



Enterobius vermicularis

(Human pinworm)

The pinworm (species *Enterobius vermicularis*), also known as threadworm (in the United Kingdom and Australia) or seatworm, is a parasitic worm. It is a nematode (roundworm) and a common intestinal parasite or helminth, especially in humans.



➤ Classification:

Kingdom : Animalia

Subkingdom : Eumetazoa

Phylum : Aschelminthes

Class : Nematoda

Order : Oxyurata

Family : Oxyuridae

e.g. : *Enterobius vermicularis*

(formerly *Oxyurias*)

➤ Morphology:

The adult female has a sharply pointed posterior end, is 8 to 13 mm long, and 0.5 mm thick. The adult male is considerably smaller, measuring 2 to 5 mm long and 0.2 mm thick, and has a curved posterior end.



Female adult worm



Male adult worm

➤ **Distribution:**

The pinworm has a worldwide distribution, and is the most common helminth (i.e., parasitic worm) infection in the United States, western Europe, and Oceania.

➤ **Habitat:**

The pinworm lives in the lower part of the small intestine, and the upper part of the colon. Unlike many other intestinal parasites, the pinworm does not usually enter the bloodstream or any other organs besides the intestines. Only in rare cases disoriented pinworms can be found in the vagina, and even more rarely in the uterus, fallopian tubes, liver and peritoneum; but the worms cannot survive long in these places.

➤ Hosts:

The definitive host of *Enterobius vermicularis* is man.

Pinworms are easily transmitted from human to human and are particularly common in children. Luckily the disease, enterobiasis, causes only anal itching.

Enterobius vermicularis does **not** need intermediate host to complete its life cycle.

➤ Infective stage:

- The infective stage is Embryonated eggs.
- The female Enterobius lays eggs that may not pass out with stool but remain attached to perianal region, representing the diagnostic stage containing larva inside. Once it's mature, it turns into embryonated egg forming the infective stage.



➤ **Mode of infection:**

Pinworms are transmitted either directly:

- By hand to the mouth of the same person (Autoinfection) or another person (Retiroinfection).

Or indirectly:

- Through bedding.
- Clothing.
- Food or other articles.
- Overcrowding.

➤ Pathogenicity:

“Enterobiasis”

- Except for itching, Enterobiasis does not cause damage to body organs, but in severe cases it may cause appendicitis.
- It is more common in children, and they may suffer from nervousness irritability and enuresis.
- Also may cause severe fatigue and insomnia.



➤ **Diagnosis:**

- It's often suspected in children with a perianal itch, and is confirmed by the detection of characteristic pinworms' eggs.
- By observing the female worm in the peri-anal region.
- Examination of stool for the presence of eggs or adult pinworms.

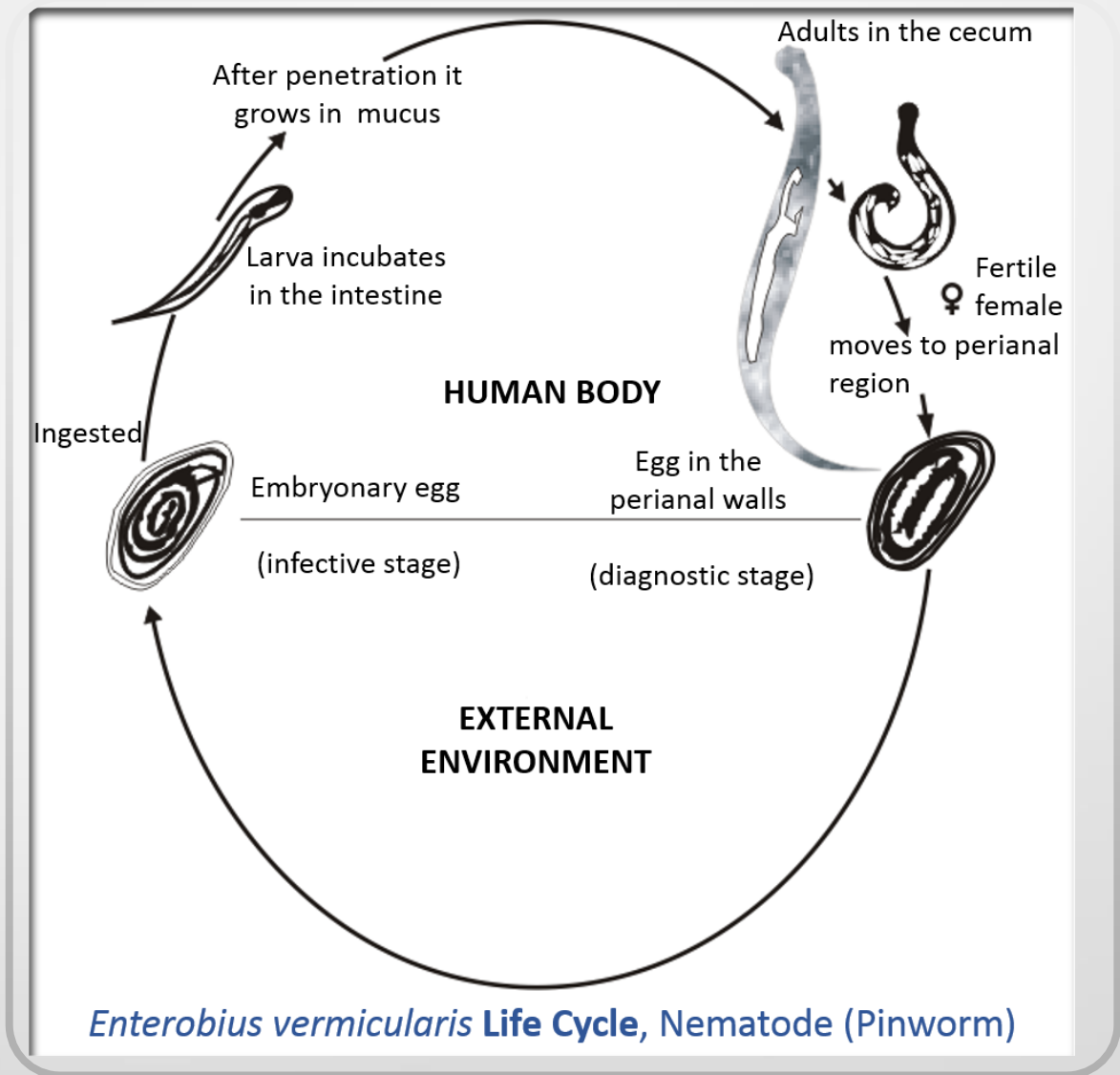


➤ Prevention & Control:

- Mainly it depends on personal prophylaxis to avoid hand-to-mouth infection
- Keeping pets clean, however they can not be infected by *Enterobius* but they may carry eggs in their fur.
- Examination and treatment of cases.

