

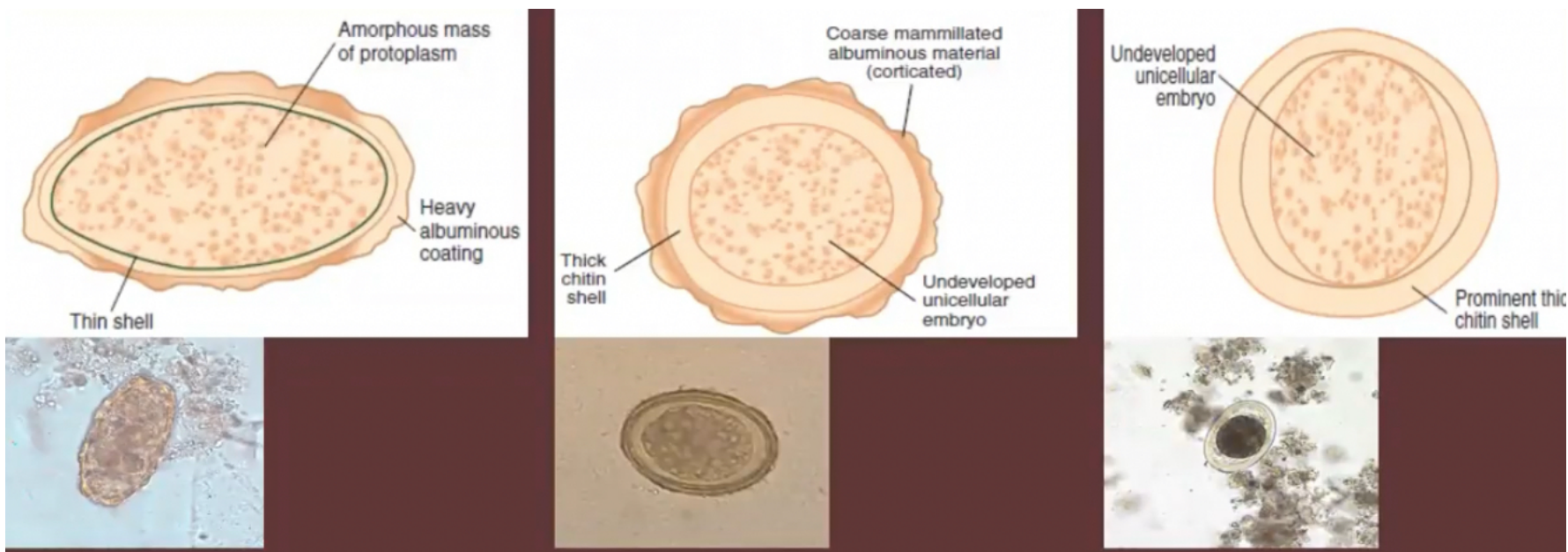
- Larviparous (does NOT lay eggs)
- Adult form lives in small intestine
- Larva form lives in skeletal muscles
- Requires 2 host to complete life cycle

## Morphologic Nematodes Ova and Larvae

### *Ascaris lumbricoides* Ova

- **Type of Female Ova:** Oviparous
- **Morphologic:** Corticated and Decorticated or Fertilized or Unfertilized

Unfertilized	Corticated (Fertilized)	Decorticated (Fertilized)
<ul style="list-style-type: none"> <li>➤ <b>Disorganized germ cell</b>, most of the time <b>Coarsely granular</b> w/o embryo</li> <li>➤ Amorphous mass of cytoplasm</li> <li>➤ Longer and narrower than fertilized eggs</li> <li>➤ No Glycogen Layer</li> </ul>	<ul style="list-style-type: none"> <li>➤ <b>Organized germ cell and finely granular</b></li> <li>➤ <b>Mammiliated</b>; w/ embryo</li> <li>➤ <b>3 layers:</b> Outer albuminous (Mamillary coat) ,middle Glycogen layer, inner lipoidal (Vitelline membrane)</li> <li>➤ Infective Stage</li> </ul>	<ul style="list-style-type: none"> <li>➤ <b>Round</b>; w/ embryo</li> <li>➤ <b>2 layers:</b> w/o outer albuminous coat</li> <li>➤ Without Mamillation</li> <li>➤ Infective Stage</li> </ul>



