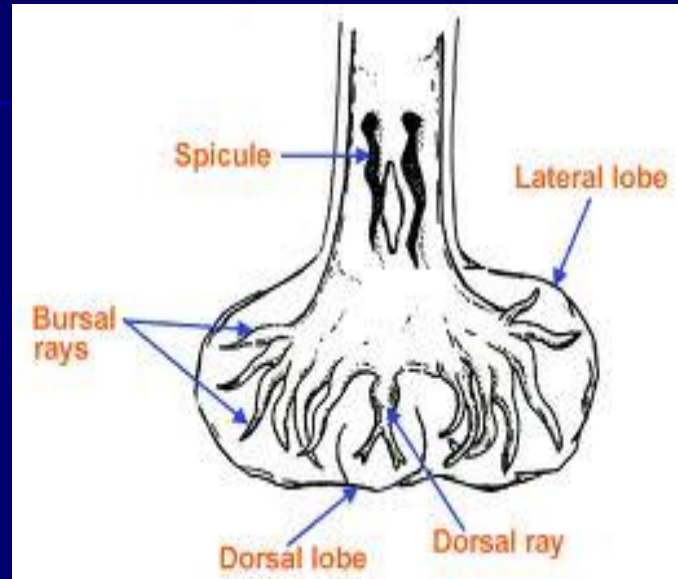
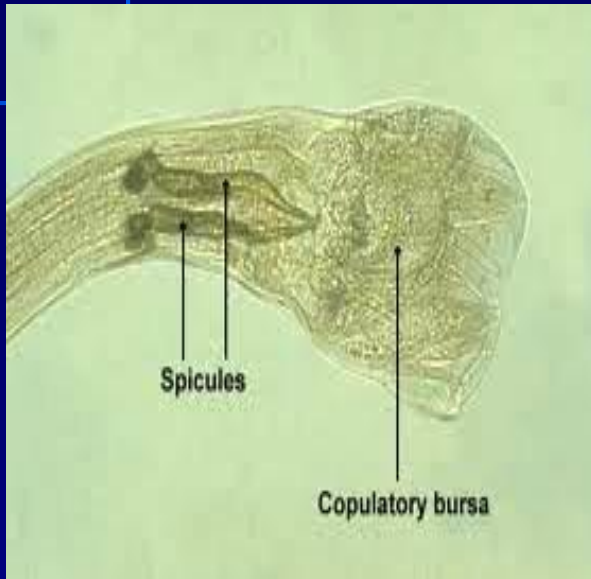


# Phylum Nemathelminthes or Aschelminthes

- Class: Nematodes
- Common name: roundworms or thread worm.
- Body is long, cylindrical, fusiform (pointed at both ends).
- Body wall is composed of an **outer non-cellular cuticle**.
- ALL medical nematodes are pathogenic .
- Mostly parasitic in their life cycle.
- **All are dioecious** (i.e.... are usually bisexual).
- Males are usually smaller than females.
- Life cycle is **direct in all intestinal nematodes** except in **rare species** .

- **Male** has always a curved end with **spicules** or **bursa** which is a posterior couplatory organ of nematode males like hookworm.



- **Female** has a **pointed tapering** posterior end.
- The life cycle involves **egg**, **larval**, and **mature male** ♂ and **female** ♀ **adult stages**.
- Copulation between a female and a male nematode is necessary for fertilization giving ova.

