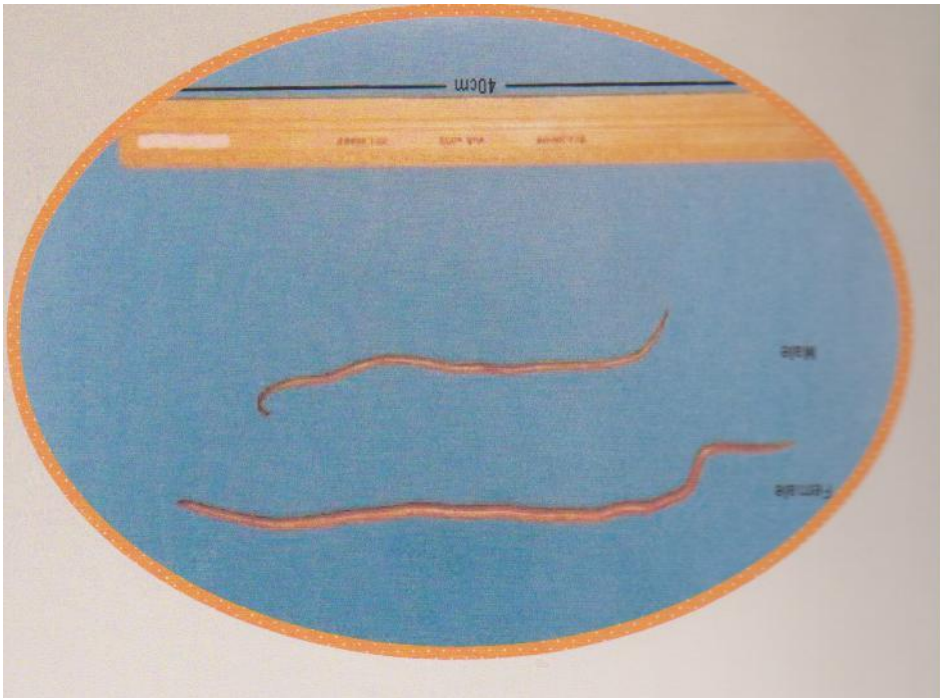


Class: Nematoda

Ascaris lumbricoides

- Largest intestinal round worms of man.
- Cosmopolitan in its distribution.
- Ascariasis.
- Habitat: lumen of the small intestine.

Morphology:



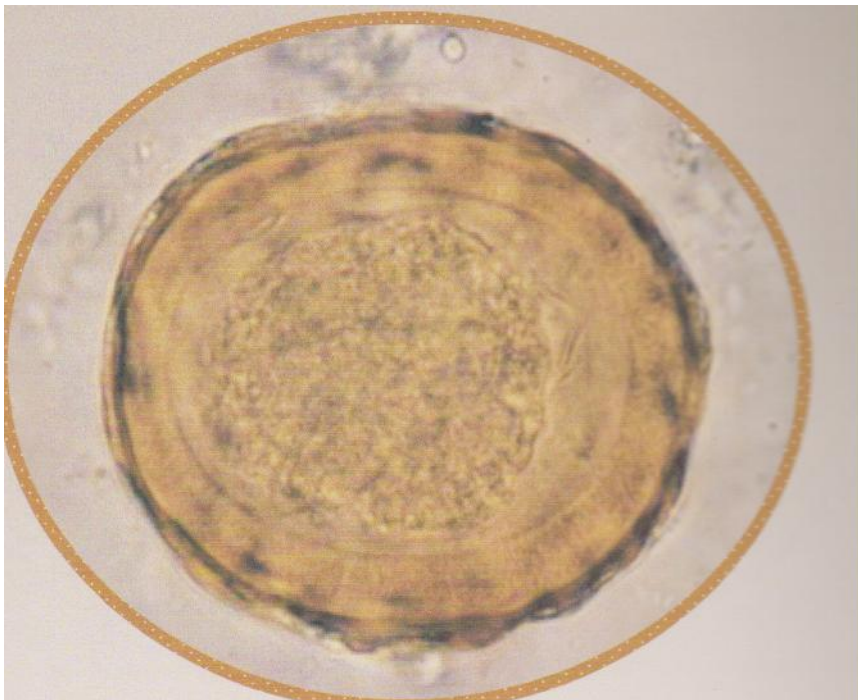
- Elongated cylindrical nematode.
- A pair of lateral whitish line along the entire length.
- Head is provided with 3 lips.
- Club-shaped esophagus.

