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Biology and Life Cycle of Cattle Face Fly Parasitic Nematode, Heterotylenchus

Parasitic nematode, *Heterotylenchus autumnalis* associated with the face fly, *Musca autumnalis*, which is deleterious to livestock producers around the world. The parasitic nematode can transmit several eye diseases and parasitic to cattle.

INTRODUCTION

Face fly, *Musca autumnalis* (Diptera: Muscidae) is a common livestock pest that often consumes on secretions from the mouth, nostrils and eyes of the cattle. Its biology studied Pickens and Miller in the year 1980. The eggs of face fly is deposited in fresh manure pits there itself hatched larvae will emerge and develop into adult. *Musca autumnalis* act as vectors of certain virulent strains. It can create bovine keratoconjunctivitis (pink eye symptom), which cause blindness in cattle. Higher population face fly promotes the pink eye the likelihood of pinkeye among cattle herds. A host-specific animal parasitic nematode, *Paraiotonchium autumnale* (early known as *Heterotylenchus autumnalis*), able to parasitize all face fly larval stages, and the entire nematode life cycle of nematode found within the host. The life cycle of *P. autumnale* is quite complex and begins with free-living gamogenetic nematodes deposited in a pat by a parasitized face fly female. After nematode coupling in manure pits, the male nematodes will die and the females moved to penetrate a face fly maggot and enter into the hemocoel, subsequently to the pupa and adult fly. The gamogenetic female lays parthenogenetic nematodes. Those will reproduce amounts of gamogenetic nematodes, which parasitically castrate the female face fly and entirely occupy her ovaries.

Heterotylenchus (Paraiotonchium autumnalis)**SYSTEMATIC POSITION**

Kingdom : Animalia
 Phylum : Nematoda
 Class : Secernentea
 Order : Tylenchida
 Family : Sphaerulariidae
 Genus : *Heterotylenchus*

TWO IMPORTANT SPECIES OF *Heterotylenchus*

- *Heterotylenchus autumnalis*
- *Heterotylenchus aberrans*

OTHER SPECIES

- *Heterotylenchus hyderabadensis*
- *Heterotylenchus simplex*
- *H. Autumnalis* : parasite of cattle face – *Musca autumnalis*
- *H. Aberrans* : parasite of onion maggot – *Hylemia antiqua*

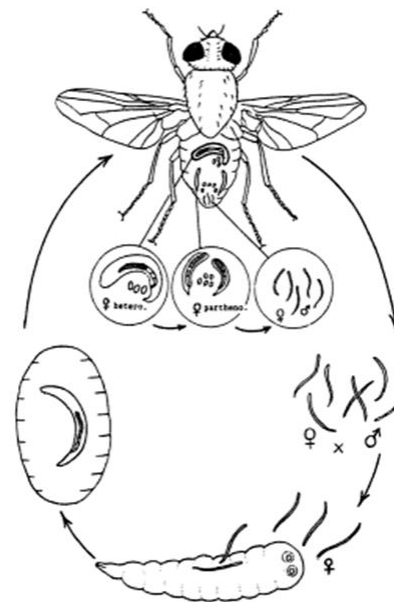
HISTORY

- 1st reported by Bovien in the year 1937.
- Information on the life-history of *Heterotylenchus autumnalis* in *Musca autumnalis*
- It was found that nematodes were able to infect all stages of the face fly larvae but did not penetrate eggs.
- Adult gamogenetic females were found in newly-emerged flies.

LIFE CYCLE OF *Paraiotonchium autumnale*

- Mated female in manure pit & penetrate into fly through cuticle
- Enter into haemocoel & give raise to parthenogenetic female
- Deposit eggs in haemocoel & develop into gametogenetic juveniles
- Develop to pre adult in host
- Affected insect become pupate & emerge as an adult
- Gametogenetic nematodes occupy ovaries & fill with eggs
- Host perceives nematodes as eggs & deposit in manure pit
- Nematode develop as male & female, then male will die

Parthenogenetic females of various sizes were found in 3-day-old hosts 5 days after adult emergence, white, parthenogenetically-produced eggs were present in the host's haemocoel. Eggs of gamogenetic females were brown. By 7 days, all stages of the nematode were present. At 9 days nematode larvae had invaded the host ovaries, which ceased to develop and became filled with nematode eggs. Nematodes removed from 11-day-old female hosts were highly infective. Infected male flies showed no abnormalities of the testes and larval nematodes were smaller and fewer in number than those in the females.