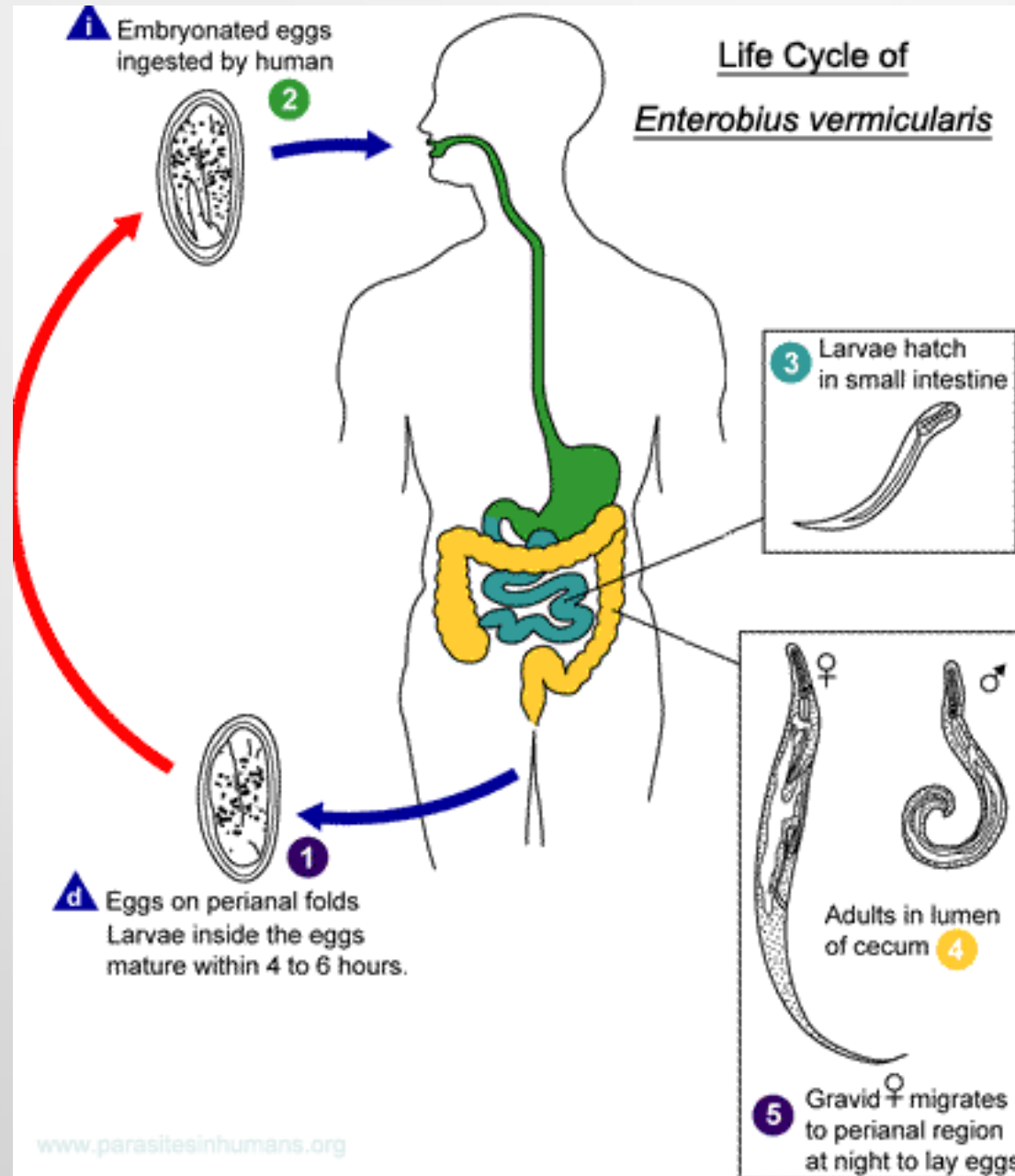
➤ **Life Cycle:**

The entire life cycle, from egg to adult, takes place in the human gastrointestinal tract of a single host, from about 2–4 weeks or about 4–8 weeks.

