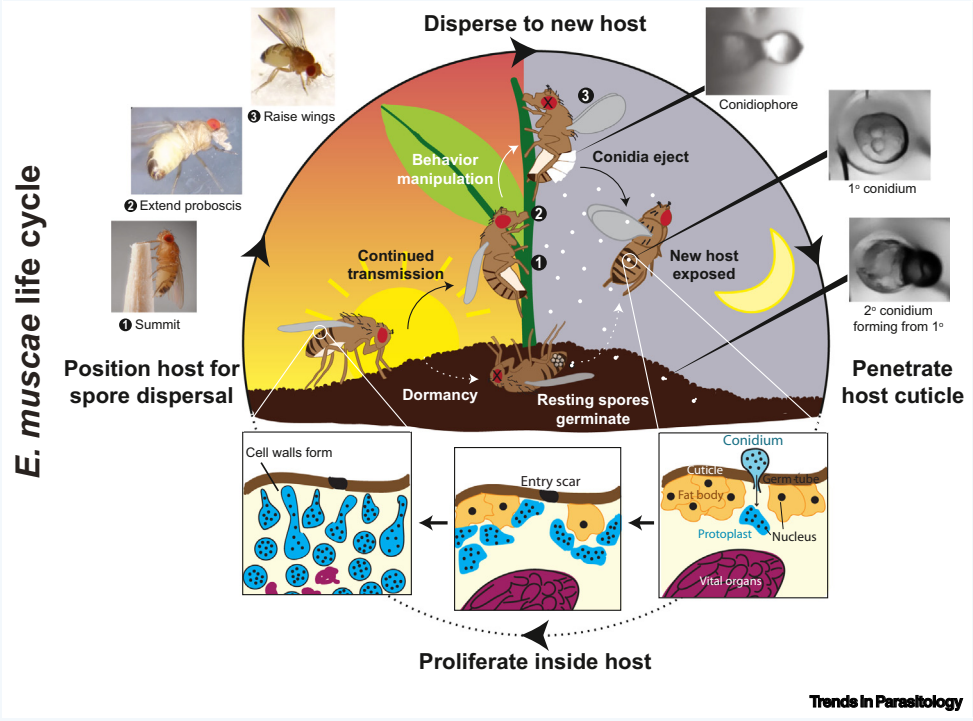
Trends in Parasitology | Parasite of the Month

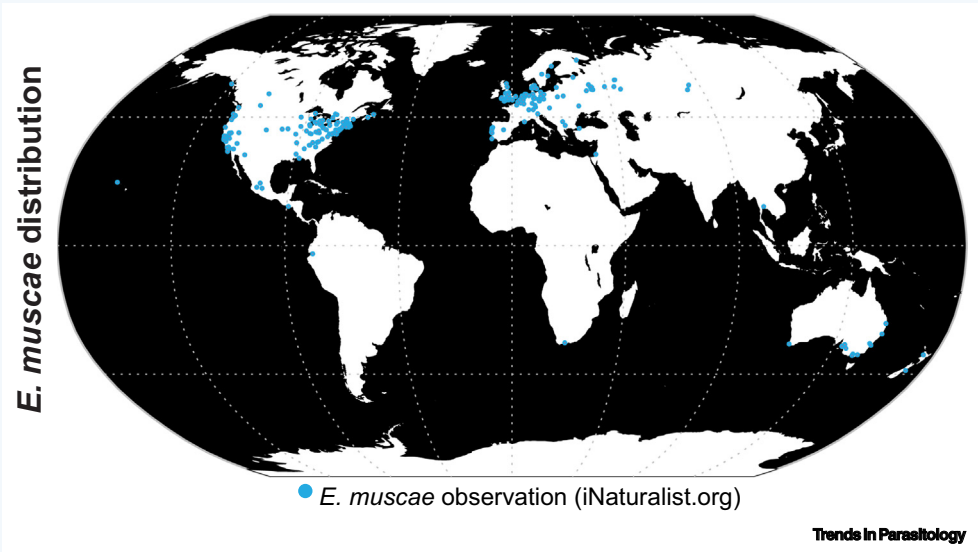
Entomophthora muscae

Carolyn Elya [1,2,*]

[1]Department of Organismic and Evolutionary Biology, Harvard University, Cambridge, MA, USA
[2]Department of Molecular and Cellular Biology, Harvard University, Cambridge, MA, USA



Entomophthora muscae is a fungal pathogen that infects, behaviorally manipulates, and kills a range of dipteran hosts over the course of 4–7 days. *E. muscae* infection begins when infectious propagules (conidia) are launched via spore-launching structures (conidiophores) from an infected cadaver and land on a living fly. Conidia grow germ tubes that pierce through the host cuticle, delivering fungal cells into the host's open circulatory system. Inside the host, *E. muscae* grows without a cell wall and uses the fat body for energy, sparing other host tissues. By the midpoint of infection, fungal cells are embedded within the host nervous system. After the fat body exhausts, the fungus digests the gut and gonads, erects cell walls, and triggers stereotyped host behaviors: the moribund fly climbs (known as summiting), extends its proboscis which gets glued in place via sticky secretions, then raises its wings. This death pose favors spread to new hosts. *E. muscae* always kills at sunset.



KEY FACTS:

E. muscae taxonomy is not fully resolved. The division Entomophthoromycota was proposed to be promoted to a phylum in 2012, but this has not been uniformly adopted. In addition, *E. muscae* is still considered a species complex, consisting of morphologically similar isolates, including *Entomophthora ferdinandii, Entomophthora scatophagae*, and *Entomophthora schizophorae.*

E. muscae has one of the largest fungal genomes (~1 Gb), over 90% of which is repetitive.

Sexual reproduction has not yet been observed in *E. muscae*, but resting spores may potentially be sexual zygospores.

E. muscae has been observed globally across temperate climates.

DISEASE FACTS:

Epizootic events tend to be observed in environments where there are large numbers of hosts. In some events, nearly 100% of hosts are infected.

E. muscae infects syrphids, muscids, and acalyptrates. The exact host span within diptera remains unclear; growing evidence suggests that different isolates preferentially infect different hosts.

E. muscae infects only adult flies.

Some *E. muscae* isolates have been observed to form resting spores, thick-walled structures that can persist in unfavorable environments (e.g., during winter). The factors that trigger resting spore formation and reactivation are not fully understood.

TAXONOMY AND CLASSIFICATION:

PHYLUM: Zoopagomycota
SUBPHYLUM: Entomophthoromycotina
CLASS: Entomophthoromycetes
ORDER: Entomophthorales
FAMILY: Entomophthoraceae
GENUS: *Entomophthora*
SPECIES: *E. muscae*

*Correspondence:
cnelya@g.harvard.edu (C. Elya).

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Declaration of interests

The author declares no competing interests.

Resources

www.ars.usda.gov/northeast-area/ithaca-ny/robert-w-holley-center-for-agriculture-health/emerging-pests-and-pathogens-research/docs/mycology/

www.inaturalist.org/

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