- 1- The head is provided with 3 lips. There are whitish lines along the entire length of the body.
- 2- Female measures 20-35 cm in length & 3-6 mm in width.
- 3- Male is 12-31 cm in length & 2-4 mm in width . The posterior end is curved ventrally.

Fertilized corticated egg:

1- Broadly ovoidal measures 65-75 μm by 30-50 μm in size.

2- Coarse granular one-cell stage embryo, surrounded by impermeable thin membrane , then smooth relatively thick colorless middle layer & lately coarse albuminous mammillated layer which is brownish in colour.

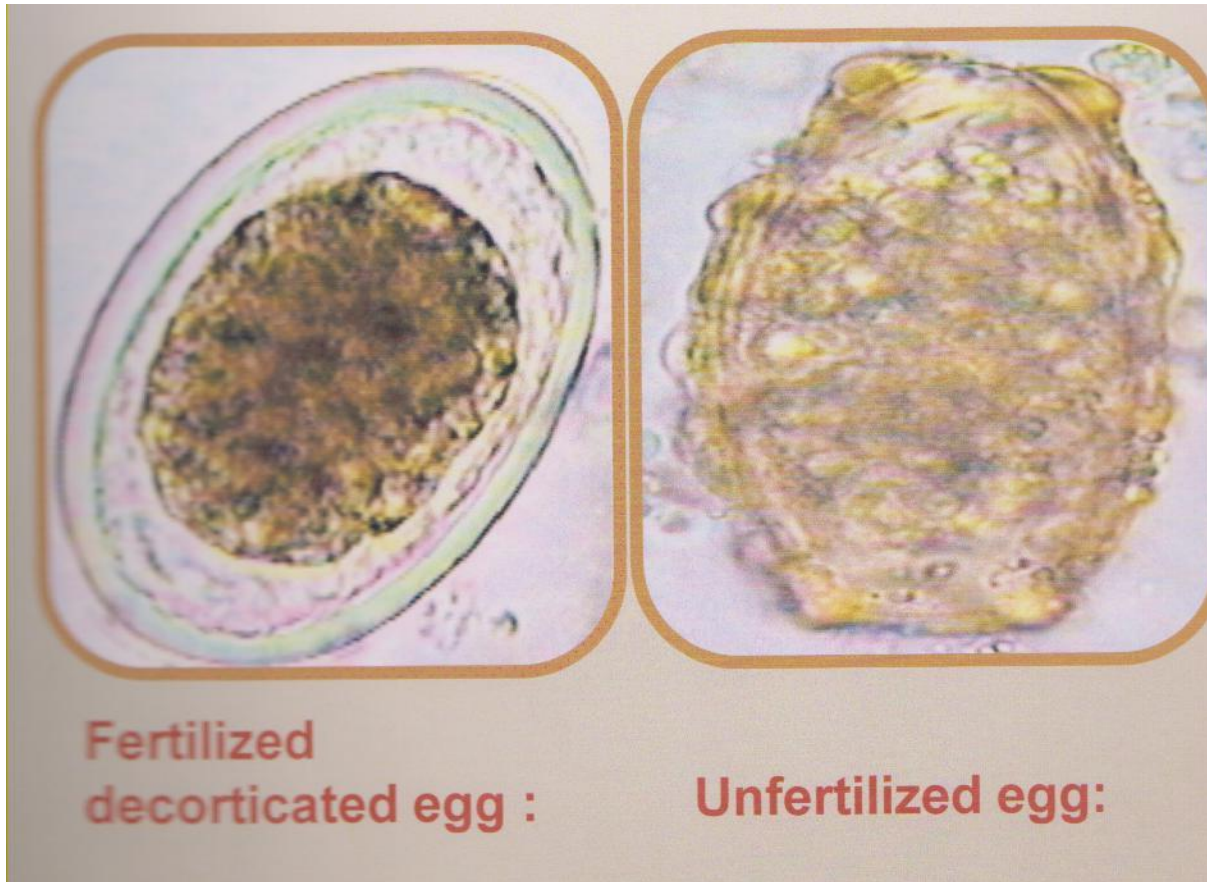


Fertilized decorticated egg:

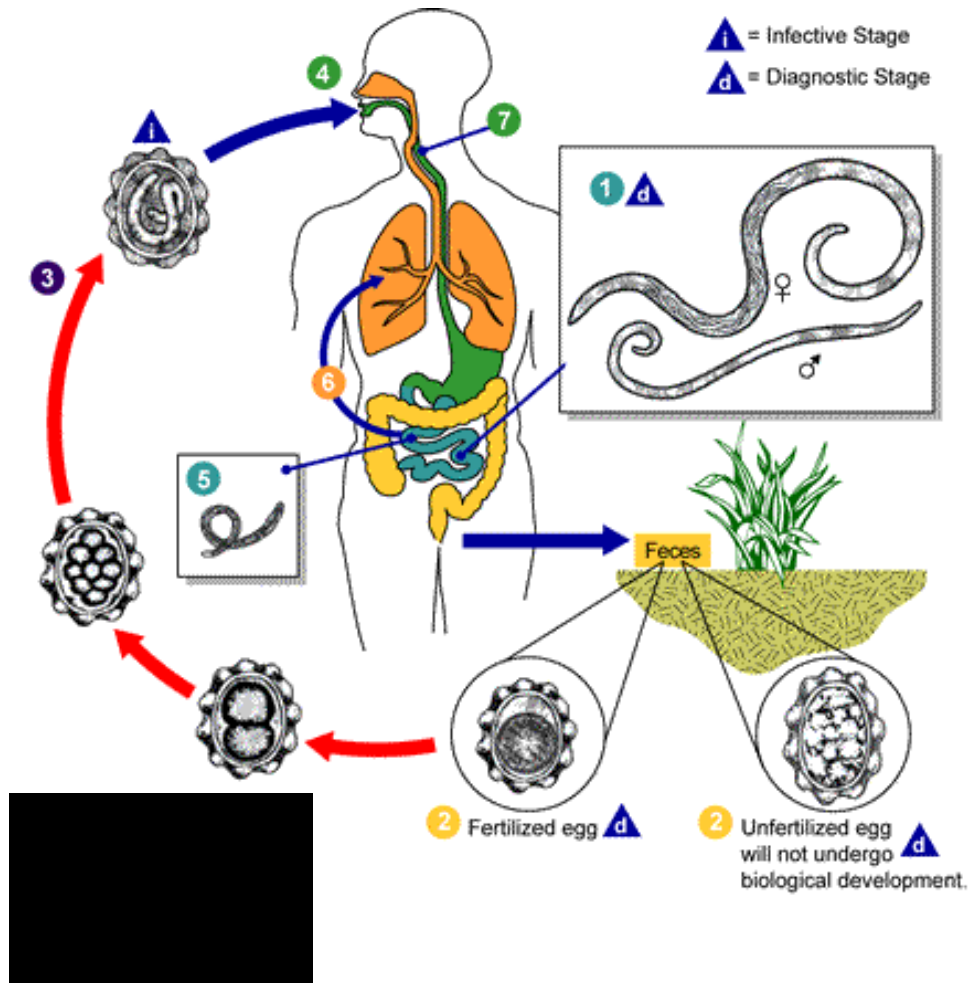
Resemble the corticated egg but the outer mammillated layer is absent, and the thick chitin shell is more prominent than in corticated one.