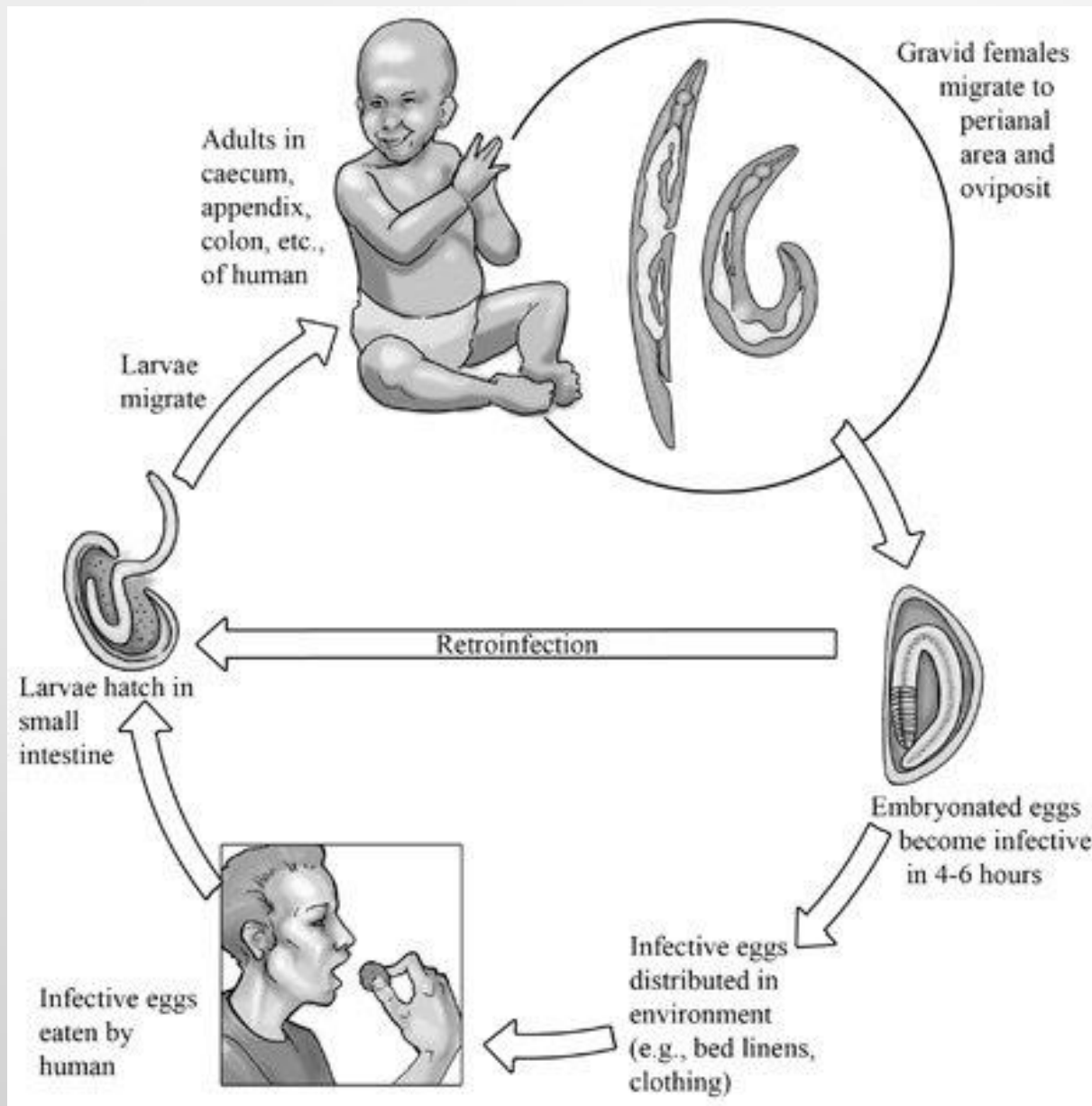


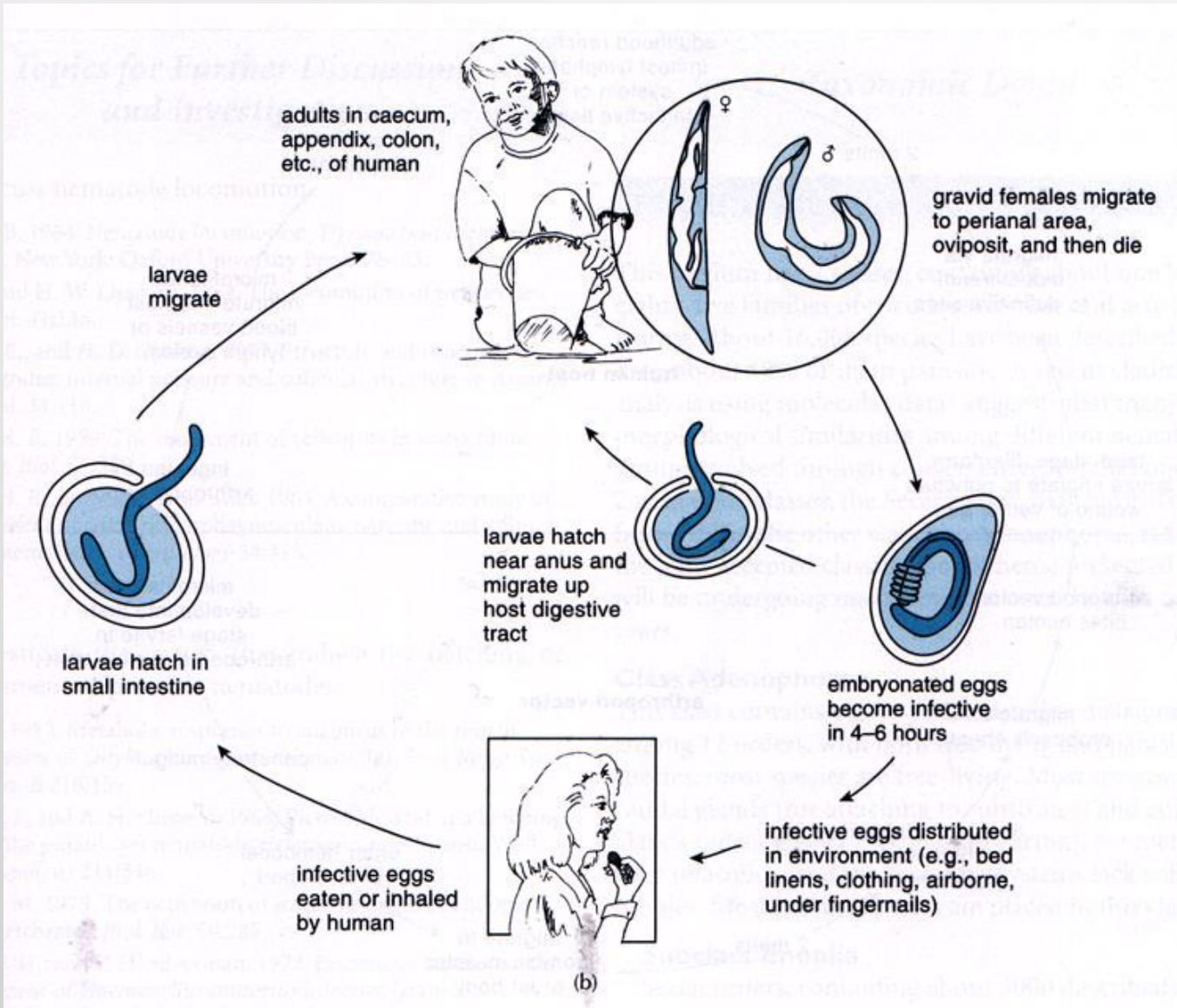
- The life cycle begins with eggs being ingested.
- The eggs hatch in the duodenum (i.e., first part of the small intestine).
- The emerging pinworm larvae grow rapidly and migrate through the small intestine towards the colon.
- During migration they moult twice and become adults, then the male and female pinworms mate in the ileum (i.e., last part of the small intestine).
- The male usually die and the gravid female pinworms settle in the ileum, caecum (i.e., beginning of the large intestine), appendix and ascending colon, where they attach themselves to the mucosa and ingest colonic contents.

Life Cycle of *Enterobius vermicularis*



- Almost the entire body of a gravid female becomes filled with eggs. (range from about 11,000 to 16,000).
- The gravid female pinworms migrate through the colon towards the rectum at a rate of 12 to 14 cm per hour. They emerge from the anus, and while moving on the skin near the anus, the female pinworms deposit eggs either through:
 - 1) contracting and expelling the eggs.
 - 2) dying and then disintegrating.
 - 3) bodily rupture due to the host scratching the worm.





adults in caecum, appendix, colon, etc., of human

gravid females migrate to perianal area, oviposit, and then die

larvae migrate



larvae hatch in small intestine

larvae hatch near anus and migrate up host digestive tract



embryonated eggs become infective in 4-6 hours

infective eggs distributed in environment (e.g., bed linens, clothing, airborne, under fingernails)



infective eggs eaten or inhaled by human

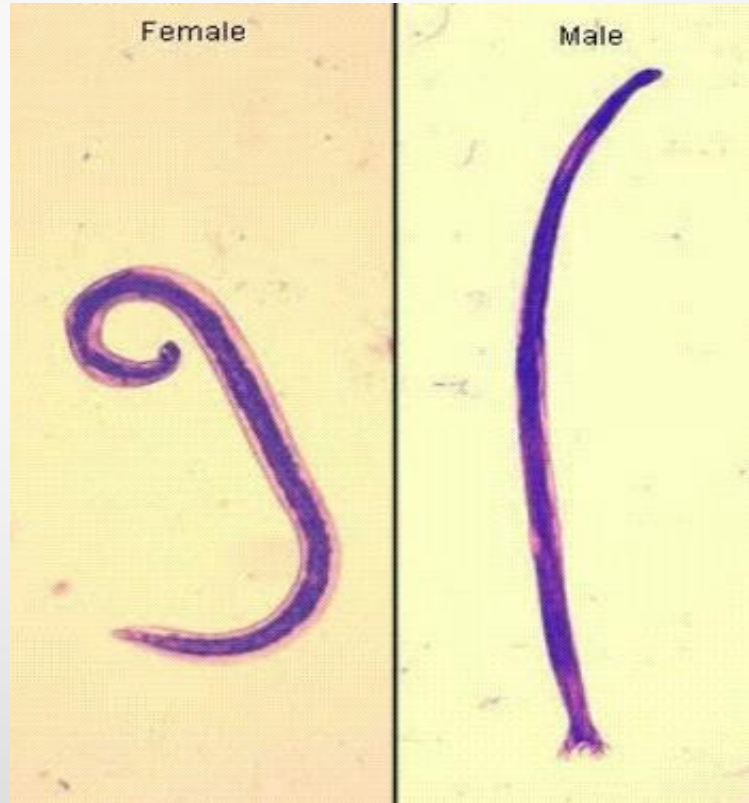
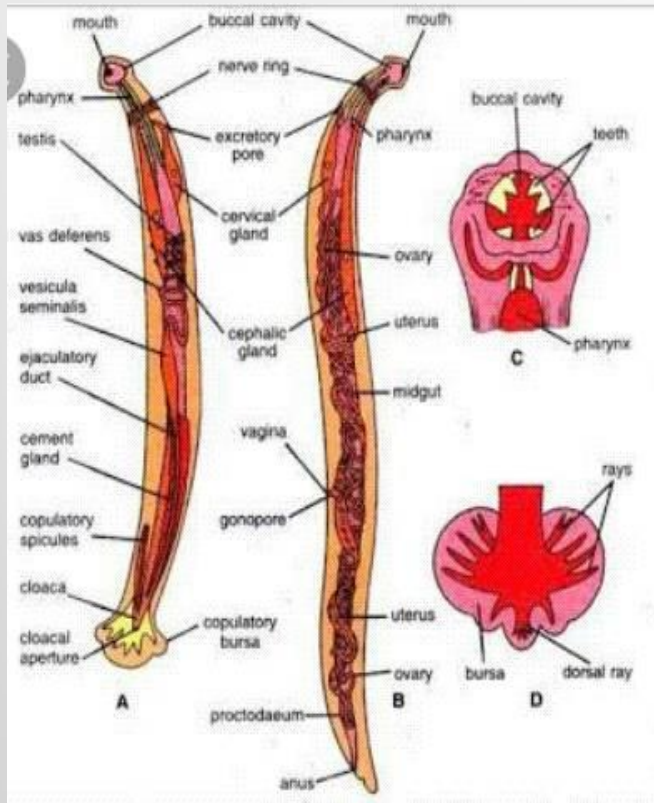
(b)

