droplets. Nits are laid by the adult female and are cemented at the base of the hair shaft nearest the scalp ❶. They are 0.8 mm by 0.3 mm, oval and usually yellow to white. Nits take about 1 week to hatch (range 6 to 9 days). Viable eggs are usually located within 6 mm of the scalp.

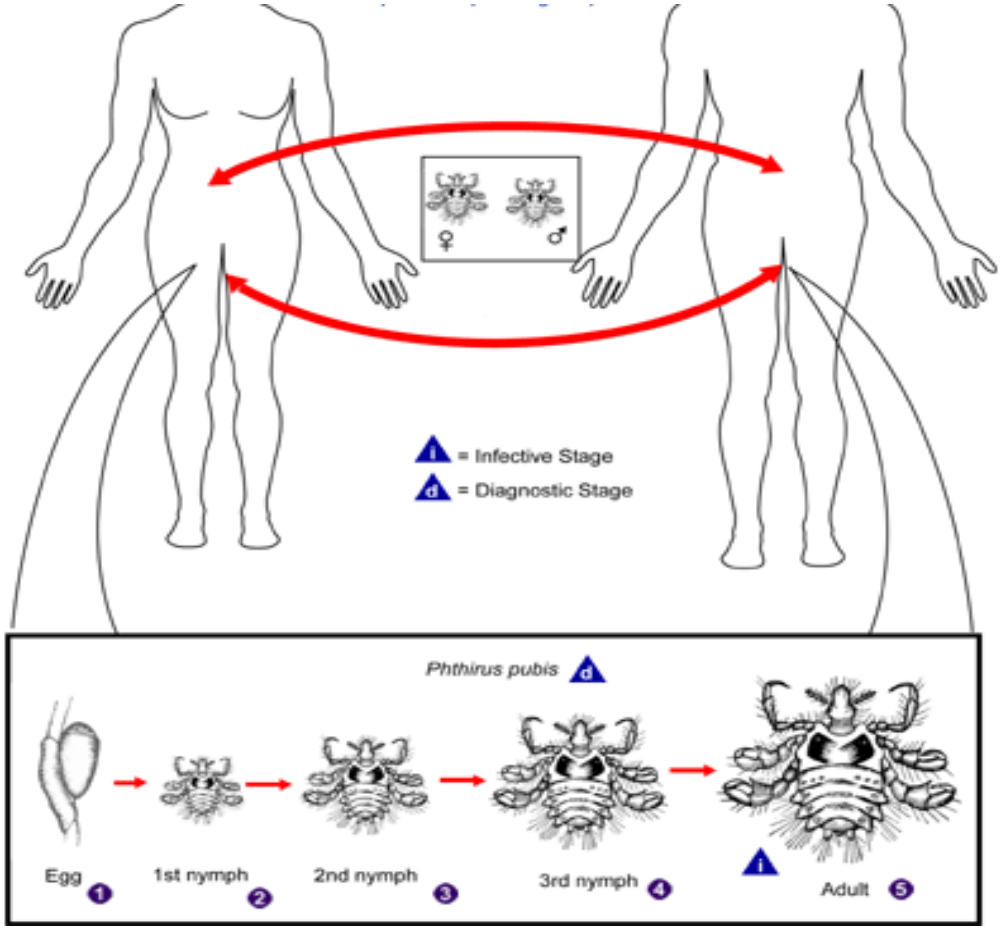
Nymphs: The egg hatches to release a nymph ❷. The nit shell then becomes more visible dull yellow and remains attached to the hair shaft. The nymph looks like an adult head louse, but is about the size of a pinhead. Nymphs mature after three molts (❸, ❹) and become adults about 7 days after hatching.

Adults: The adult louse is about the size of a sesame seed, has 6 legs (each with claws), and is tan

to grayish-white ❺. Females are usually larger than males and can lay up to 8 nits per day. Adult lice can live up to 30 days on a person's head. To live, adult lice need to feed on blood several times daily. The louse will die within 1 to 2 days off the host. It transmitted mainly via head-to-head contact. Less commonly, via fomites (such a hats, scarves, coats, sports uniforms, or hair ribbons).



Pubic lice (*Phthirus pubis*) have three stages: **egg, nymph** and **adult**. **Eggs** (nits) are laid on a hair shaft❶. Females will lay approximately 30 eggs during their 3-4 week life span. Eggs hatch after about a week and become nymphs, which look like smaller versions of the adults. The **nymphs** undergo three molts (❷,❸,❹) before becoming adults ❺. **Adults** are 1.5-2.0 mm long and flattened. They are much broader in comparison to head and body lice. Adults are found only on the human host and require human blood to survive. If adults are forced off the host, they will die within 24-48 hours without a blood feeding. Pubic lice are transmitted from person to person most-commonly via **sexual contact**, although **fomites** (**bedding, clothing**) may play a minor role in their transmission.



Medical importance:

I. Lice as causative of diseases

1. **Pediculosis:** The majority of infestations are asymptomatic. When symptoms are noted they may include a tickling feeling of something moving in the hair and body. Lice bites for sucking blood causes discomfort, irritation, scratching and itching, **manifesting as a small red papule at each new feeding site and** become deeply pigmented – a condition known as **vagabond's disease .**caused by an allergic reaction to louse saliva which may lead to secondary bacterial infection.
2. **Phthiriosis:** Pruritus and scratches in the genital area and other infestation sites. In some patients typical slate-blue spots, a few mm to 1cm in size maculae may developed.

II. Lice as vectors:

☒ Only the body louse is a vector of human diseases.

☒ It transmits typhus fever (Rickettsia) and relapsing fever (caused by Borrelia)

End of Lecture 3 Medical Entomology