1- It is more elongated , elliptical in shape measures 88-93 \times 38-45 μm .

2- Unembryonated & consists of a disorganized mass of granules & globules which completely full the shell.



Life cycle:



I. Stage of larval migration:

Liver :

- Focal eosinophilic infiltration.
- Granuloma.
- Inflammation along the portal tract.
- Fibrosis of the peri portal & interlobular spaces.

Lung:

- Cellular reaction, eosinophil, epithelioid cells & macrophages infiltration.
- Petechial haemorrhages.
- *Ascaris* pneumonitis.

Abnormal sites:

- **Peritoneum peritonitis.**
- **Heart, pulmonary arteries & brain.**
- **Appendix appendicitis.**
- **Biliary & pancreatic ducts calculi & obstruction with colic.**
- **Liver & pancreas tissue destruction, liver abscesses in children.**
- **Lung.**
- **Nasopharynx.**
- **Lacrimal duct.**

Eustachian tubes.

Complications:

- 1. Intestinal obstruction or perforation.**
- 2. Biliary, hepatic or pancreatic ascariasis.**
- 3. Appendicitis.**
- 4. Obstruction of the upper respiratory tract.**

Diagnosis:

- **Stool examination to recover the eggs.**
- **Identification of the worms in the faeces.**

Control:

- 1. Mass treatment every 6-12 months.**

2. Home & community sanitation; Avoid defecation in and around houses.
3. Proper washing of vegetables.
4. Stool should be exposed to direct sun light or to chemicals (e.g: Amm. nitrate) before using stool as a fertilizer.