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Ancylostoma

Ancylostoma belongs to order **Strongylata**

That are Nematodes with simple mouth
,without papillae, and males have two
spicules and a true bursa copulatrix.



1-DISTRIBUTION

-Flourishing in all tropical and subtropical regions.

-It abundant in Egypt, as well as in the mines in the colder countries.

2- definitive host

Man , lives in small intestine



3-intermediate host

No intermediate host



4-infective stage

Filariform larvae

5-MODE OF INFECTION

-By penetration of infective stage (filariform larvae) to the skin of man.

6-PATHOGENESIS

1-Anemia

2-Ulcers

3-Colic

4-Loss of weight

5-Abdominal discomfort

7-DIAGNOSIS

Examination of stool of patients reveal the 4-blastomere stage eggs.

8-PROTECTION

1-Treatment of patients

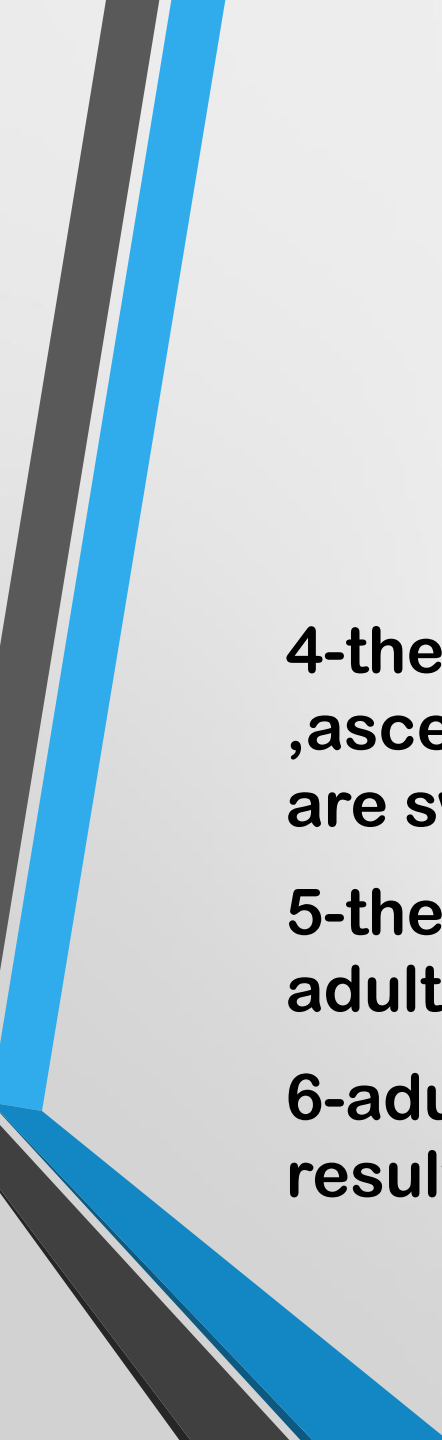
2-Not walk barefoot in contaminated soil

3-Avoid skin contact with soil

4-Examination and treatment of food and drinks handlers

LIFE CYCLE

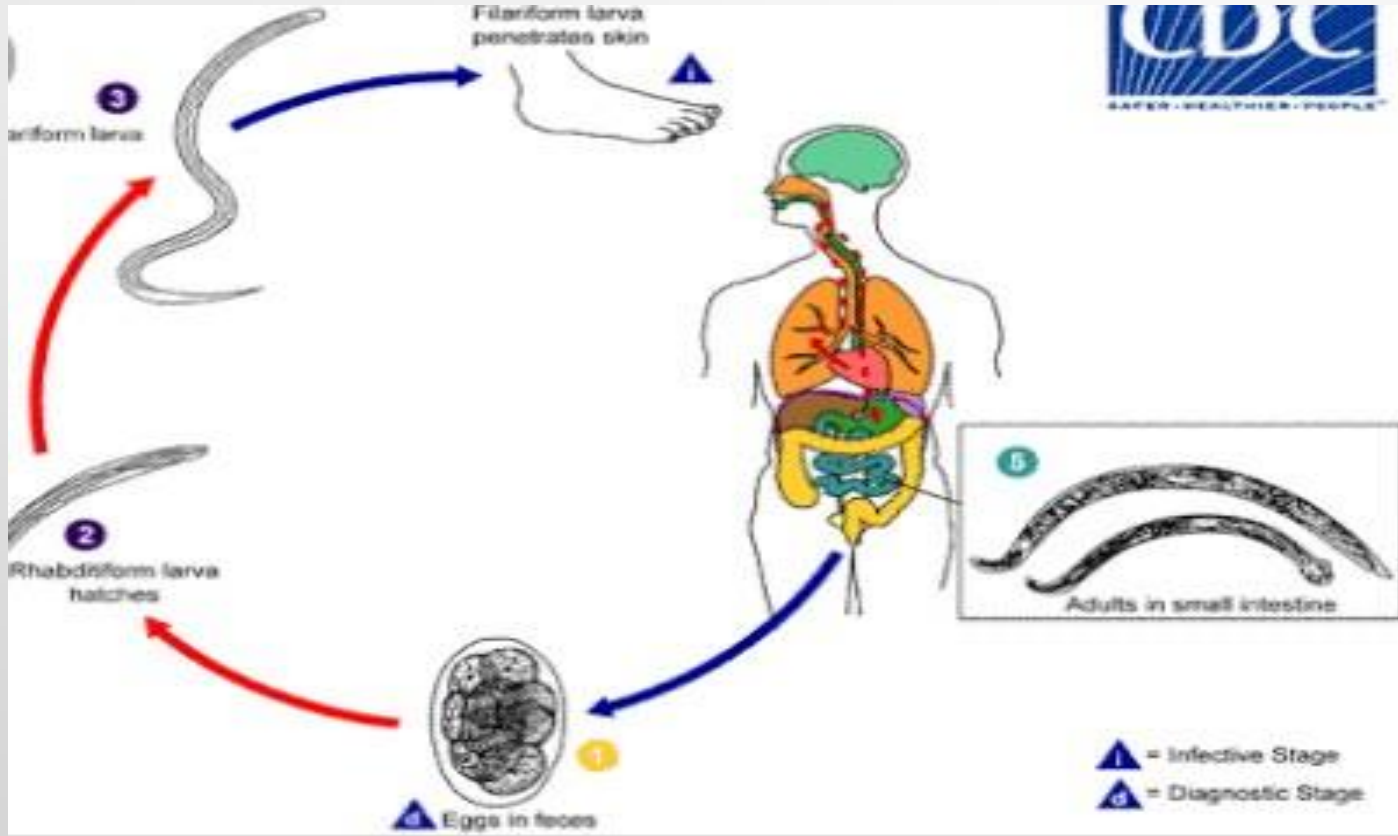
- 1- Eggs are passed in stool, and under the favorable conditions ,larvae hatch in 1 to 2 days and release *Rhabditiform* larvae ,grow in feces or in soil.
- 2- After 5 to 10 days they become *Filariform* larvae (third-stage) larvae that are infective.
- 3- On contact with human , penetrate the skin and carried to the heart then to lungs.