in copulation

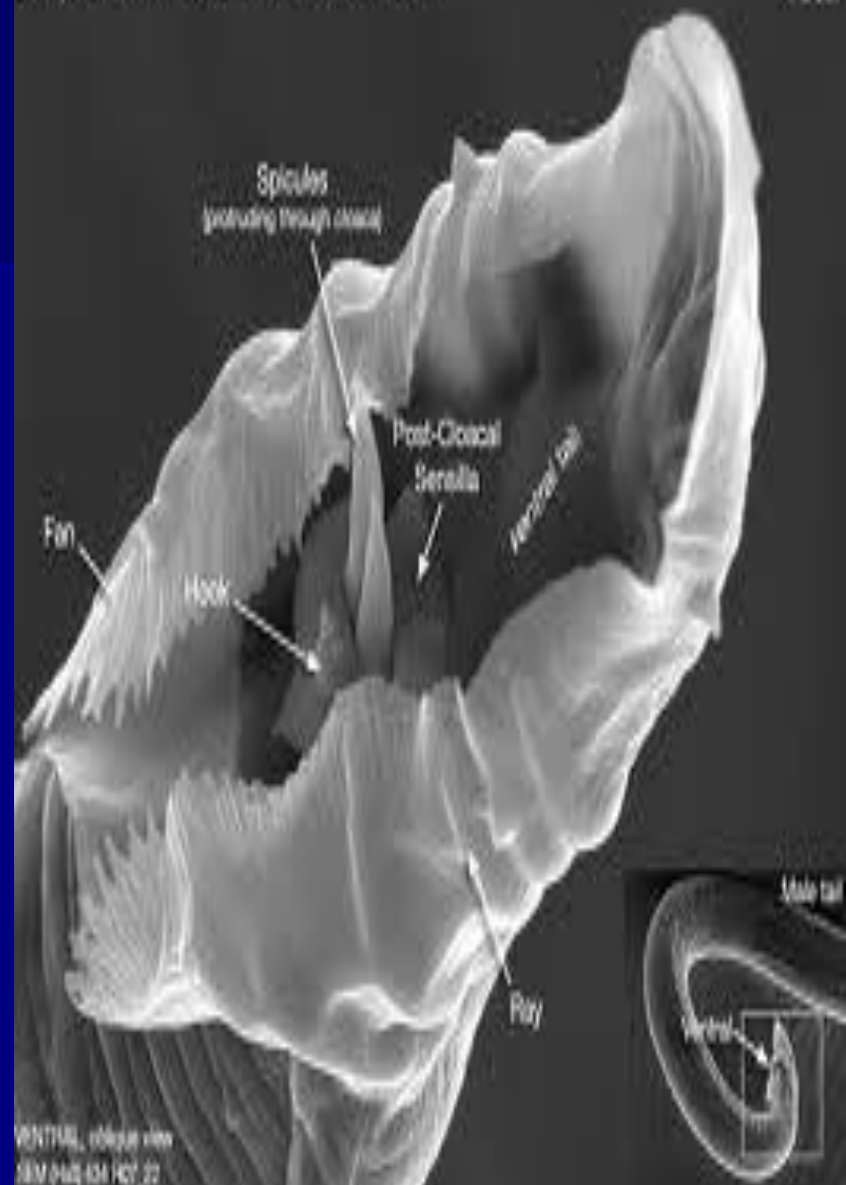
Male

Copulatory bursa

Female

MaleEpFIG10A: MALE-SPECIFIC SENSILLA OF THE TAIL

ADULT



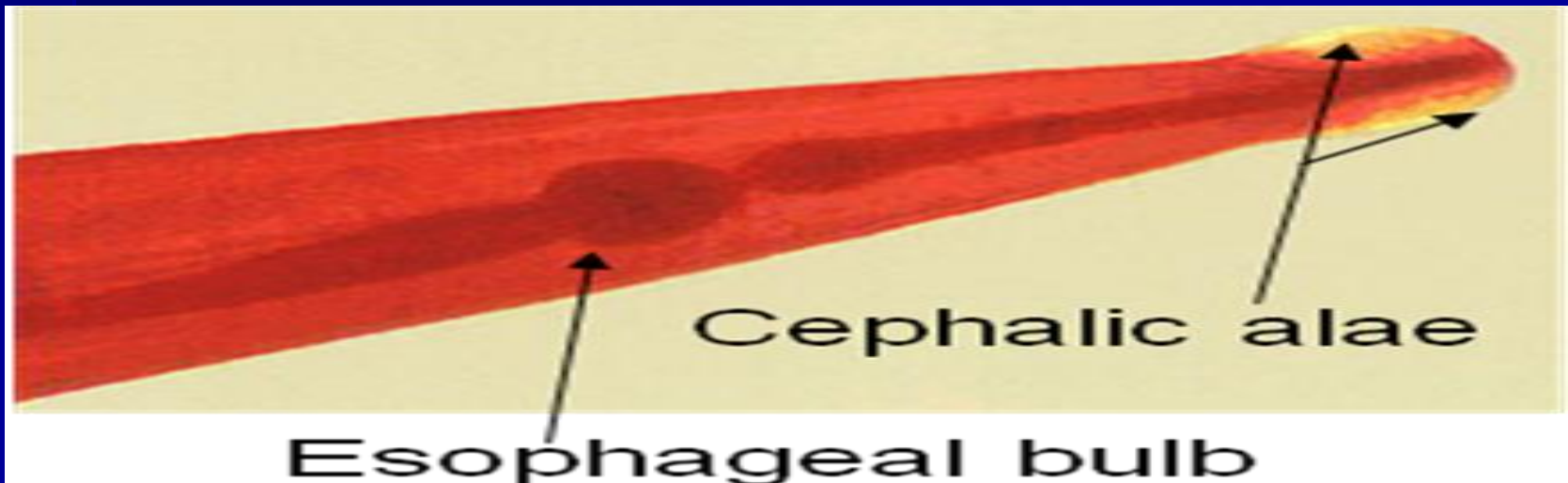
# Intestinal nematodes:

## 1-*Enterobius vermicularis* or (*Oxyuris vermicularis*)

**Common name:** pinworm or seat worm or oxyuris .

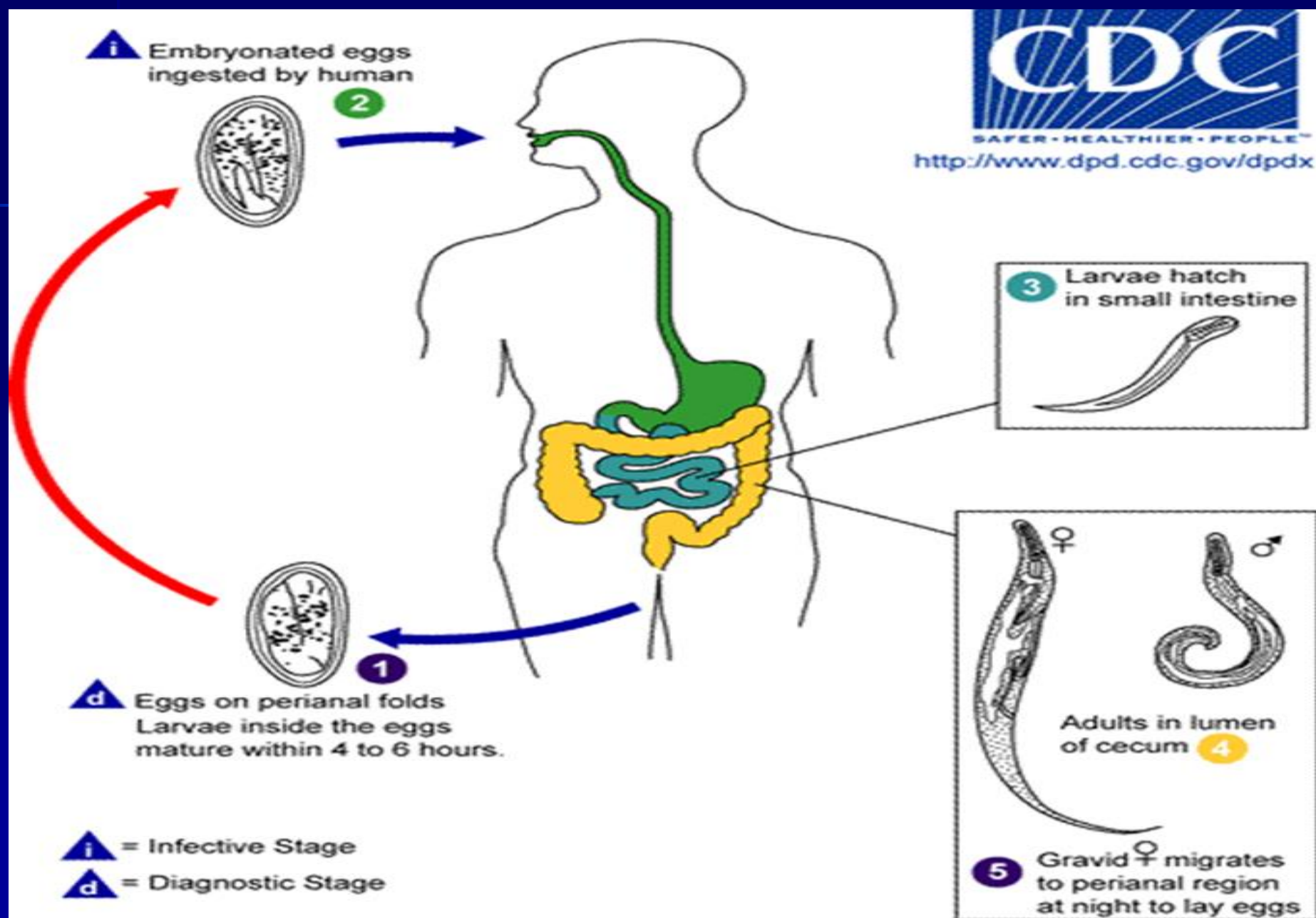
**Disease:** Pinworm or seat worm infection or enterobiasis

**Adult shape** is pin like with both oral cuticle alae.









**Infective stage:** fully developed and mature ova.

**Ova** plano-convex in shape or D-Shaped ova.

Ova found in **dirt** under the **nails** and in **household dust**.

(Adult females: 8 to 13 mm, adult male: 2 to 5 mm.) .

**Habitat:** adults in the **rectum, anus, colon**.

# Modes of infection:

- 1- Contamination of food and water (fecal oral route).
- 2- Aerosol inhalation from contaminated sheets dust.
- 3- Retro-infection-infection: where some of the pin larvae which hatch on the anus return to the gastrointestinal tract of the original host, leading to a very high parasitic load as well as ensuring continued infestation.
- 4- Auto-infection: the eggs are infective as soon as they are passed by the female worm. If the hands of the patients get contaminated with these eggs, human will infected again and again.



# Symptoms

Many people with pinworm infections have no symptoms and may never be aware of the infection.

The infection can go away without treatment

- Itching around the anal region.

female migrate after mid night from intestine to perianal region what is called nocturnal migration to lay eggs causing pruritic and perianal itching, sleeping disturbances.

Diagnosis: Rarely found in stool. Perianal swab by cellulose adhesive tape technique to see ova under microscope.

Treatment: antihelminthics drug Mebendazole.