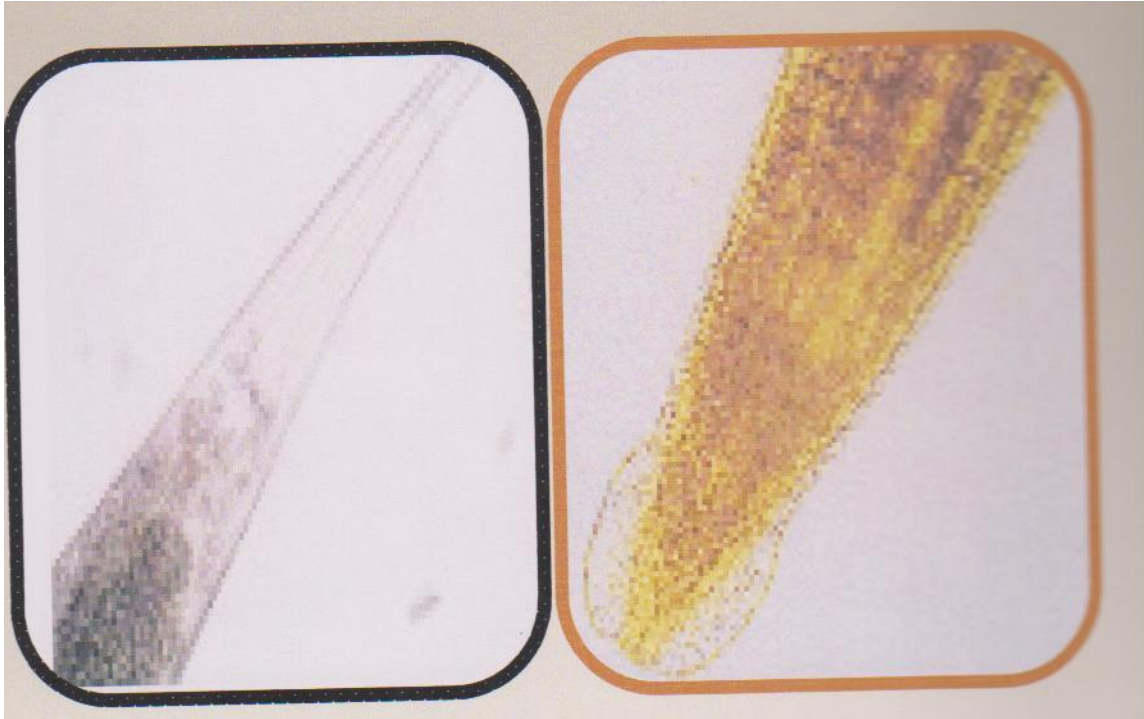
Enterobius vermicularis

Oxyuris vermicularis

(Pin worm or seat worm)

- Inhabit appendix & caecum → enterobiasis or oxyuriasis.
- Group infection = large families, asylum, schools, institution etc.
- It is more common in children.
- It is world wide in its distribution.

Morphology:



Female:

- 1- It is 13 mm in length, with sharply pointed posterior end.**
- 2- Two dorso-ventral expansion of cuticle at the anterior end called alae or cephalic inflation.**
- 3- Two lateral cuticular thickenings running along the full length of the parasite.**
- 4- Double- bulbed oesophagus.**
- 5- Vulva is situated at the junction of anterior fourth with the rest of body.**

Male:

Smaller than female (5 mm) in length and has a width of 0.1-0.2 mm.

- 2- The posterior end is curved ventrally & has a single spicule.**

Cross-Section:

You can easily identify the worm in the section by the spine-like thickening of the cuticle. In some section you can identify the ova of *Enterobius* inside the uterus.



Egg:

1. 48-60 μm in length by 20-30 μm in width.
- 2- Oval in shape by upper & lower view while it is plano-convex by side view.
- 3- Colorless double shell .
- 4- The content is fully developed larva.



Life cycle:

Methods of infection and transmission:

1. Autoinfection.
2. Person sleeping in the same bed or bedroom with carriers or using the same toilet & fomites.
3. Air-borne infection is possible → light infection.

Pathogenesis and symptoms:

I- Pruritus ani → scratching, scarification, haemorrhage, weeping eczema & pyogenic infection.

Symptoms: tiredness, restless sleep, vague abdominal pain, diarrhea or constipation & eosinophilia.

II- Parasite might migrate up into the:

Vagina.

Uterus.

Encysted.

Fallopian tubules.

Salpingitis.

Symptoms: mucoid vaginal discharge with pruritus vulvae.

III- Minute ulceration & secondary bacterial infection → appendicitis.

Complications:

I- Intestinal:

- **Appendicitis.**
- **Perianal dermatitis.**

II- Non-intestinal:

- **Vulvovaginitis.**
- **Endometritis & chronic pelvic peritonitis.**
- **Urinary tract bacterial infection.**

- Psychological problems.
- Clinical picture.

Diagnosis:

Recovery of eggs from the perianal region using scotch-tape slide technique or National Institute of Health (N. I. H.) swab method

Control:

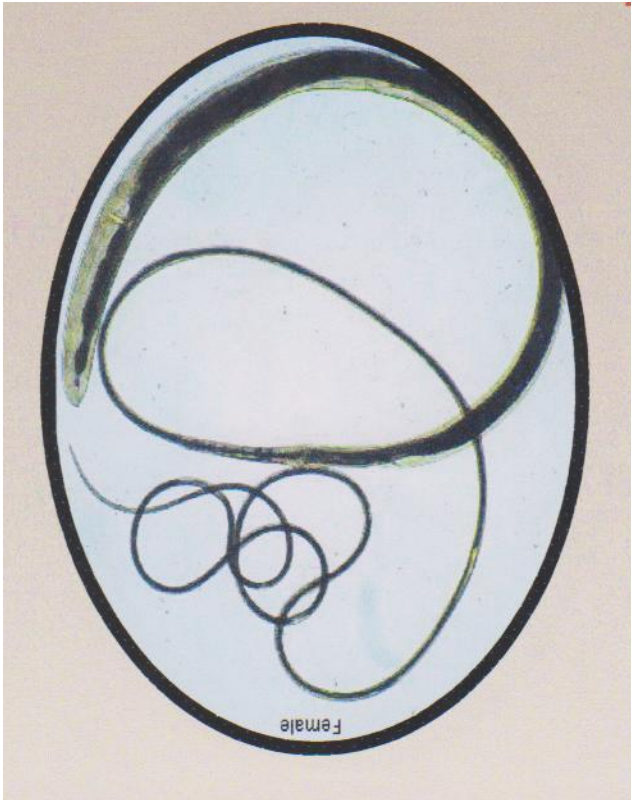
1. Personal & group hygiene.
2. Mass treatment.