### Three Layers of Fertilized Egg

Outer Layer	Middle Layer	Inner Layer
<ul style="list-style-type: none"> <li>➤ Mammary layer for protection</li> <li>➤ Has lecithin</li> </ul>	<ul style="list-style-type: none"> <li>➤ Glycogen carbohydrates as a source of energy</li> </ul>	<ul style="list-style-type: none"> <li>➤ Lipoidal Vitellin acts as insulator</li> </ul>

### Ascaris lumbricoides Larvae

#### Morphologic:

#### Adult Ascaris:

- Triangular, pyruvate lips (Prominent)
- Has Buccal cavity

#### Male Ascaris:

- Smaller and Curvy

#### Female Ascaris:

- Larger and Straight



**Trichuris trichuria**

- ▶ Type of Female Ova: Oviparous
- ▶ Morphologic: Bipolar plugs
- ▶ Yellowish to brownish color and transparent inner shell (young)
- ▶ Pinkish to Greyish (Adult)

- ▶ Barrel, football, and lemon-shaped or Japanese lantern shape



### **Trichuris trichuria larvae**

#### **Morphologic:**

- ▶ Whiplike structure
- ▶ Prominent/Thickened Posterior

#### **Female:**

- ▶ Longer, straight tail

#### **Male:**

- ▶ Smaller, coiled tail



### **Enterobius vermicularis**

► **Type of Female Ova:** Ovoviparous/Oviviparous

► **Morphologic:** One side flattened, Lopsided or D-shaped, With thin & transparent shell, Egg with larva inside



### **Enterobius vermicularis Larvae**

#### **Morphologic:**

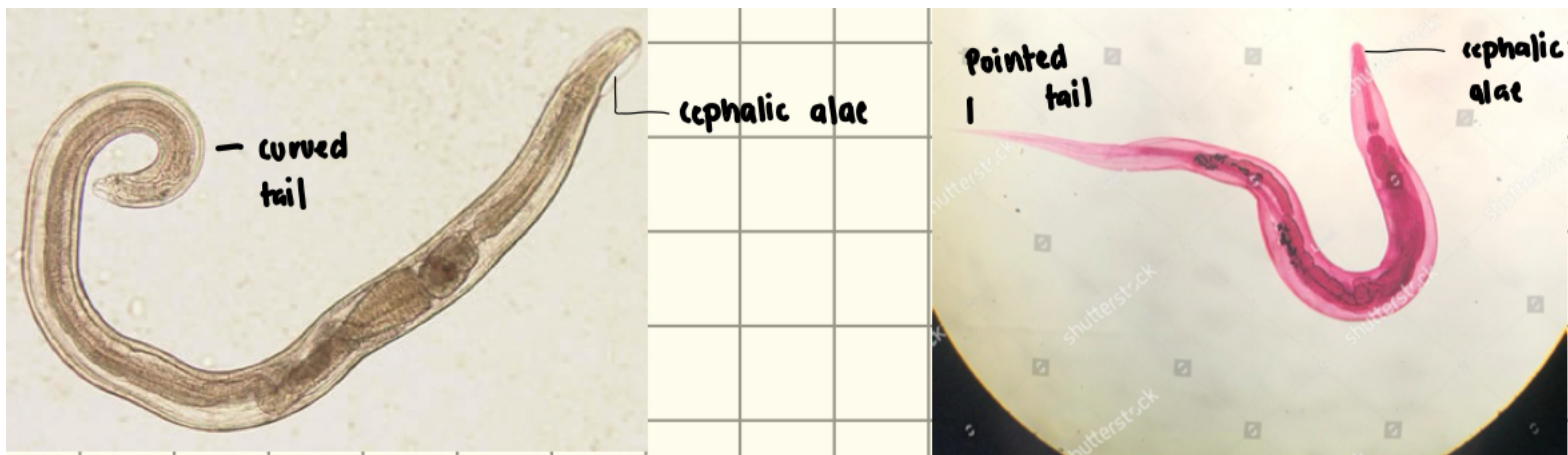
- Cephalic Alae Prominent Double Esophageal Bulb