*Enterobius vermicularis*

Female

Male



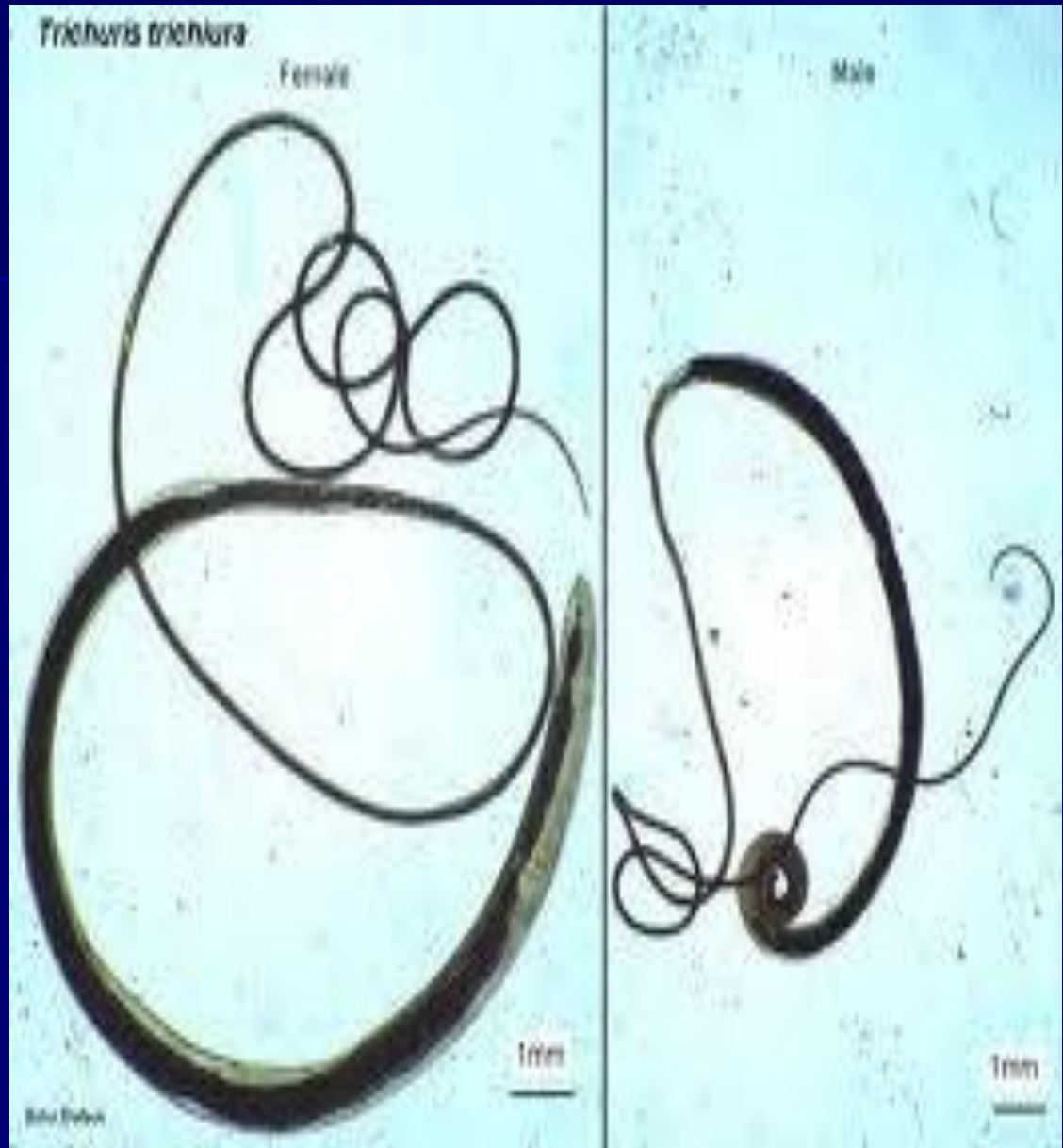
2mm



1mm

## 2- *Trichuris trichiura*

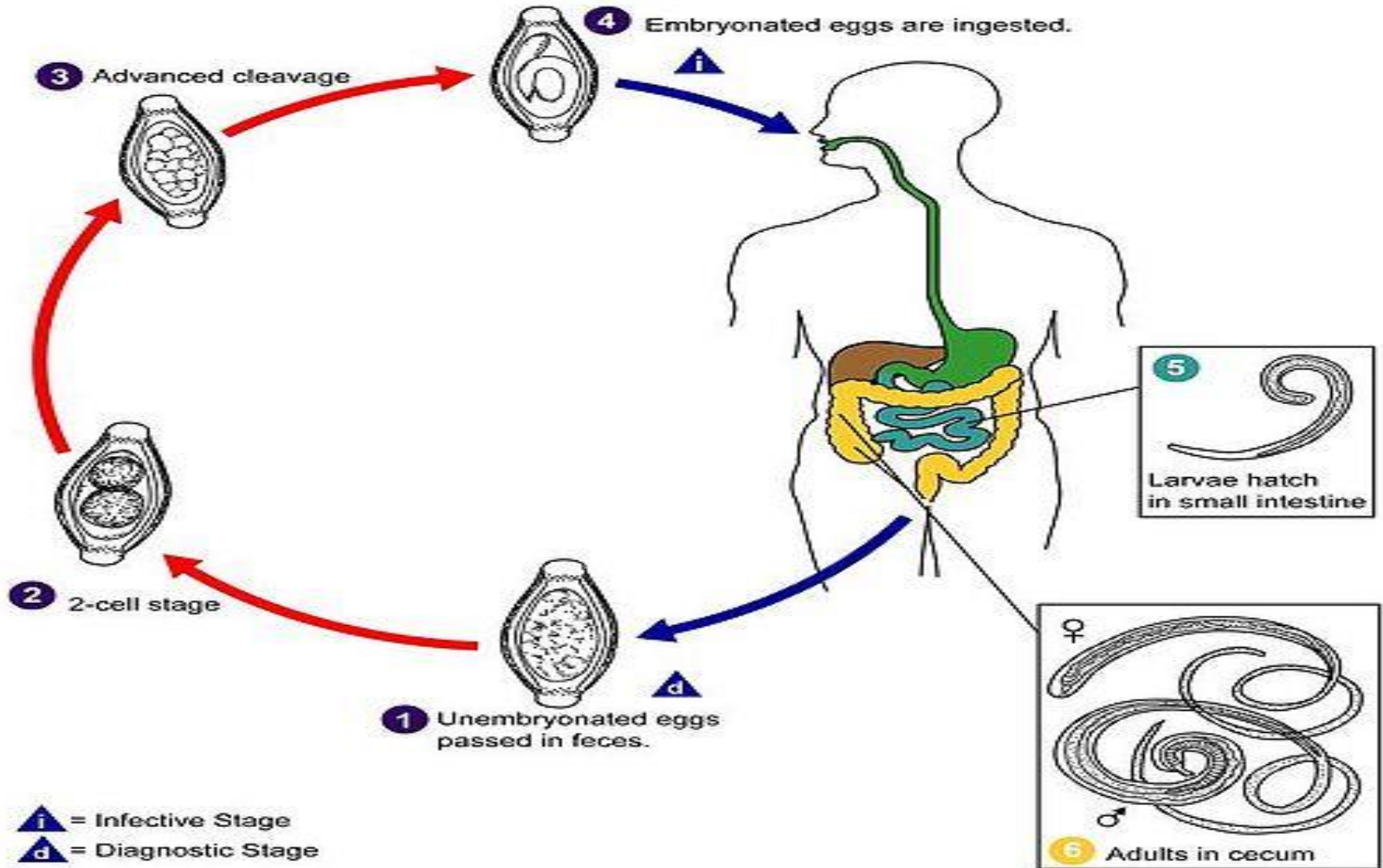
- **Common name:** whipworm.
- **Disease:** whipworm infection or Trichuriasis.
- Adult worms measure approximately 4 cm whip like worm
- Female longer than male
- Male posterior end is coiled and possesses a single cubicle.
- Female posterior end is straight.
- Egg is barrel shaped with bipolar plugs or American football-shaped. Cubicle
- **Adult habitat:** cecum, appendix, colon and rectum.
- **Infective stage:** fully developed ova
- **Mode of infection:** contamination of food and water WITH MATURE OVA.