Trichuris trichiura

(Whip worm)

- Inhabit the caecum & appendix → trichuriasis.
- Cosmopolitan in its distribution but is more common in warm moist regions

Morphology:



Female:

- **35-50 mm in length.**
- **2- It consists of thin anterior three fifths & a thick posterior two fifths of the worm looks like a whip.**
- **3- Cellular oesophagus occupying all the thin anterior part while the intestine & the single set of reproductive organs occur in the posterior thick part.**
- **4- Vulva situated at the junction of the thin & the thick parts.**

Male:



1- It measures 30- 45 mm in length.

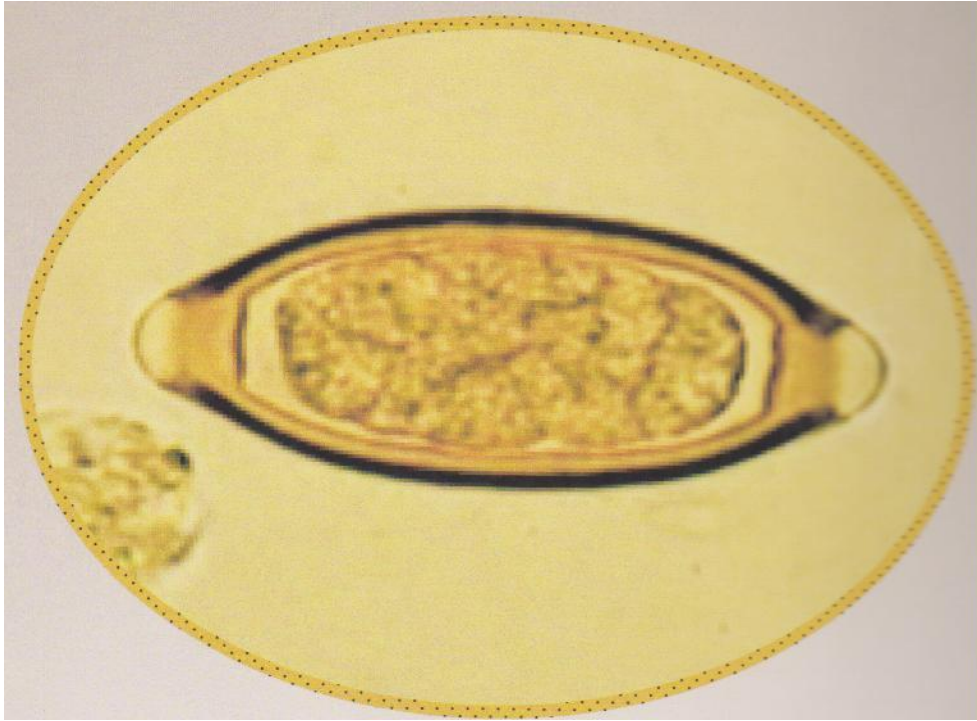
2- It consists of anterior thin part & posterior thick part .

3- Single spicule inside a retractile spine covered sheath.