#### **Female:**

- Posterior and Straight

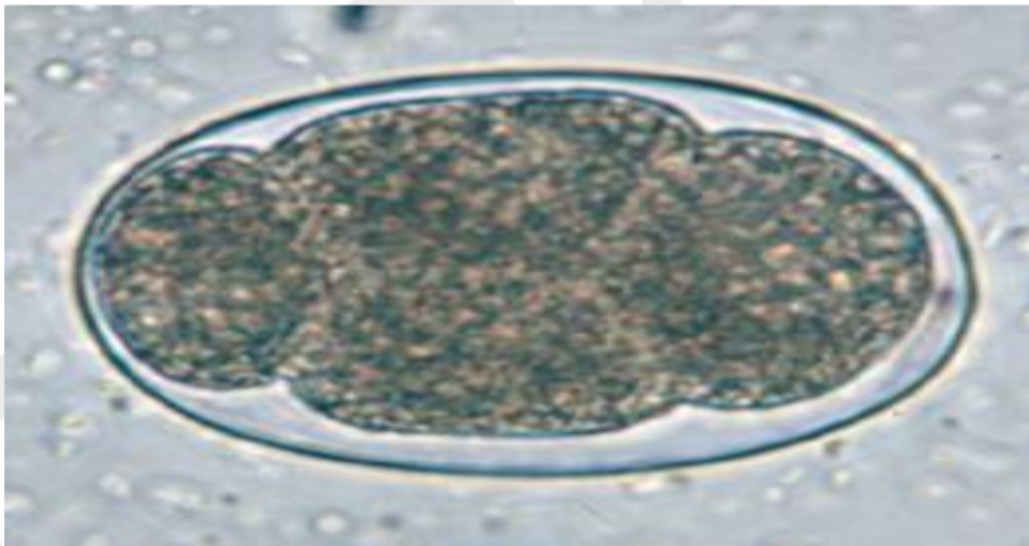
#### **Male:**

- Posterior one third curved



### Hookworm

- ▶ Type of Female Ova: Oviparous
- ▶ Morphologic: Ovoid, with thin hyaline transparent shell, contains 4-8 germ cells



### *Strongyloides stercoralis*

▶ **Type of Female Ova:** Ovoviparous/Oviviparous

▶ **Morphologic:** Same with Ancylostoma, Oval shaped, 4-8 germ cells



### **Capillaria phillipinensis**

▶ **Type of Female Ova:** Typical: With Flattened Bipolar Plugs, **Atypical:** No Flattened polar plugs

▶ **Morphologic:** Ova are peanut shaped, with flattened bipolar plugs with striated membranes