4-they penetrate into the pulmonary alveoli ,ascend the bronchial tree to the pharynx, and are swallowed.

5-then reach to small intestine, and converted to adults.

6-adult worms attach to intestinal wall with resultant blood loss by the host.



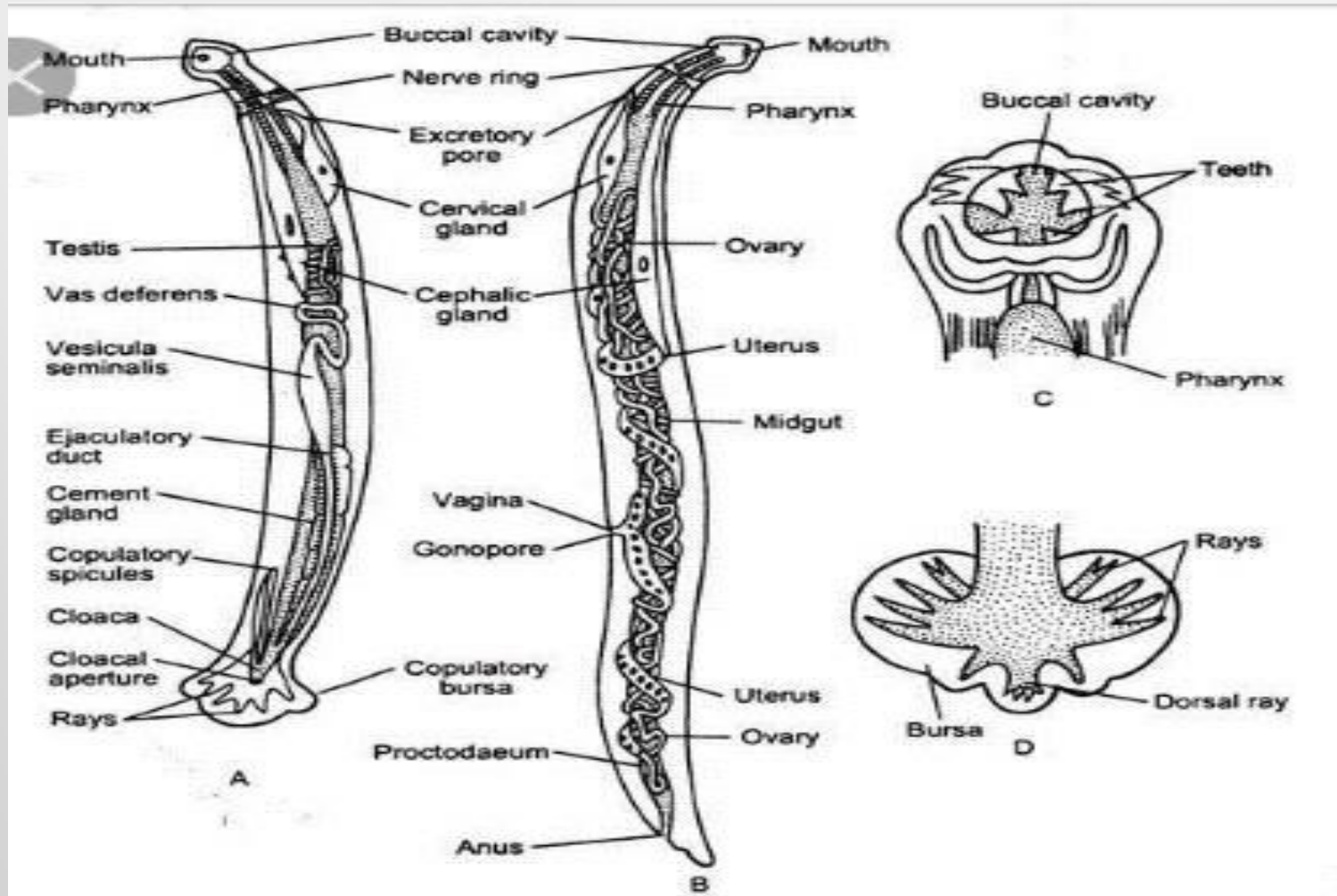
DIGESTIVE CANAL

1- start with mouth

2- the modaeum consists of a wide buccal cavity and along oesophagus.

3-A long midgut follows, then a short hindgut which open by the anus –in female- or in cloaca –in male-.

4-Has two cephalic glands open in buccal cavity ,their secretion prevents coagulation of the host blood.



Excretory system

Consists of:

- Two longitudinal excretory canals which run along the two lateral lines and join anteriorly by a transverse canal.**
- Two cervical glands join the transverse canal.**

