



Myiasis

Zoo 511

Dr. Reem Alajmi

Definition

- **Myiasis can be defined as the invasion of organs and tissues of humans or other vertebrate animals with fly larvae, which for at least a period feed upon the living or dead tissues or, in the case of intestinal myiasis, on the hosts ingested food.**
- **The distribution of human myiasis is worldwide, with more species and greater abundance in poor socioeconomic regions of tropical and subtropical countries. In countries where it is not endemic, myiasis is an important condition, where it can represent the fourth most common travel-associated skin disease (Caumes E, *et al.* 1995)**



Types of myiasis

- Various forms of myiasis may be classified from an entomological or a clinical point of view
- **Clinically**, myiasis can be classified to the site of magote invasion or subsequent development in the host such as cutaneous, dermal or subdermal myiasis (skin), urogenital myiasis (urogenital tract), ocular myiasis (eyes), nasopharyngeal myiasis (nose and pharynx), etc....
- **Entomologically**, three types of myiasis are recognized:
 - **Accidental myiasis**
 - **Facultative myiasis**
 - **Obligatory myiasis**

Accidental myiasis

- **Accidental myiasis results when fly egg or larvae contaminate foods ingested by a host or come in contact with the genitourinary tract. Fly species involved include those which are free-living in all stages and rarely are parasitic. In most cases these flies pass unharmed through the host's alimentary tract, but they can cause discomfort, nausea, and diarrhea. In some cases symptoms can be severe.**
- **Flies of the families *Muscidae*, *Calliphoridae*, and *Arcophagidae* may be involved**

Obligatory myiasis

- In obligatory myiasis it is essential for the fly maggots to live on a live host for at least a certain part of their life for their development. For example, larvae of *Chrysomaya bezziana* and *Dermatobia hominis*.



Facultative myiasis

- In facultative myiasis larvae are normally free-living, but under certain conditions they may infect living tissues. Several types of fly, including species of *Calliphora*, *Lucilia* and *Sarcophaga*, which normally breed in meat or carrion may cause myiasis in people by infecting festering sores and wounds.
- Three types of facultative myiasis are recognized by Kettle (1995):
 - a- **Primary myiasis**: Involving species which can initiate myiasis.
 - b- **Secondary myiasis**: Involving species which continue myiasis.
 - c- **Tertiary myiasis**: Involving species which join the primary and secondary species just prior to host death.

- These facultative myiasis flies are able to shift from dead to living tissue and back a gain e.g. *Cochliomyia macellaria*, *Wohlfahrtia nuba*.

LARVAL PRESERVATION AND IDENTIFICATION

- When treating a patient with myiasis, it is critical to make the correct identification of the larva. It helps not only to understand how the infestation was acquired but also to plan the treatment and to promote preventive measures.
- After removal, the maggot should be killed by immersion for 30 s in very hot (enough to produce vapor) but not boiling water, which prevents decay and maintains the natural color. Larvae should then be preserved in a solution of 70% to 95% ethanol for further identification.
- Identification can be very challenging and demanding. Specific knowledge of the morphological aspects of the larva is necessary for the identification of the maggot's species, a task usually done by a trained entomologist

Insects involved in myiasis

- The vast majority of species involved in myiasis are related into three dipteran families:
 - **Calliphoridae** (non-metallic flies and metallic flies).
 - **Sarcophagidae**.
 - **Oestridae**.

Calliphoridae: Non-metallic flies

1- *Cordylobia anthropophaga*

- the common name is **tumbu** or **mango** fly.



➤ Life cycle

- Eggs → Larvae → Pupae → Adult
- Females lay 100-300 eggs. (1-3 days)
- It has three larval instars, each of them has different body shape. Larvae attach to host or washed clothing placed on ground.



Calliphoridae: Non-metallic flies

Medical Importance

- Traumatic or nasopharyngeal myiasis.
- Cause boil-like swellings
- Usually 1 or 2 larvae are found in a patient. However more than 60 larvae have been recovered from a person
- Infections prevented by not spreading clothes on the ground.
- Dogs and rats are commonly infected.