### **Capillaria philippinensis Larvae**

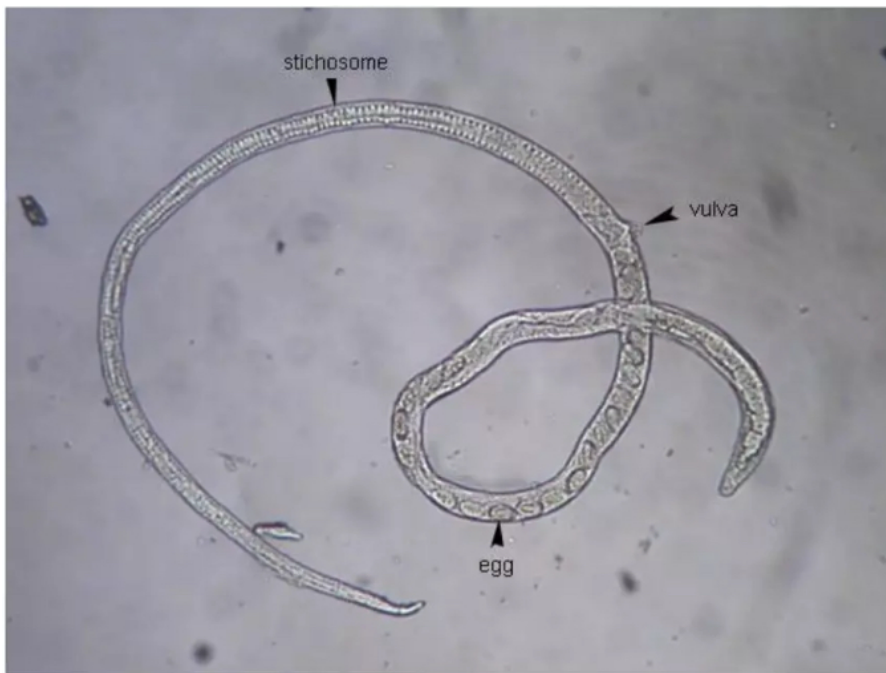
#### **Morphologic:**

**Female:** 2.5-4.4mm

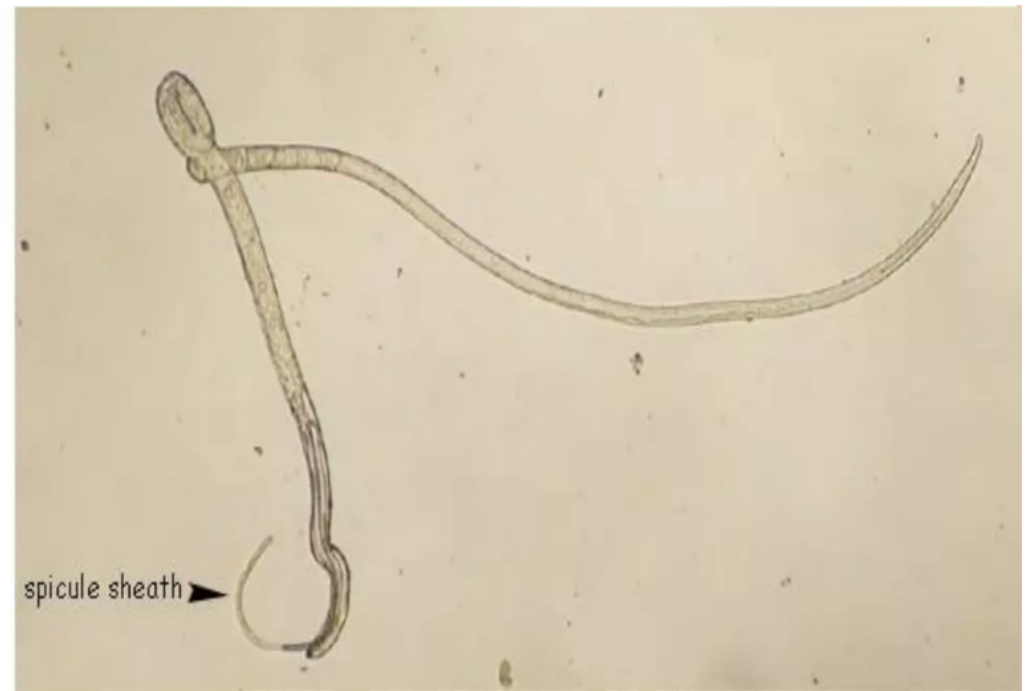
1. **Typical Female** -egg in uterus (8-10) in single row
2. **Atypical Female** - viviparous, larvivapous, 40-45 eggs arranged in 2-3 rows