Reproductive system

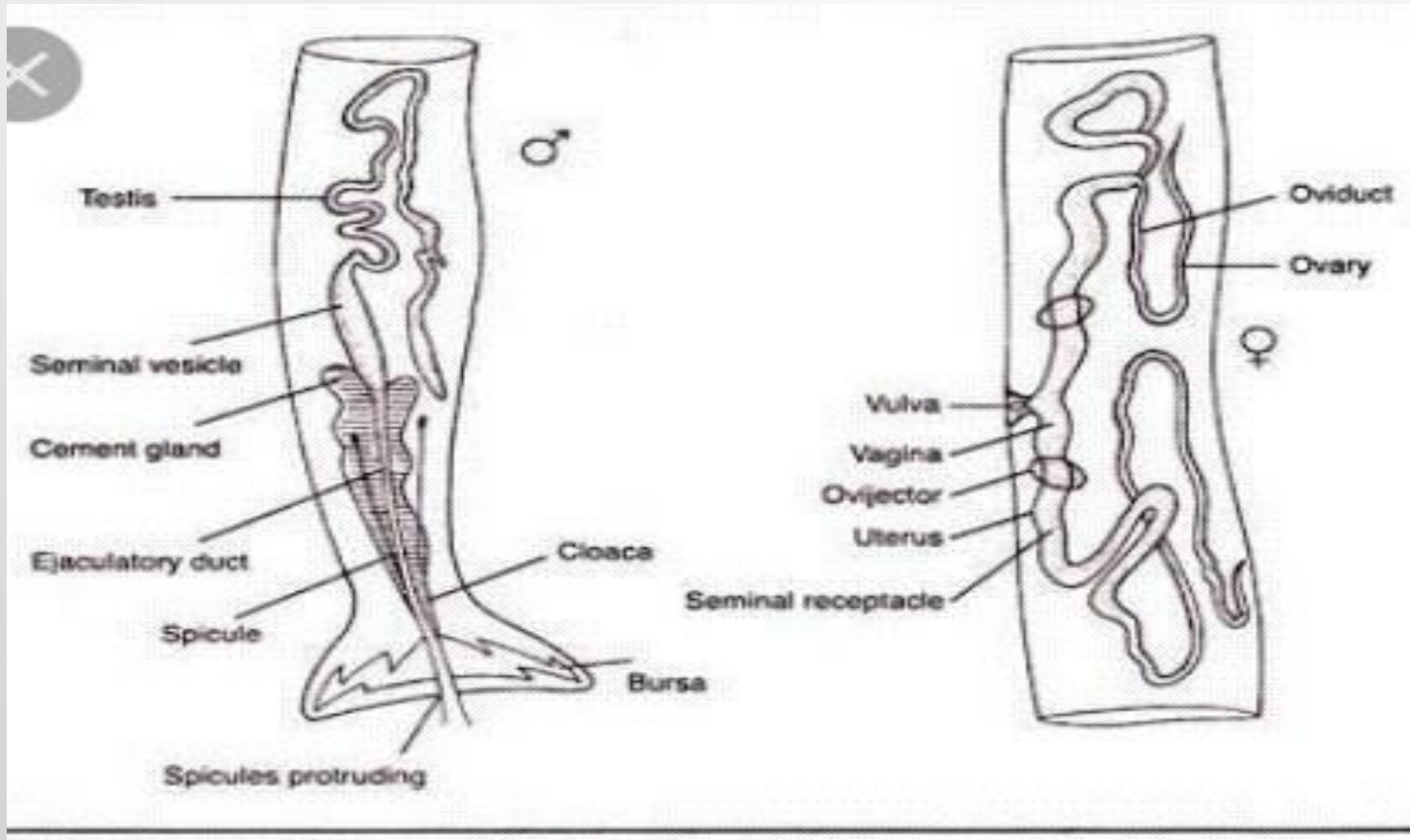
1- In male

-consists of single tubular coiled testis which leads by vas deferens into vesicula seminalis followed by long ejaculatory duct which surrounded by large cement gland ,and joins the hindgut which together open in the cloaca.

-Has copulatory spicules and copulatory bursa.

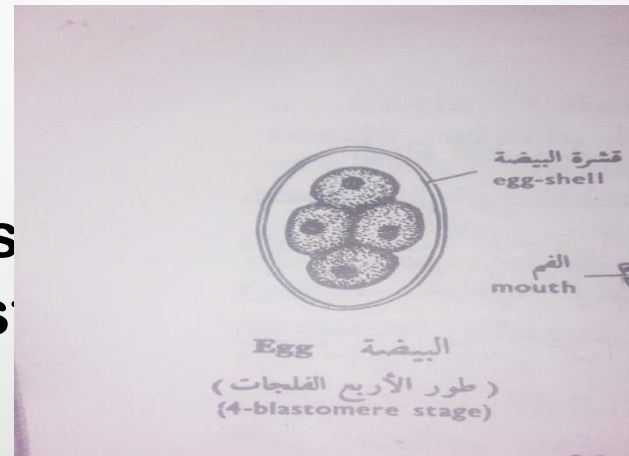
2- In female

-consists of two thread-like coiled ovaries which lead by two oviducts into two dilated uteri which join to vagina that open by genital opening on ventral surface ,at the beginning of the posterior third of the body.



The egg

-Oval and has a thin trans
contain embryo in 4-blas

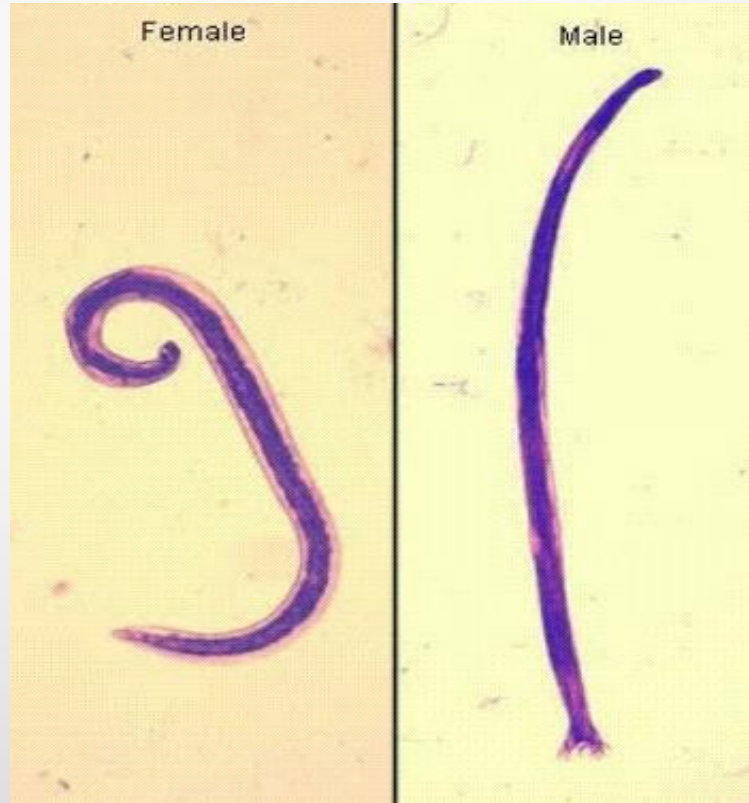
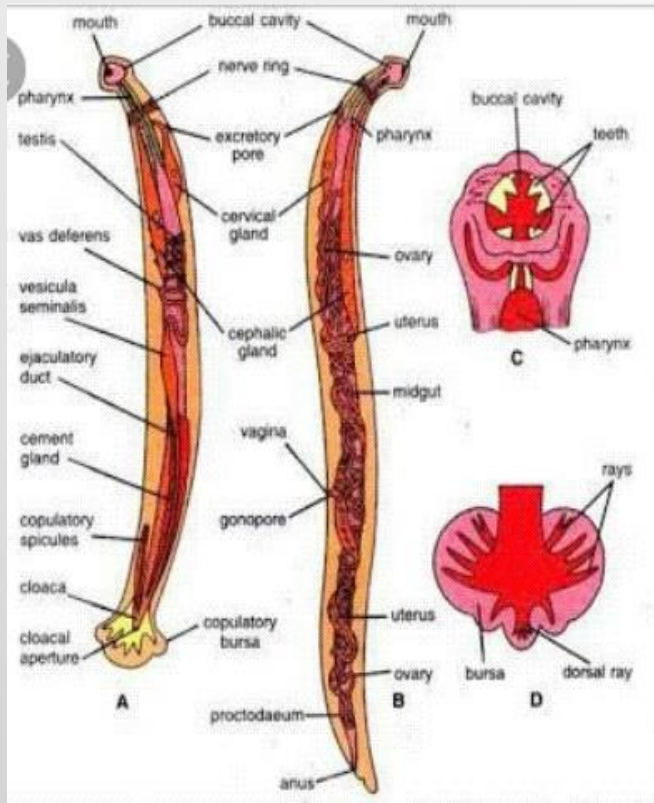


بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Ancylostoma

Ancylostoma belongs to order **Strongylata**

That are Nematodes with simple mouth
,without papillae, and males have two
spicules and a true bursa copulatrix.



1-DISTRIBUTION

-Flourishing in all tropical and subtropical regions.

-It abundant in Egypt, as well as in the mines in the colder countries.

2- definitive host

Man , lives in small intestine



3-intermediate host

No intermediate host



4-infective stage

Filariform larvae

5-MODE OF INFECTION

-By penetration of infective stage (filariform larvae) to the skin of man.

6-PATHOGENESIS

1-Anemia

2-Ulcers

3-Colic

4-Loss of weight

5-Abdominal discomfort

7-DIAGNOSIS

Examination of stool of patients reveal the 4-blastomere stage eggs.