# Trichuriasis

(*Trichuris trichiura*)





**Life cycle is direct.**

**Reservoir host:** dogs as well as human.

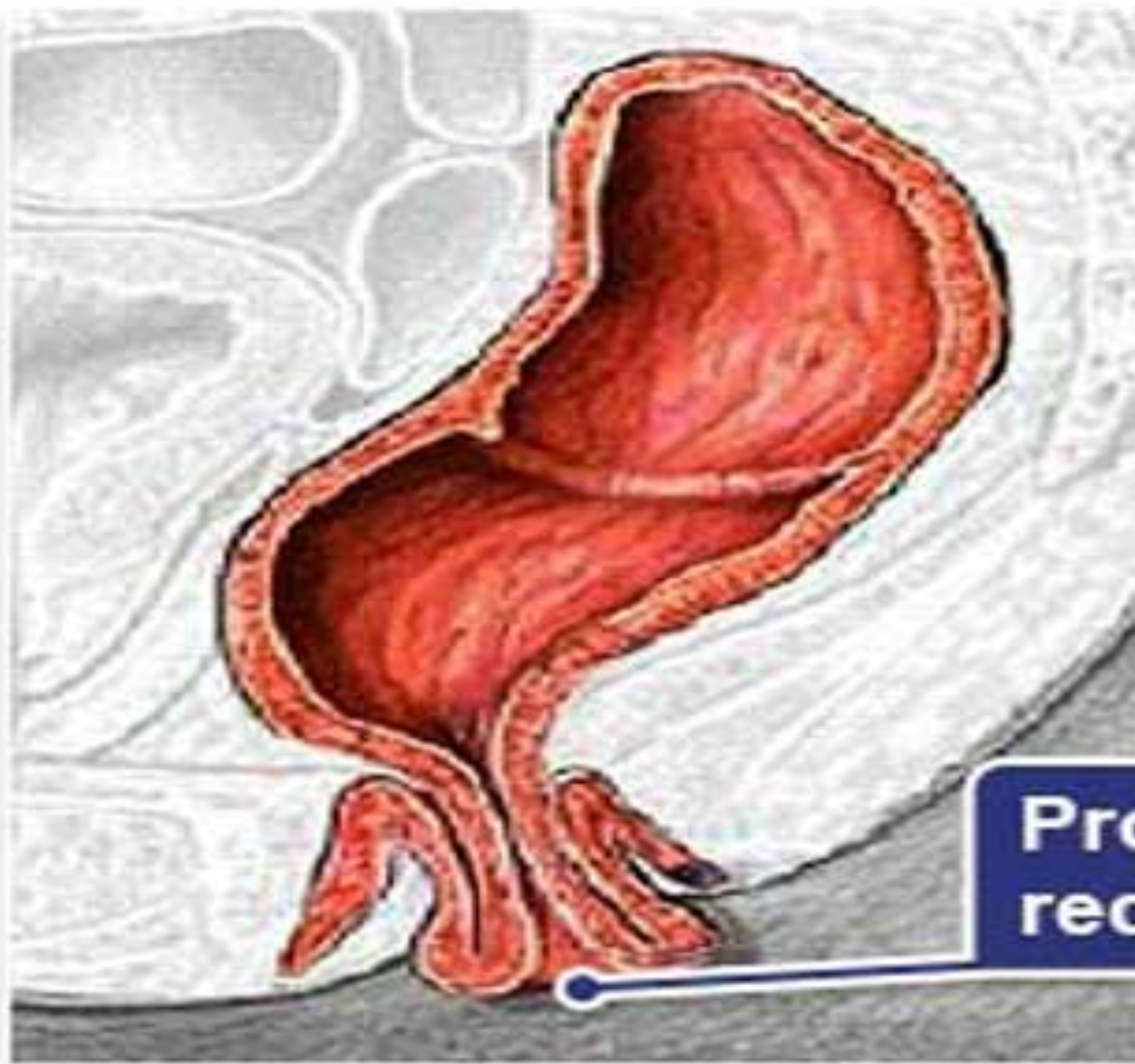
**Symptoms:** Generally asymptomatic, the adult is not blood feeders but bleeding occurs due to attachment, blood loss may lead to iron-deficiency anemia.

- Heavy infestations may have bloody diarrhea.
- Rectal prolapse is possible in severe cases.

**Diagnosis:** by finding ova and adult in the GSE.

- Vitamin A deficiency may also result due to infection.