**Male:** 2.2-3.2mm

►with chitinized spicule and a long spicule sheath



**Female**



**Male**

**Trichinella spiralis**

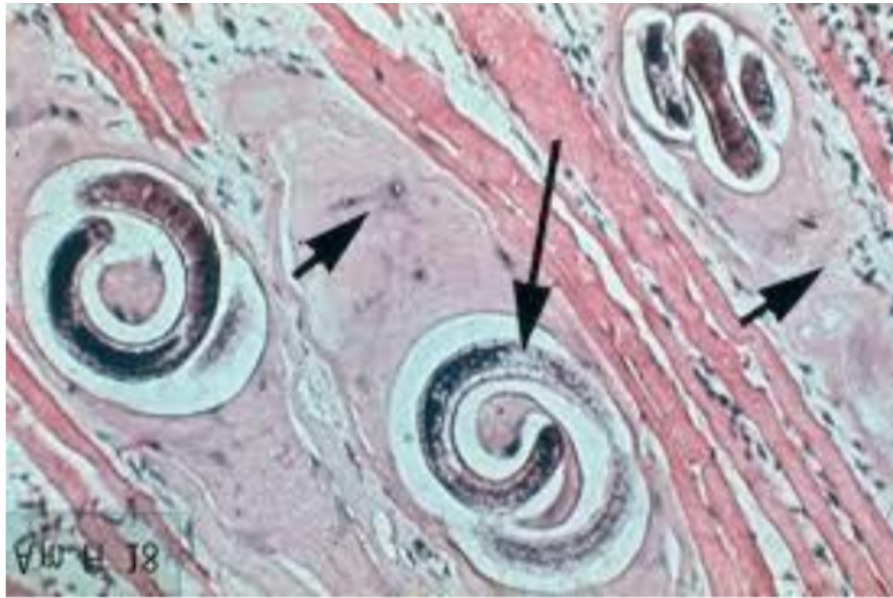
- ▶ Type of Female Ova: Viviparous
- ▶ Morphologic: Encysted Larva

**Female:**

- ▶ Club shape uterus

**Male:**

- ▶ Conical papillae



### Hookworm Larvae

**Rhabditiform Larva:** With longer buccal cavity & smaller genital primordium

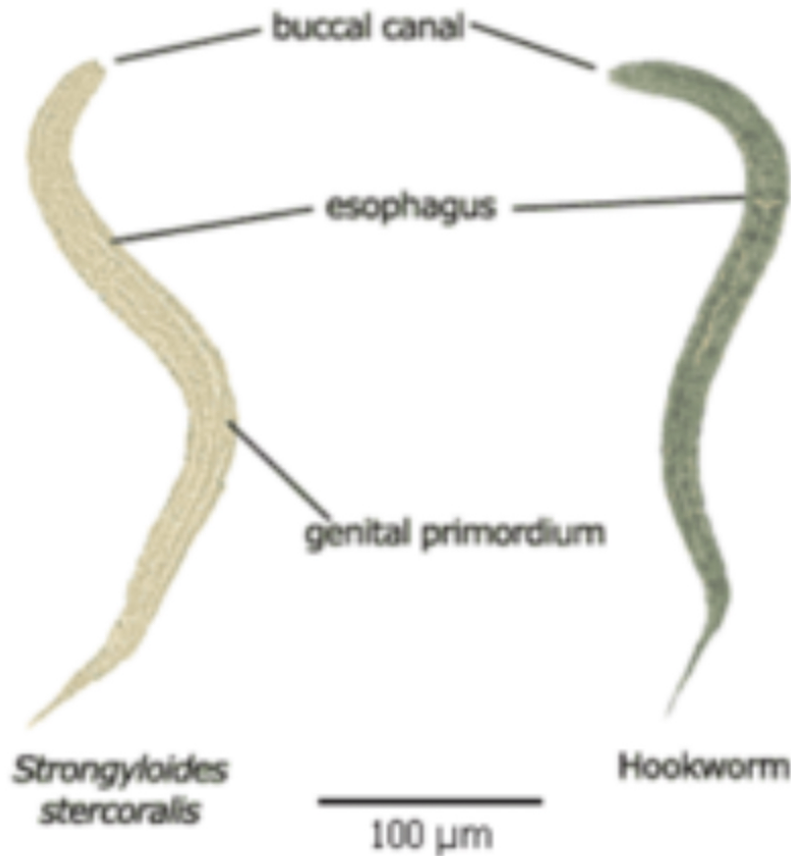
**Filariform Larva:** Sheathed, shorter esophagus & with pointed tail

