

## Lecture #19 Phylum Nematoda: General Anatomy

### Order Rhabditida: *Strongyloides*.

#### Objectives:

- 1) Define nematode anatomical terms with regard to function.
- 2) Describe the rhabditiform and filariform esophagi characteristic of adult and larval stages of species in the Order Rhabditida.
- 3) Draw the life cycle of *Strongyloides sp.*
- 4) Describe the pathogenesis of *Strongyloides* infections and important routes of infection in dogs, horses and pigs.
- 5) Outline control measures for *Strongyloides* infections in dogs, horses and pigs.

#### Outline:

##### I. General morphology and physiology of nematodes.

##### A. Movement by sinusoidal ("S" shaped) undulation requiring elevated pressure of fluid in body cavity or **pseudocoelom**.

1. Greater than external atmospheric pressure.
2. Keeps worm rigid until muscles (longitudinal) contract to bend it.
  - a. muscles extend from hypodermal **lateral cords**.
  - b. muscles form dorsal and ventral fields.
  - c. muscles innervated from **dorsal and ventral cords**.

##### 3. Nerve function essential to life: target of many anthelmintics.

##### B. Feeding requires ingestion at anterior end and forcing nutrient into collapsed intestine.

1. Buccal cavity with or without teeth.
2. Esophagus of various configurations.
  - a. rhabditiform
  - b. strongyliform
  - c. filariform
  - d. stichosome esophagus or trichurid

##### 3. Intestine

##### 4. Anus or cloaca near posterior end.

##### C. Excretion at mid ventral pore near anterior end.

1. Excretory glands
2. Excretory ducts running in **lateral cords**

##### D. Reproduction - for almost all species of nematodes only sexual replication.

1. Males smaller than females.
  - a. males have prominent to vestigial **copulatory bursa** - often characteristic of genus.
  - b. male **copulatory spicules** are cuticular folds of the cloaca used to open the vulva of the female - also characteristic of genus.
  - c. **testis, seminal vesicle** and **vas deferens** are one long continuous tube ending at the ejaculatory duct in the **cloaca**.
2. Females also have a tubular reproductive tract that is usually composed of two branches.
  - a. **Ovary, oviduct, uterus** and **vagina** make up a continuous tube that opens to the outside at the **vulva** on the ventral surface near posterior or anterior ends or at midbody.
  - b. Eggs in the **uterus** are released to the outside through the **vulva**.

#### **BEGIN STUDIES OF INDIVIDUAL NEMATODE PARASITES**

##### II. General morphology for species in the Order Rhabditida.

##### A. Free-living generation that has sexual replication.

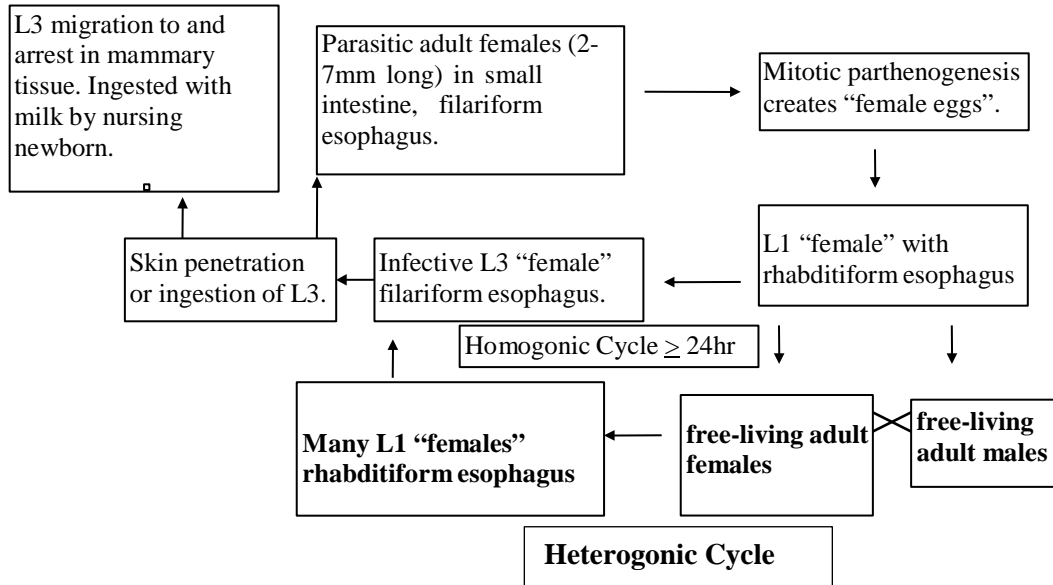
1. Adults are less than 10 mm long.
2. Rhabditiform esophagus

##### B. First stage larvae and non-parasitic stages have rhabditiform esophagi.

##### C. Third stage larvae that are infective, and parasitic females found in the mucosa or the small intestine have filariform esophagi.

III. *Strongyloides* sp.: *S. stercoralis* in dogs, (primates and cats strain variable). *S. papillosus* in ruminants. *S. westeri* in equine species. *S. ransomi* in swine. A MOST UNUSUAL PARASITIC NEMATODE

A. Life Cycle: prepatent time in host **5-7 days**



- B. Pathological lesions - enteritis at location of parasitic adult females that are only 2-7 mm long; petechial hemorrhages in lungs where larvae migrated. Hyperinfection can occur due to autoinfection in dogs and man, usually associated with immunosuppression of the T helper 2 (TH2) response.
- C. Clinical signs and diagnosis – Disease usually in very young (2 weeks –2 months) or naïve, congested lung sounds, diarrhea, larvated eggs (ruminants, horses, pigs) or rhabditiform L1(dogs, cats, man) in fresh feces; fecal culture yields filariform larvae with “notched” tail.
- D. Treatment and control - **young animals are the source of environment contamination**, whereas lactating mothers are source of infection to newborns. Reinfection of mothers from her environment (newborns) maintains infection from one set of offspring to the next. **Treat newborns to prevent environment contamination.** Can also treat mares at foaling with ivermectin to reduce lactogenic infection in foals. Clean dog runs/cages twice a day to stop the homogonic cycle.
- E. Zoonotic infections with *Strongyloides stercoralis* between dogs and humans MUST be considered when *S. stercoralis* is diagnosed in a pet. Strain variability makes this unpredictable and requires rigorous monitoring of infections, especially in immunocompromized individuals, human or dog. Autoinfection due to quick L<sub>1</sub> to L<sub>3</sub> within gut leads to **hyperinfection**.

WHAT COMMON THERAPEUTIC ACTION LEADS TO IMMUNOCOMPROMIZED PET?

- ANTHELMINTIC TREATMENT
- ANTIBIOTIC TREATMENT
- CORTICOSTEROID TREATMENT
- SURGERY