**Treatment:** The drug of choice for trichuriasis is **mebendazole**  
(90% effective in the first dose)



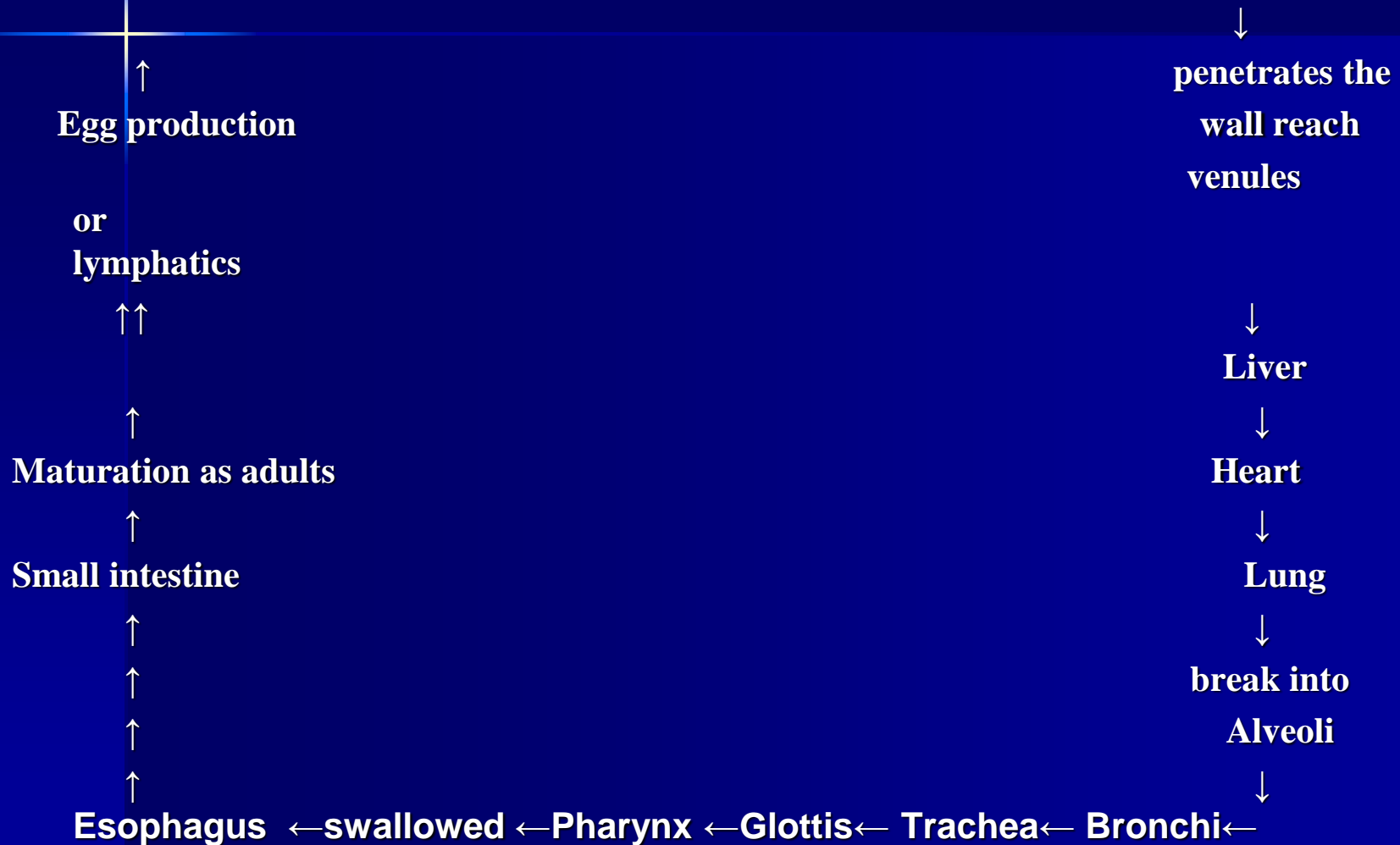
**Prolapsed  
rectum**

# 3-*Ascaris Lumbricoides*

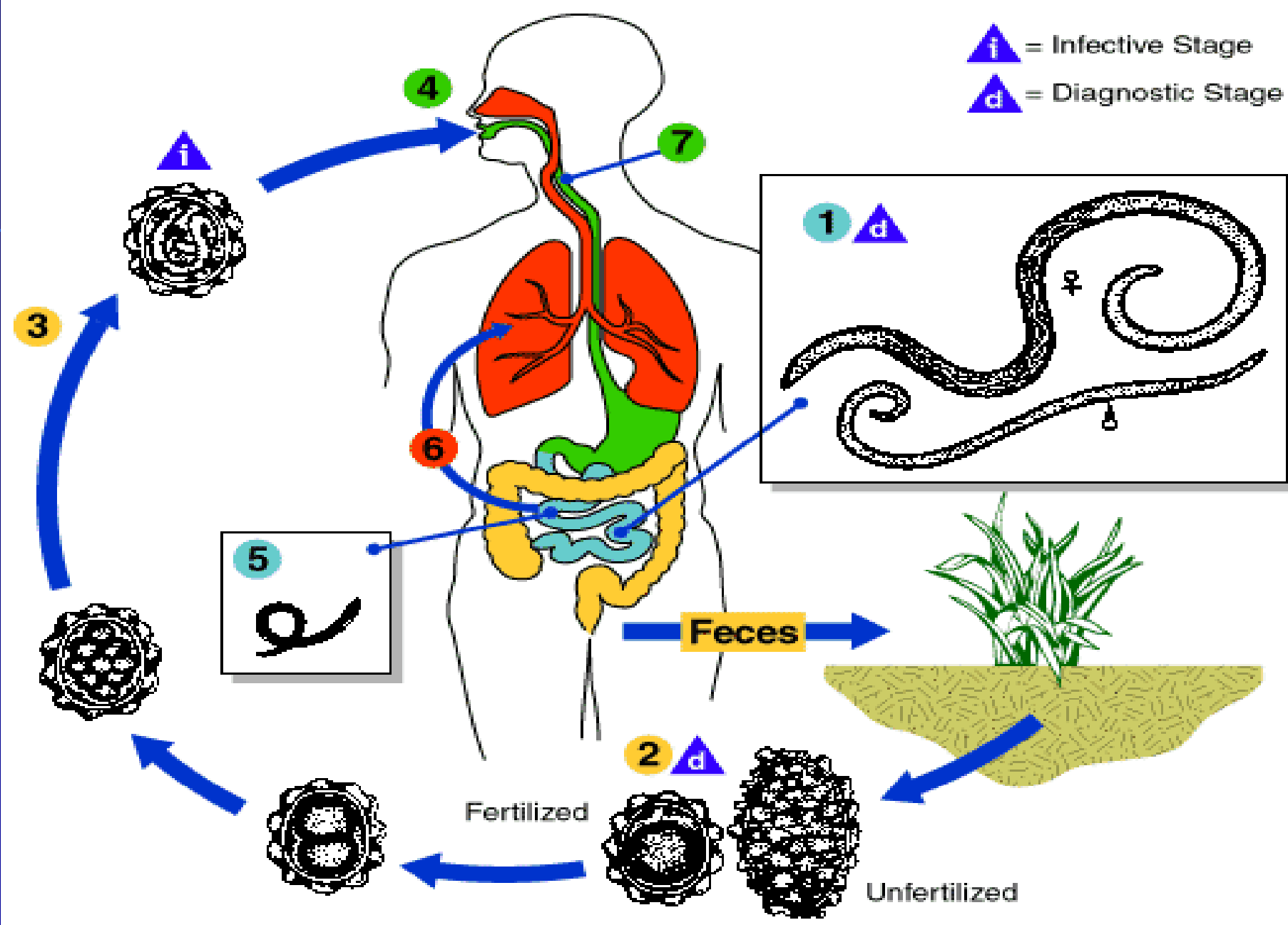
- **Disease:** Giant round worm infection or Ascariasis.
- Adult worms measure approximately up to 30 cm
- Female longer than male.
- Male has curved posterior end to ventral side with two capulatory.
- **Adult habitat:** live s in the lumen of the small intestine.
- **Infective stage:** fully developed fertilized ova.
- Unfertilized eggs may be ingested but are not infective.