Calliphoridae: Non-metallic flies

Medical importance

- The standard method of extracting a larva is to cover the small hole in the swelling with medicinal liquid paraffin. This prevents the larva from breathing through its posterior spiracles with the result that it wriggles a little, further out of the swelling to protrude the spiracles. In so doing it lubricated the pocket in the skin, and the larva can then usually be extracted by gently pressing around the swelling.

Calliphoridae: Metallic flies

Cochliomyia hominivorax

- Its common name is New World screwworm



Genus: Chrysomyia

- Its common name is Old World screwworms
- 10 species are present, but the most important one is *Chrysomya bezziana*, because its larvae are obligatory parasites.



Life cycle

Eggs → Larvae → Pupae → Adult

Medical importance of screwworms

- Larvae are obligatory parasites of living tissues and cause human myiasis, which can be very severe, resulting in considerable damage and disfigurement, especially if the face is attacked.
- Larvae mainly invade natural orifices, such as the nose, mouth, eyes or vagina, they can cause severe pain.
- Larvae may cause permanent damage.



Medical importance of screwworms

- Formerly maggots in open wounds or body openings were often removed by irrigating infested areas with 5-15% chloroform mixed with vegetable oil, but because of health and safety regulations, ethanol can be substituted for chloroform.
- Surgery may be necessary to exposé deeply embedded larvae.
- Some screwworms species may cause myiasis in cattle, goats, sheep and horses and are responsible for enormous economic losses to livestock industry.

Calliphoridae: Metallic flies

Genus *Lucilia*

Genus *Calliphora*



- Greenbottles in the genus *Lucilia*
- Bluebottles in the genus *Calliphora*

➤ Life cycle

Eggs → Larvae → Pupae → Adult

Larvae develop in foul-smelling wounds and ulcerations, especially those producing pus.

Medical importance



- The dirty habit of blowflies of feeding on excreta, decaying material and virtually all foods of humans makes them potential vectors of numerous pathogens. However, their medical importance is usually associated with **facultative myiasis**.
- They have been recorded in hospitals underneath the bandages and dressing of patients. Larvae feed mainly on pus, not much damage and rarely invade healthy tissue.
- Removal of these maggots usually without any problems because they can be picked out of wound with sterile forceps and antibiotic dressings applied.

Sarcophagidae: Flesh-flies

➤ Only species in the genera *Sarcophaga* and *Wohlfahrtia* are of medical importance.



➤ Life cycle

Eggs → Larvae → Pupae → Adult

- Larvae are scavengers
- Pupate in soil (7-12 days)
- Adults emerge and go to carrion to feed.

Sarcophaga medical importance

- Facultative myiasis
- Cause little to no damage as they feed on necrotic tissue.
- Accidental intestinal myiasis.
- Most enteric myiasis are Sarcophagidae or Muscidae.

Wohlfahrtia medical importance



- Obligatory myiasis in humans and animals (camels, domestic livestock and dogs)
- Some 120 – 170 larvae are deposited, often in several batches in scratches, wounds, sores and ulcerations.
- In people the ears, eyes and nose are frequently infested, and this can result in deafness, blindness and even death.



Oestridae: Bot-flies

- The human botfly *Dermatobia hominis* invade the subcutaneous tissues of humans on various parts of the body, including head, arms, abdomen, buttocks, thighs, scrotum and axillae.
- Life cycle
- Eggs → Larvae → Pupae → Adult



Medical Importance

- Invade subcutaneous tissues in various parts of body.
- Produce boil-like swellings.
- Lots of discomfort and pain.
- Difficult to remove by squeezing out.
- Surgery may be required.
- Place meat or medicinal liquid paraffin.



Other myiasis producing flies

- Black Blow Fly
 - Breeds mainly on carrion
 - sometimes cause facultative myiasis in human
- Several species of flies cause myiasis in livestock.
- Occasionally humans become infected.
- Several species of flies cause myiasis in wildlife.







In a group of 3, write a short report on different types of myiasis based on the location of myiasis. Explain one of these types by giving an example of the cause, host and the medical importance.

Note: each group should explain different type of myiasis.