***Heterotylenchus aberrans*****SYSTEMATIC POSITION**

Kingdom : Animalia
 Phylum : Nematoda
 Class : Secernentea
 Order : Tylenchida
 Family : Parasytylenchidae
 Genus : *Heterotylenchus*
 Species : *Heterotylenchus aberrans*

LIFE CYCLE

- The female of *Heterotylenchus aberrans* Bovien, after copulation, penetrates into the maggot of a fly, *Hylemya antiqua*
- where it remains during metamorphosis of the latter Within the adult fly, the nematode lays its eggs and from these hatch parthenogenetic

generation that also reproduces within the body cavity of flies, but the bisexual larvae emerges from the eggs.

- The latter penetrate into the ovary and from there into the oviduct through which they escape from the body cavity.
 - This bisexual generation becomes adult in the soil
 - and fertilized females seek a fresh maggot to penetrate
- | | |
|-----------------------------|--------------------------------------|
| a - Parasitic female | I- larva |
| b - Eggs | II- pupa |
| c - Parthenogenetic females | III- adult of <i>Hymelia antiqua</i> |
- d - Eggs of parthenogenetic females
 - e - Larvae escaping through ovaries
 - f - Free living sexual generation
 - g - Fertilized females penetrating into the larvae
 - h - Adult females of bisexual generation
 - 1,20,000 juveniles per hosts,
 - Heterosexual females- 15 to 24 with brownish eggs
 - Whereas parthenogenetic females – 250 to 300 with white eggs.

MORPHOLOGY

- Young female has small body (0.5mm) in length.
- Predominant telyt with distinct knobs
- Excretory pore posterior to the nerve ring and pre mature ovary
- Male with short stylet than females.
- Caudal alae is absent in male

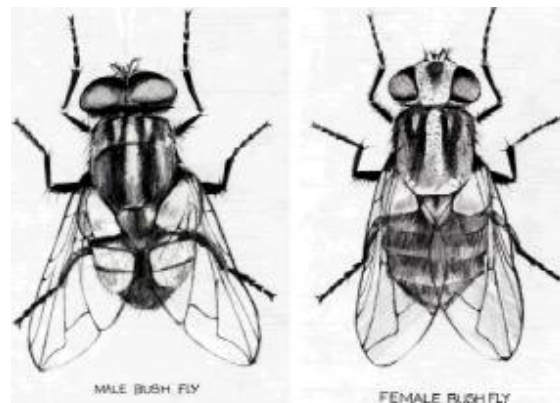
ANTHOMYIID FLIES

MARY MILES

On the life-history and habits of *C. cilicrura*,

- The flies' *C. cilicrura*, travel towards moisture, freshly turned soil at all times from April to October, particularly in warm bright weather.
- Males and females are attracted and some of the females will lay eggs within a few minutes of their capture.
- The females will spend varying periods up to 44 days before laying eggs.
- The eggs usually lay in batches of less than ten at irregular intervals over periods extending up to 28 days.
- The *Heterotylenchus* is a parasitic nematode.
- The nematode spends entire life cycle inside the of bush fly

- The nematode *Heterotylenchus* makes females as sterile one. In contrast, the female bush fly laid packets of *Heterotylenchus* larvae instead her



'eggs' on dung.

- Surviving larvae grow up and turn into flies; they carry the *Heterotylenchus* parasite as well.

NEW SPECIES

- Kurochkin describes and illustrates *Heterotylenchus pawlowskyi*
- Parasitizes the fleas *Coptopsylla lamellifer* and *Ceratophyllus laeviceps* in the Astrakhan district during the whole period of their metamorphosis and causes their castration.

DIAGNOSIS

- The spicules (0.013-0.0157 mm.) are shorter than those of *H. aberrans*
- Parthenogenetic female 0.6-0.82 mm in length. It is about half the length of *H. aberrans* and considerably shorter than in *H. stammeri*
- In the sexual generation the male tail is shorter
- Female is more than twice as long as in *H. stammeri*, *H. wülkeri* or *H. boviene*
- Stylet length is 0.008-0.001 mm, which is larger than in these three species and in *H. aberrans*.

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