



BLOW FLY MYIASIS

Myiasis is an infection with fly larvae.

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OVERVIEW OF BLOW FLY MYIASIS IN AMPHIBIANS

Myiasis is a skin lesion caused by parasitoid fly larvae that feed on vertebrate tissue. Blow flies are parasitoids that can infect amphibians around the world. In the Americas, the only blow flies that specialize on amphibians belong to the greenbottles (Calliphoridae) and the flesh flies (Sarcophagidae). However, frit (Chloropidae), house (Muscidae), and hump-backed flies (Phoridae) infect and cause myiasis in amphibians elsewhere.

LIFE HISTORY AND BEHAVIOR

Female flies deposit small but visible creamy-white eggs onto amphibian skin. These flies are parasitoids because the maggot (larva) stage remains attached onto or within their host. Maggots have dark hook-like teeth that macerate into the tissues. They create one or more lesions that form into a growing cavity (or cavities) under the skin, within the nasal passage, or into the eyes. They can reduce an anuran down to bones in about two days.

The maggot's mouth is tapered, the body is segmented, and the outer skin is partly translucent where tiny internal organs can be viewed under a microscope. Some maggots remain on the host to complete their development and transform into adult flies, whereas some abandon their host at a late-developmental stage to enter soils where they pupate into flies. Adults have a metallic green, blue, or bronze sheen, large compound eyes, translucent wings, and mouth parts that extend outward to feed on rotting carrion. It is estimated that three fly generations of blowflies can occur over the summer.

HOST-PARASITE ECOLOGY

Little is known about blow fly-amphibian ecology, such as infection rates, mortality rates, interactions, geographic ranges, or patterns of spread or retreat. Yet, amphibian infections are documented across the Palearctic, Asiatic regions,



Image source: Mark Thompson, EcoLogic Consultants Ltd.

*Myiasis (red circle) caused by a greenbottle maggot infection in a Western Toad (*Anaxyrus boreas*; left main panel is a ventral image; top-left inset is a dorsal image). Two entry wounds on the lateral aspect of the belly opened into a cavity containing maggots that were wriggling and feeding into the anterior of their host (right-panel set zooms into the cavity). A total of ten maggots (e.g., lower-left inset panel) were extracted with tweezers from this individual that was alive and responsive when caught.*

Contact

Mark Thompson
mthompson@ecologicconsultants.com

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the Americas, and in Australia. Adult flies are diurnal and are abundant near wetlands of the amphibian hosts that they infect. Live amphibians are only attacked by female flies seeking to deposit their eggs. Infections can be fatal or sub-lethal but hosts with nasal myiasis rarely survive

Host skin secretions may deter infection, but even some South American poison frogs (*Epipedobates*) are not immune to infection. Infected animals tend to return and sit in water, which can sometimes drown the blowfly larvae and has led to hypotheses that infections increase in drier years.

SPECIES AFFECTED

Multiple families of saprophagous parasitoid flies are known to infect and cause myiasis in frog and salamander (*Salamandra salamandra*) hosts. The Palearctic lineage of the greenbottle subfamily predominantly infects the European Toad (*Bufo bufo*), whereas the Nearctic lineage most commonly infects different species of the genus *Anaxyrus* (e.g., *A. boreas*). In North America, other parasitoid-species infections have been recorded in Wood Frogs (*Rana sylvatica*), Chorus Frogs (*Pseudacris maculata* and *P. triseriata*), Rio Grande Leopard Frog (*R. berlandieri*), and the American Bullfrog (*R. catesbeiana*). There are additional host records in South America and the Palearctic.

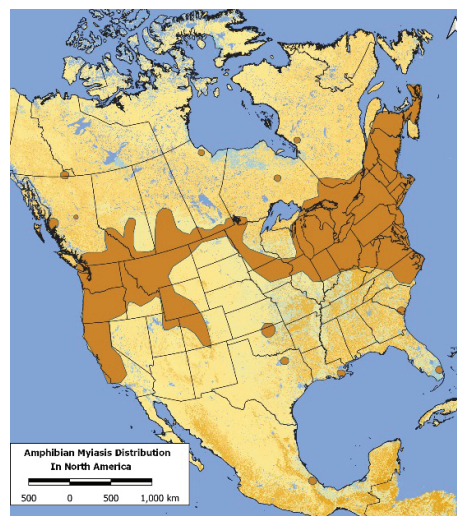
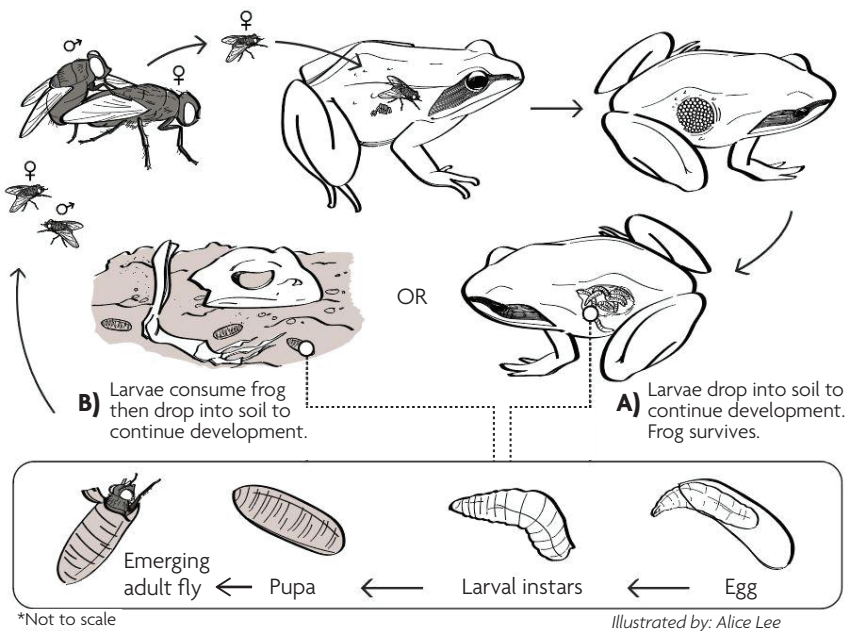
DISTRIBUTION

North America's amphibians are infected by one of three species of greenbottle blow fly: *Lucilia bufonivora*, *L. elongata*, or *L. thatuna*. Limited locality reports for these species were hand digitized to create a range map (right) of potential myiasis infection areas. The distribution is likely much broader than depicted.

OBSERVATIONS, RECORDS, AND COLLECTING VOUCHERS

An emerging priority is to advance occurrence knowledge, and hence the extent of potential threat of blow fly myiasis in North American amphibians. To detect infection, the entire body of an amphibian must be visually inspected for signs of egg deposition, lesions, or cavities with maggots on the skin, in the nasal passages, or in the eyes. Date, location, photographs, and voucher samples can complete the record.

The different flies that infect their respective amphibian hosts can be properly identified by professionals. If discovered, the eggs or maggots must be carefully removed for preservation in alcohol; note that a permit may be required to capture and handle amphibians in some jurisdictions, or a local conservation officer may be contacted for guidance. Alternatively, late-stage maggots can be held and reared in a ventilated container containing sawdust or soil. Emergent flies collected from the container can be more easily identified to species, whereas maggots may require DNA testing to identify species.



Cartography by Mark Thompson. Map showing where species of greenbottle flies (Calliphoridae) known to cause myiasis in amphibians are known in North America.

SUGGESTED READING

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