### *Strongyloides stercoralis* Larvae

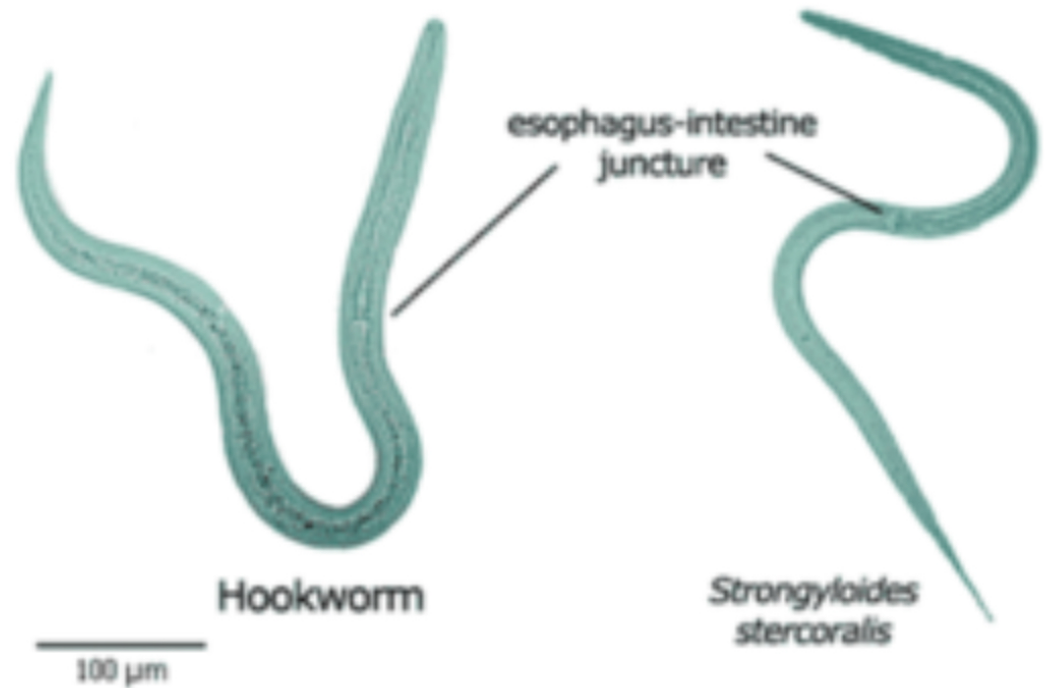
**Rhabditiform Larva:** with shorter buccal cavity & larger genital primordium

**Filariform Larva:** unsheathed, longer esophagus & with bifid or notched tail

## Rhabditiform Comparison



## Filariform (L3) Stage Comparison



### Rhabditiform Larva

- ▶ 1st Stage larva of Hookworms and Strongyloides.
- ▶ Considered as FEEDING stage
- ▶ Larvae with open mouth, shorter and robust than filariform larva.
- ▶ Not infective

### Filariform Larva

- ▶ 2nd stage larva considered as the NON-FEEDING stage
- ▶ Larvae with closed mouth