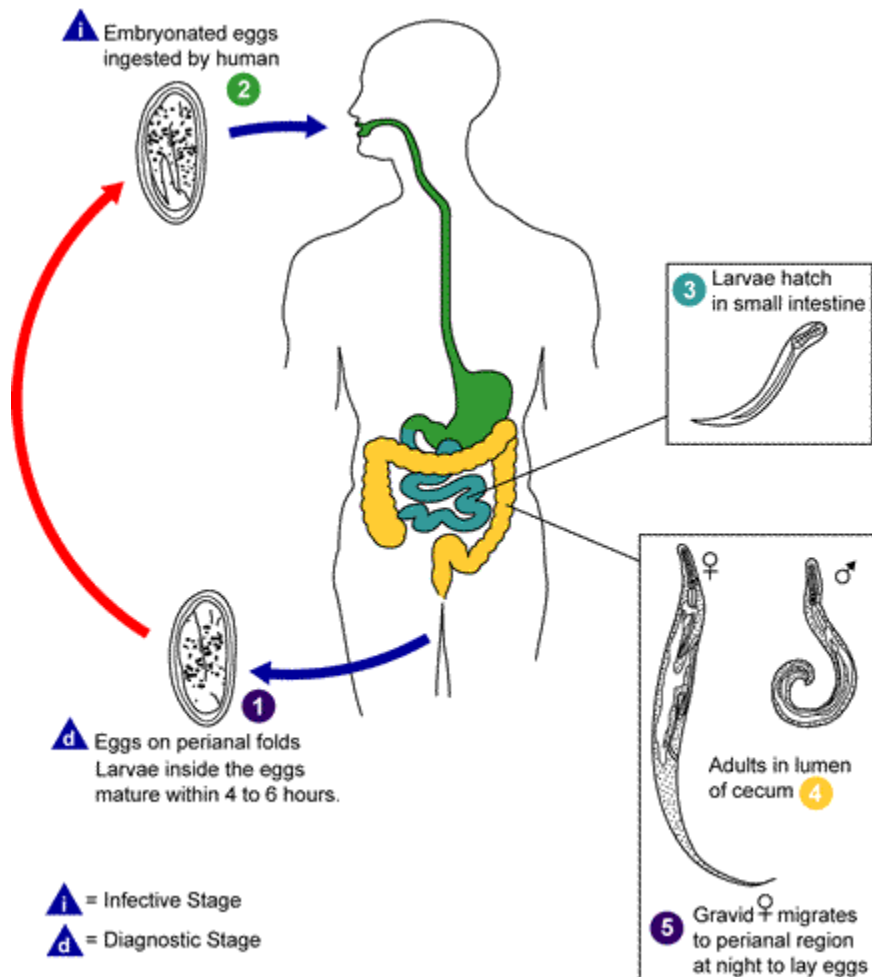
Egg:

50-55 μm by 25 μm , barrel-shaped laid in one –cell stage embryo . It has a thin transparent inner membrane & a golden- brown outer shell.

2- Blister- like prominence at each end.



Life cycle:



Strongyloides stercoralis

Parasitic adults live in the mucosal epithelium of the small intestine (duodenum & jejunum) of man --- strongyloidiasis.

**** A parasite of warm climates & has been reported sporadically in temperate & cold regions.***

Morphology:

Filariform larva:

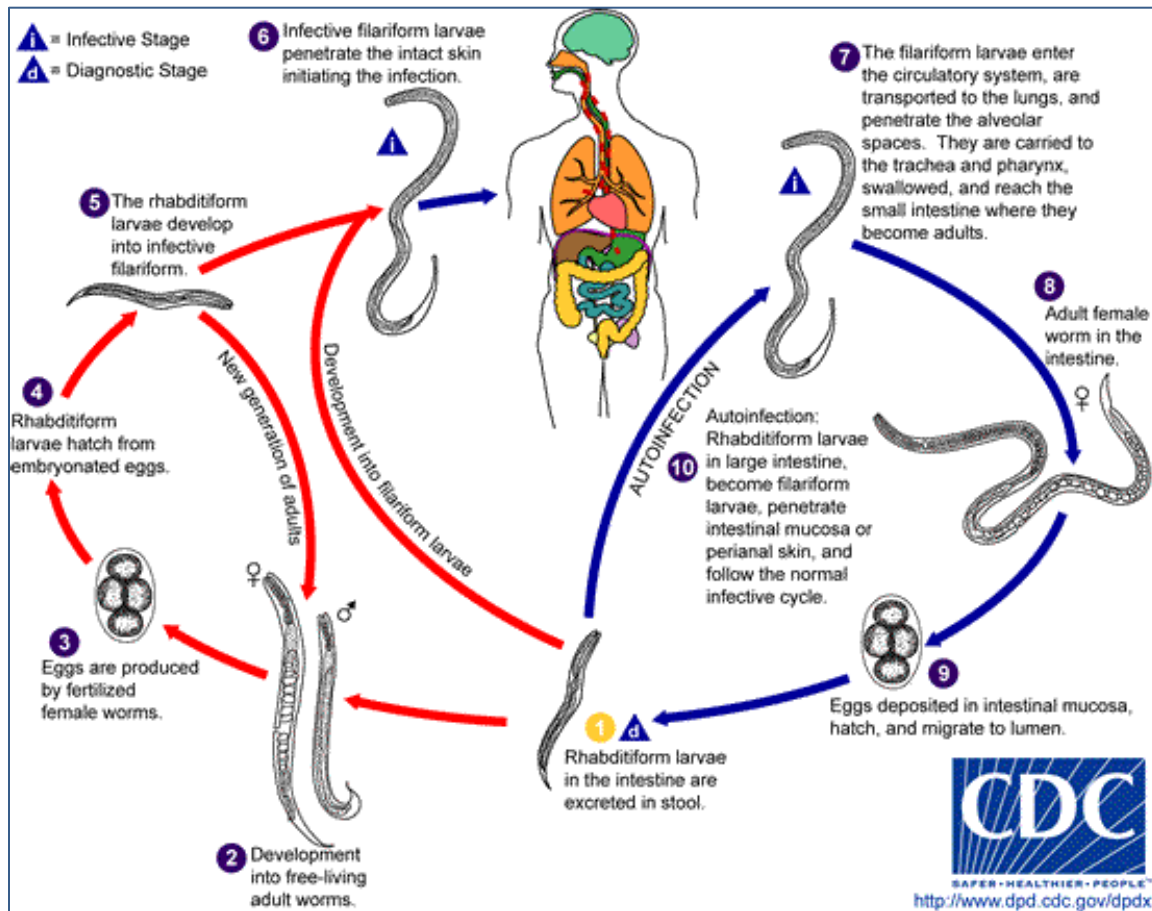
- 1- Long-slender and has long cylindrical oesophagus.**
- 2- It measures 600×20 µm.**
- 3- The tail is notched.**

Rahbditiform larva:

- 1- 250 ×20 µm in size.**
- 2- It has a rhabditiform oesophagus.**



Life cycle:



Diagnosis:

Clinical picture.

Stool examination by either direct or concentration methods for the detection of eggs.

Pathogenesis:

I) Skin penetration stage:

Petechial haemorrhage at the site of invasion ----pruritus --- congestion & oedema.

Severe perianal dermatitis during autoinfection.

II) Migration stage:

Petechial haemorrhage & cellular infiltration in the air sacs & bronchioles.

Lobular pneumonia.

Pleurisy

Pericarditis have been reported.

III) Intestinal stage:

Chronic inflammation of the intestinal mucosa.

Inflammatory cells & eosinophils infiltration.

Necrosis & sloughing of areas of 0.5-1 cm in diameter.

Diagnosis:

Clinical picture.

Demonstration of the rhabditiform larvae in the stool.

Occasionally, larvae are recovered from sputum, urine or aspirates of duodenum & body cavities.

Harada and Mori *in vitro* cultivation.