8-PROTECTION

1-Treatment of patients

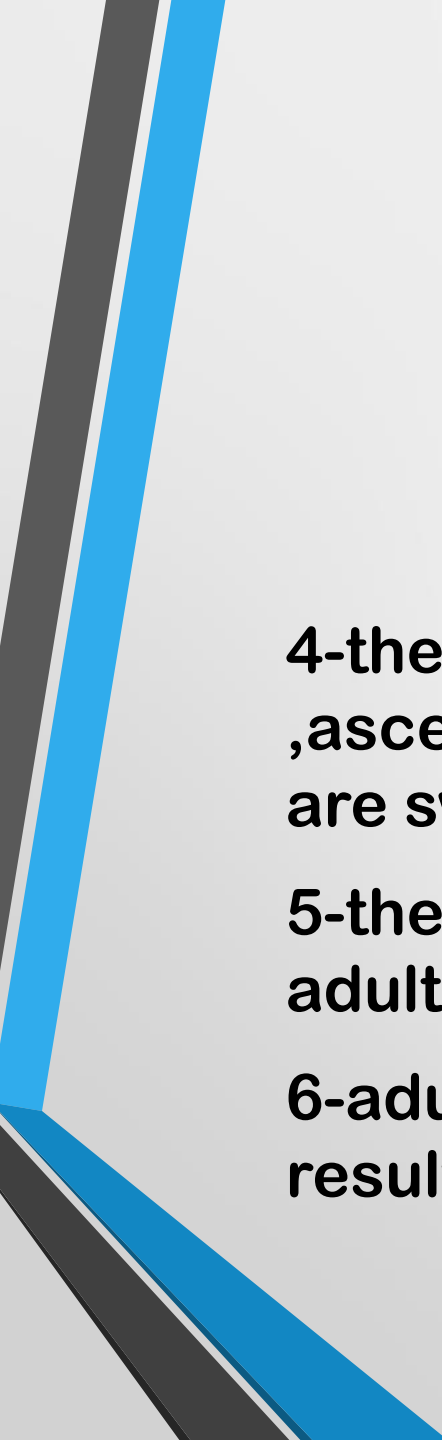
2-Not walk barefoot in contaminated soil

3-Avoid skin contact with soil

4-Examination and treatment of food and drinks handlers

LIFE CYCLE

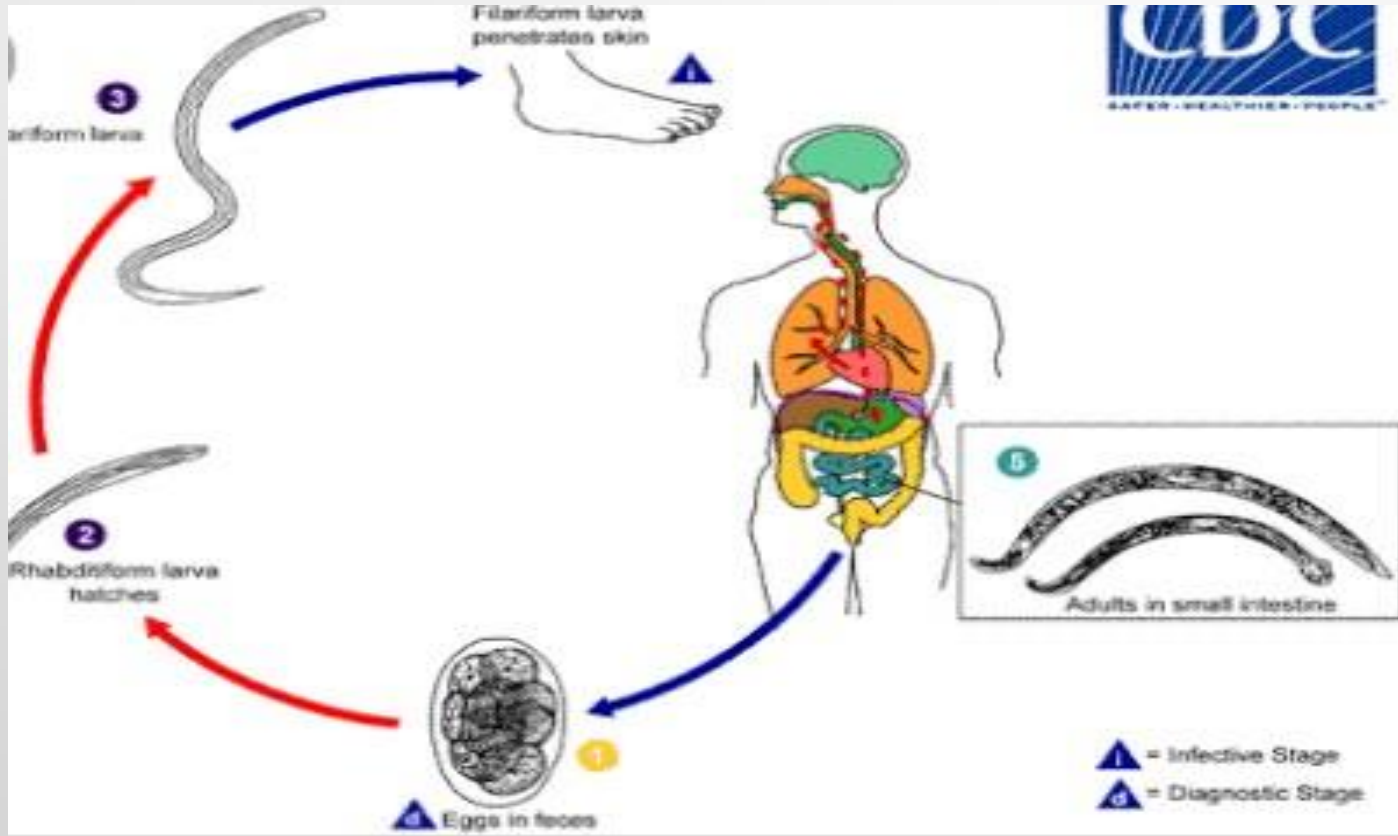
- 1- Eggs are passed in stool, and under the favorable conditions ,larvae hatch in 1 to 2 days and release *Rhabditiform* larvae ,grow in feces or in soil.
- 2- After 5 to 10 days they become *Filariform* larvae (third-stage) larvae that are infective.
- 3- On contact with human , penetrate the skin and carried to the heart then to lungs.



4-they penetrate into the pulmonary alveoli ,ascend the bronchial tree to the pharynx, and are swallowed.

5-then reach to small intestine, and converted to adults.

6-adult worms attach to intestinal wall with resultant blood loss by the host.