- **Mode of infection:** Ingestion of food contaminated with eggs.

# LIFE CYCLE OF ASCARIS

Ova in faeces with 1<sup>st</sup> stage larvae → orally hatching in small intestine → free larvae



 = Infective Stage  
 = Diagnostic Stage





# Life cycle

Is direct with heart lung migration

Adults causes bloating, stomach pains, loss of appetite, nausea, vomiting and bloody stools.

Larvae in the lung may cause inflammation of the lung

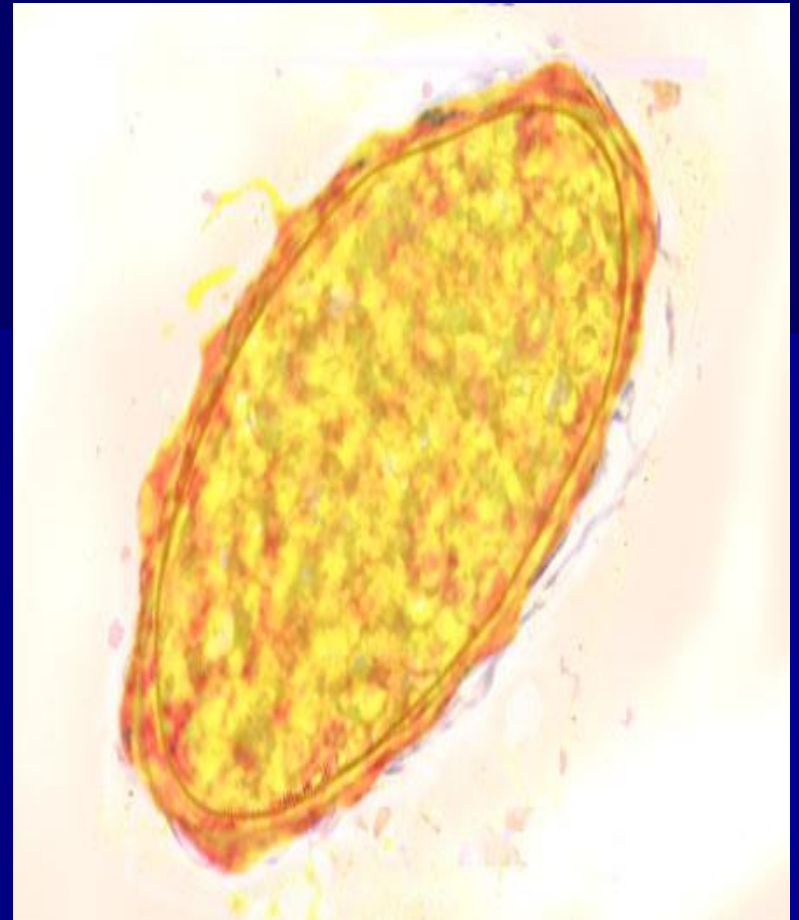
(Loeffler's syndrome) – pneumonia – like symptoms / During lung migration patient shows signs and symptoms similar to asthma or pneumonia.