- ▶ Longer and slender than Rhabditiform Larva
- ▶ Infective Stage

### Summary of Microfilaria Nematodes

Species	Periodicity	Vector	Location
<b>Wuchereria bancrofti</b>	<b>Nocturnal</b> 8:00 PM-2:00 AM or 10:00 PM-4:00 AM	Culex; Aedes; Anopheles	Lower extrimities
<b>Brugia malayi</b>	<b>Nocturnal Subperiodic</b> Day and Night Time  <b>Note:</b> Mostly in the blood is at night	Aedes; Anopheles; Mansonia	Upper extrimities
<b>Loa loa</b>	<b>Diurnal</b> 11:00 AM-1:00 PM	Chrysops; Deer Fly; Mango Fly	Subcutaneous tissue Conjunctiva (Eyeworm infection)
<b>Onchocerca volvulus</b>	<b>Non Periodic</b>	Simulium; Black Fly	Subcutaneous nodule Conjunctiva (Eyeworm infection)
<b>Mansonella streptocerca</b>	<b>Non Periodic</b>	Culicoides	Subcutaneous
<b>Mansonella ozzardi</b> ( New World Filaria)	<b>Non Periodic</b>	Culicoides; Simulium	Serous Cavity
<b>Mansonella perstans</b>	<b>Non Periodic</b>	Culicoides	Serous Cavity

### Morphologic Microfilaria Nematodes

Species	Possession of Sheath	Nuclei
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<b>Wuchereria bancrofti</b>	Sheated	► With nucleus NOT extending to tip of tail
<b>Brugia malayi</b>	Sheated	► With 2 terminal nuclei
<b>Loa loa</b>	Sheated	► With nucleus extending to tip of tail
<b>Onchocerca volvulus</b>	Unsheated	► With nucleus NOT extending to tip of tail
<b>Mansonella ozzardi</b>	Unsheated	► With nucleus NOT extending to tip of tail
<b>Mansonella perstans</b>	Unsheated	► With nucleus extending to tip of tail
<b>Mansonella streptocerca</b>	Unsheated	► With nucleus extending to tip of tail

### Summary of Pathogenesis

<b>Wuchereria bancrofti</b>	<p>Elephantiasis</p> <p>► Tissue swelling due to obstruction of lymph glands</p> <p>"Malabar Leg" (Elephantiasis)</p> <p>Hydrocoele</p> <p>► Can be done thru collection of fluid in the membrane surrounding the testicles causing the swelling in the scrotum</p>
<b>Brugia malayi</b>	► Malayan filariasis (type of elephantiasis)

<p><b>Loa loa</b></p>	<ul style="list-style-type: none"> <li>▶ <b>Fugitive Swelling or Calabar Swelling</b> or transient subcutaneous swellings</li> <li>▶ Also known as African Eye Worm</li> <li>▶ Can be found in eyes and also known as eyeworm</li> </ul>
<p><b>Onchocerca volvulus (Blinding Filariasis)</b></p>	<p><b>River Blindness</b></p> <ul style="list-style-type: none"> <li>▶ Second causing preventable blindness in the world</li> </ul> <p><b>Onchocercomata</b></p> <ul style="list-style-type: none"> <li>▶ Painless nodules.</li> </ul> <p><b>Sowdah / Onchodermatitis</b></p> <p><b>Nodding Syndrome</b></p> <ul style="list-style-type: none"> <li>▶ Believed to be associated with this parasite</li> </ul>
<p><b>Mansonella ozzardi (Ozzard filarial or New World Filaria)</b></p>	<ul style="list-style-type: none"> <li>▶ None (considered non pathogenic), Urticaria, Lymphadenitis, Skin itching, Arthralgias</li> </ul>
<p><b>Mansonella perstans (Persistent filarial)</b></p>	<ul style="list-style-type: none"> <li>▶ None (considered non pathogenic), mild allergic reactions</li> </ul>

### Fatal Visceral Larva Migrans

#### Oesophagostomum

- ▶ Resembles the Hookworm

#### Diectophyme renale

- ▶ Giant kidney worm of carnivores

#### Baylisascaris procyonis

►Racoon roundworm