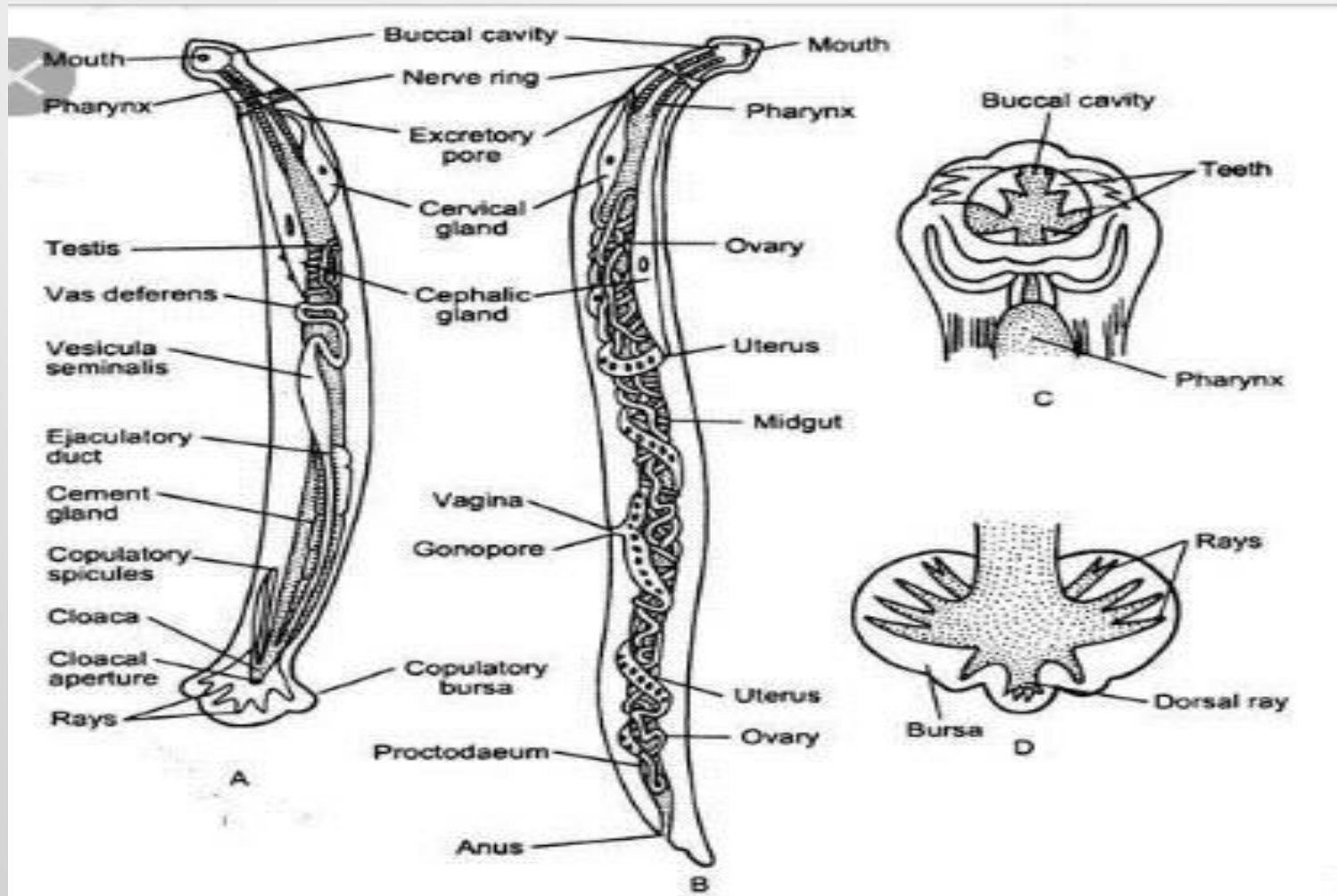
DIGESTIVE CANAL

1- start with mouth

2- the modaeum consists of a wide buccal cavity and along oesophagus.

3-A long midgut follows, then a short hindgut which open by the anus –in female- or in cloaca –in male-.

4-Has two cephalic glands open in buccal cavity ,their secretion prevents coagulation of the host blood.



Excretory system

Consists of:

- Two longitudinal excretory canals which run along the two lateral lines and join anteriorly by a transverse canal.**
- Two cervical glands join the transverse canal.**

Reproductive system

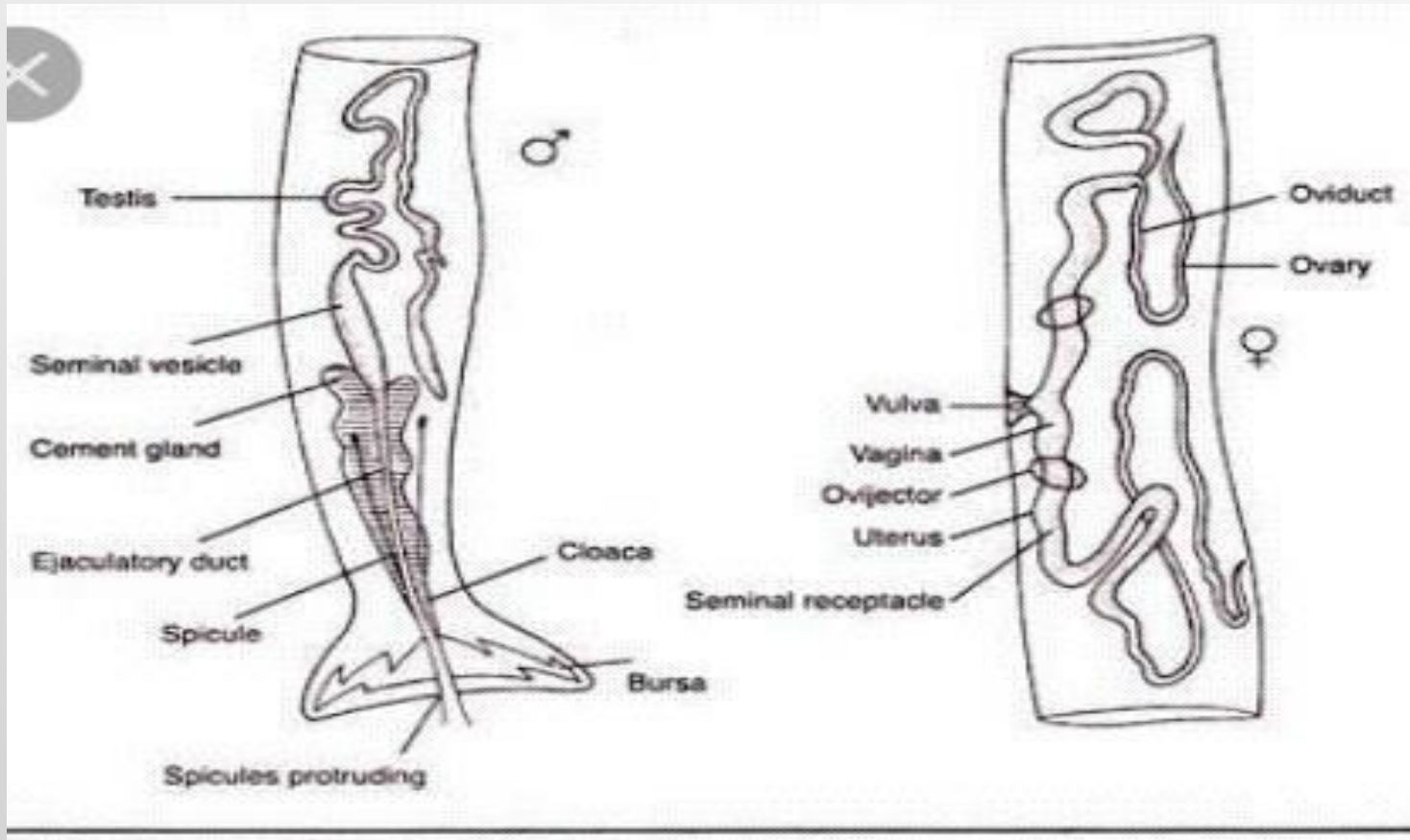
1- In male

-consists of single tubular coiled testis which leads by vas deferens into vesicula seminalis followed by long ejaculatory duct which surrounded by large cement gland ,and joins the hindgut which together open in the cloaca.

-Has copulatory spicules and copulatory bursa.

2- In female

-consists of two thread-like coiled ovaries which lead by two oviducts into two dilated uteri which join to vagina that open by genital opening on ventral surface ,at the beginning of the posterior third of the body.



The egg

-Oval and has a thin trans
contain embryo in 4-blas