**Diagnosis:** stool samples for ova.

**Drugs such as Mebendazole, Albendazole** can eliminate these parasitic roundworms out of your body



**Fertilized ova**



**Un-fertilized ova with cortex**

## 4- *Ancylostoma duodenale*

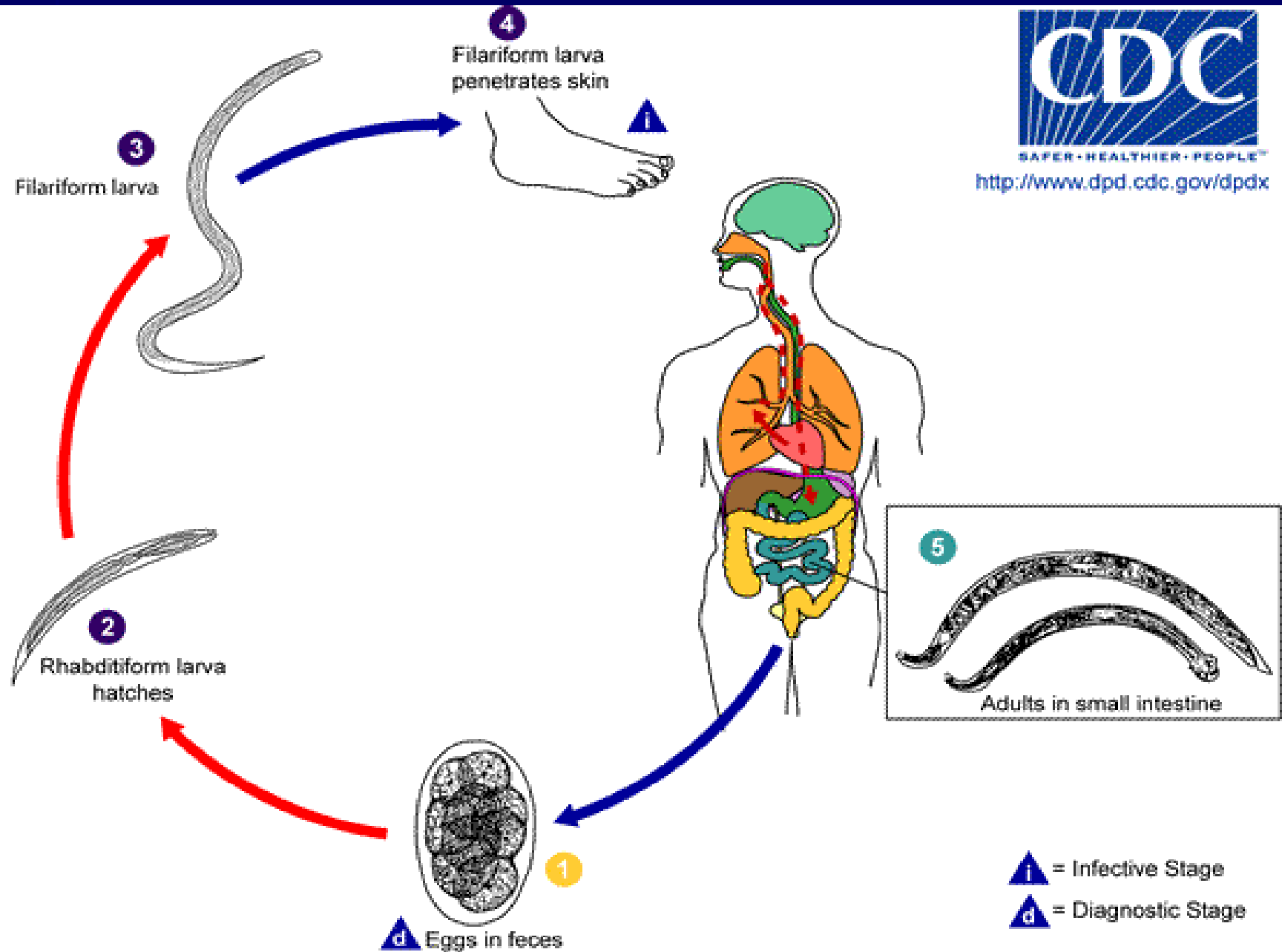
- **Disease:** old world hook worm infection or Ancylostomiasis
- commonly known as Old World hookworm.
- It lives in the small intestine of hosts such as humans, cats and dogs.
- it is dioecious: Males are 8 mm to 11 mm long with a copulatory bursa at the posterior end. Females are 10 mm to 13 mm long, with the **vulva located at the posterior end**; females can lay 10,000 to 30,000 eggs per day.





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# Life cycle

- ☐ Embryonated eggs on soil will hatch into juvenile 1 stage (rhabditiform or non – infective feeding stage) and mature in to filariform larvae.
- ☐ The filariform (infective and feeding larvae can then penetrate the exposed skin of another organism and begin a new cycle of infection.
- ☐ Then a filariform larvae penetrate the skin, the larvae enters the blood circulation.
- ☐ It is then carried to the lung, coughed up, and swallowed back into the small intestine.
- ☐ The larvae later mature into an adult in the small intestine and female worms can lay 25,000 eggs per day.
- ☐ The eggs are released in to the feces and reside on soil.



*Ancylostoma duodenale*: cosmopolitan in distribution.

**Infective stage:** filariform larva

**Mode of infection:** by skin penetration by larva from contaminated soil.

**Route of infection:** skin



## Life cycle: direct.

When a **filariform larva** (infective stage) penetrates the intact **skin**, the larva enters the **blood circulation**. It is then carried to **the lungs**, coughed up, and **swallowed** back into the small intestine.

**Symptoms:** usually vary according to the severity of infection.

Heavy infections may cause a person to become **anemic** due to worms feeding on the host's blood. while **iron deficiency anemia** might result in **mental dullness and heart failure**

Occasionally coughing and upper respiratory tract infections.

**Diagnosis:** by finding ova in fresh stool or rhabditiform larva.

**Prevention:** wearing shoes or not walking with barefoot on dirty soil.

**Treatment:** mebendazole or vermoz.

