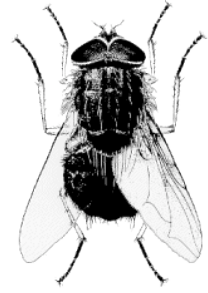




FACT SHEET

FLIES



Natural History

Non-biting flies have developed a close relationship with human habitation over many centuries which has basically benefited the fly populations. This association has resulted in the deaths of thousands of people, due to the ability of this humble insect to transmit disease. Non-biting flies have adapted to the different niches available within a human population which permit them to feed, grow and reproduce. Their feeding and breeding habits enable these commensal flies to be effective mechanical vectors of disease to humans.

The life cycles of flies are complex, but each species has the same developmental stages in common, consisting of an egg, larval (maggot) stage, pupa, and finally the adult. Growth at each immature stage is dependent on many variables but primarily temperature and suitable substrates for a food supply. Each adult fly has its own special requirements that must be met before mating and egg laying (oviposition) commences. Non-biting Australian flies contain many species that are of medical significance. These flies are responsible for contamination and spoilage of foodstuffs, annoyance, mechanical transmission of disease-causing pathogens, and invasion of living tissues (myiasis). Collectively known as "filth flies", they are distributed throughout the families of Calliphoridae (blow flies), Sarcophagidae (flesh flies) and Muscidae (house flies).

Non-biting flies are often associated with domestic dwellings, especially throughout the warmer months when flies bred prolifically, invading homes and can be a constant annoyance for humans. Flies are equipped with special sensory cells on their antennae and feet which enable them to locate suitable food and egg laying sites. These sensory cells aid in detecting compounds such as ammonia, carbon dioxide and other strong compounds that are emitted from decomposing organic materials, such as carrion and faeces. The free interchange flies have with such sites ensures the flies are laden with bacteria on their mouthparts, body hairs and the sticky pads of their feet, as well as in their stomachs (where the bacteria rapidly multiply), faeces and vomitus. Contact with any foodstuffs, or feeding, which often involves vomiting and defecating, will contaminate food, preparation surfaces and utensils with potentially disease causing organisms. Eggs or young larvae may also be deposited if the substrate is deemed suitable for oviposition by the fly. Flies can be strongly attracted to uncovered, malodorous wounds, body openings, open sores or damaged skin. Some species will deposit their eggs or larvae on the site if the circumstances are suitable. This can result in myiasis, wherein young maggots feed on healthy or diseased tissue to complete their growth cycle.

Some species of fly are well known for their nuisance value, such as the "bush fly", *Musca vetustissima*. This fly is a major pest which breeds in manure in pastures and disperses widely to surrounding rural and adjoining urban environments throughout the summer months. These flies are annoying, constant companions of humans and livestock which they visit in large numbers, and attempt to feed at the mouth, nose, eyes or wounds at every possible moment. Bushflies have been known to transmit eye infections and other enteric diseases by their continual interchange between other animals and humans. Another two species that can be bothersome are the "common house fly", *Musca domestica* and the "lesser house fly", *Fannia canicularis*.

Recent research overseas has revived the interest in the "benefits" of some maggots and some medical units are now using "clean" maggots to aid in the cleansing of decaying flesh of humans. This supervised introduction of maggots to otherwise slow healing wounds can be beneficial in promoting healing and can lead to an enhanced recovery of the affected tissue. The science of forensic entomology has also recognised maggots as a useful tool as an aid in determining the time of death in humans. Flies are the first insect to locate and oviposition on a corpse, in fact some species arrive within minutes of death, but various species arrive at different stages of decomposition; identification and ageing of the resulting maggot population in a body can lead to an estimation of the "time since death", and this can be beneficial in murder investigations.

Returning tourists or overseas visitors to Australia from countries in Central and South America, and Africa can unknowingly bring with them the immature stages of certain flies. From Central and South American countries the human bot fly, *Dermatobia hominis*, is a frequent souvenir. African countries provide other species including *Cordylobia anthropophaga* (the Tumbu fly) and *Cordylobia rodhaini* (Lund's Fly). Each of these species of fly has a peculiar and interesting life history that brings them in close contact with humans or livestock producing a furuncular (boil-like) myiasis. When skin contact is made, usually with normal healthy tissue, the young larvae immediately burrow into the skin and develop through a further two moults, before emerging to pupate in the soil and mature to the adult. Over this growth period of several weeks the lesions grow to large, painful boil-like structures which house the growing maggot. Efficient air travel has made the transportation of these larvae to other continents very easy and often rapid. People can be in another part of the world before the larvae have completed their life cycle, which makes accidental introduction of an exotic species of fly to other countries a constant threat to livestock and human habitation.

Clinical Presentation

Patients exhibit a vast number of symptoms in relation to fly problems. Disease-causing organisms that have been isolated from flies include enteric pathogens such as Salmonella and Shigella and typhoid bacteria (food poisoning), plus various parasites such as pinworm and tapeworm; however, in modern developed societies with high standards of hygiene, fly-borne disease is relatively uncommon.

With respect to the flies that affect patients with pain and discomfort associated with myiasis, some of the larger exotic species can produce painful boil-like swellings or simply a disgusting appearance on a wound. Removal of these maggots may simply require irrigation of the wound and subsequent antibiotic treatment as necessary, or with subcutaneous infestations a forced expulsion of the maggot by cutting off its air supply with petroleum jelly; however, sometimes surgical intervention may be necessary.

Other species of maggots are often recovered from patients' faecal material or urine, or associated clothing, indicating oviposition has occurred in the genito-anal area; no fly has a development cycle involving ingestion by humans, so such instances should be seen as accidental or incidental contaminations. The isolation of maggots from vomit can usually be traced to spoilage of foodstuffs that were contaminated prior to eating.

Information courtesy of the Medical Entomology Department at ICPMR, Westmead Hospital.



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