

Phylum: nemathelminthes

Class: nematoda

Subclass: aphasmidia

✗ Order: Trichurida

1-Family: Trichinellidae

✗ *Trichinella spiralis*

✗ Disease : trichinosis or trichinellosis

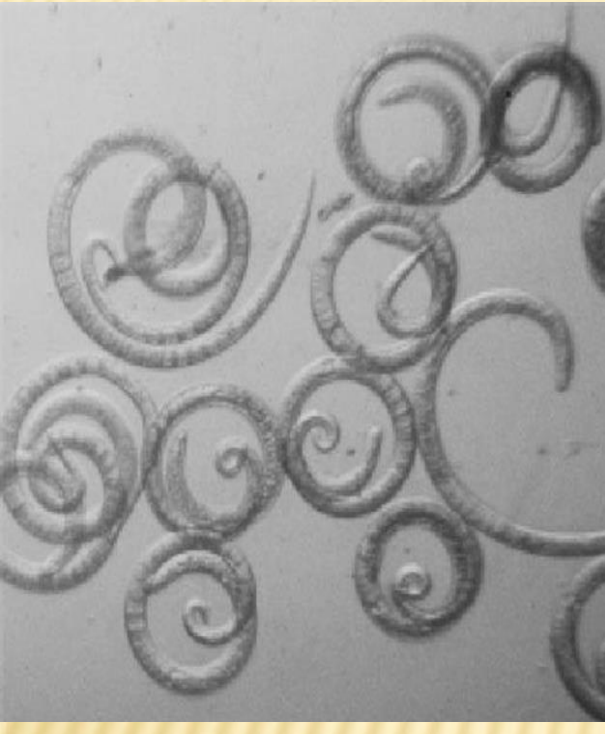
Morphology:

1. Adults are tiny worms, whitish and thread like.
2. They have a stichosome, a row of glandular cells forming apposition of esophagus.
3. Male worms are less than 2 mm, while females may reach a length of 5 mm.
4. Both adult worms are wider posteriorly than anteriorly
5. The male has a pair of lobed structures (apseudo bursa) at posterior tip, spicules are lacking.
6. Female is larvipositor, eggs immediately developed into larva in the uterus, each female produces 1500 larva passed in stool.

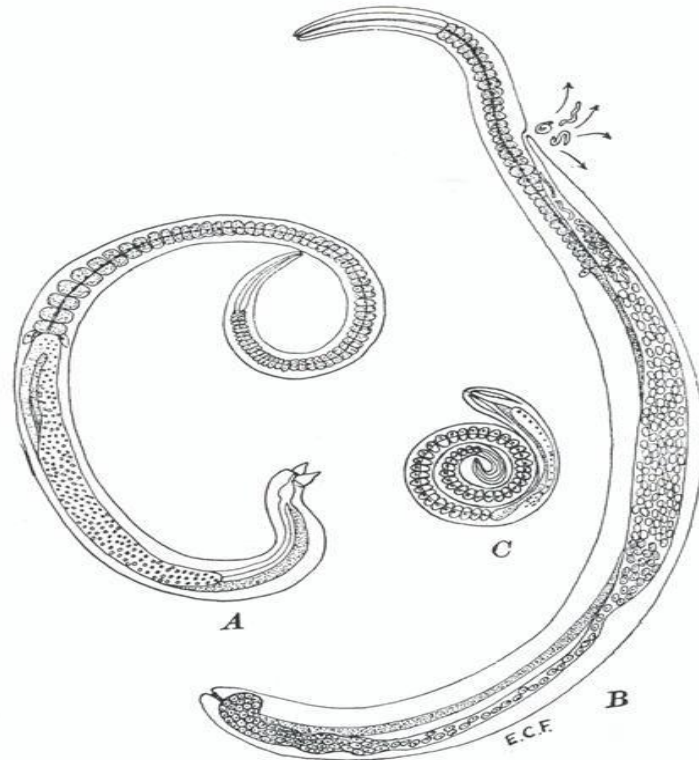
Trichinella spiralis

Morphology:

Anterior end: slender with small **non papilated mouth**.



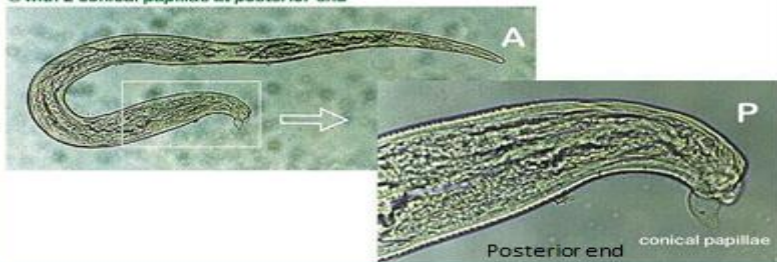
Males



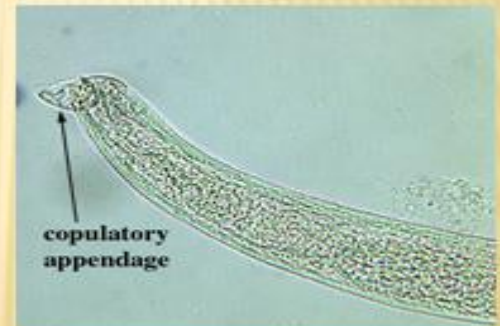
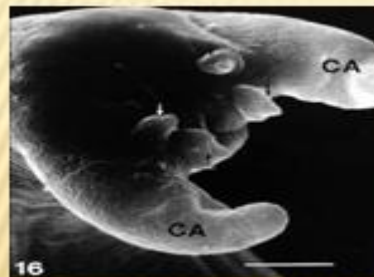
Female:

Male Adult of *Trichinella spiralis*

- ① 1.2 - 1.5 mm
- ② without spicule
- ③ with 2 conical papillae at posterior end



Male of *Trichinella spiralis*



LARVAE

Encyst-larvae of *Trichinella spiralis*

⊙ 0.5 - 0.25 mm

⊙ In host striated muscle

⊙ May be calcification after 18 months or more



Larvae in
← muscle press

T. spiralis

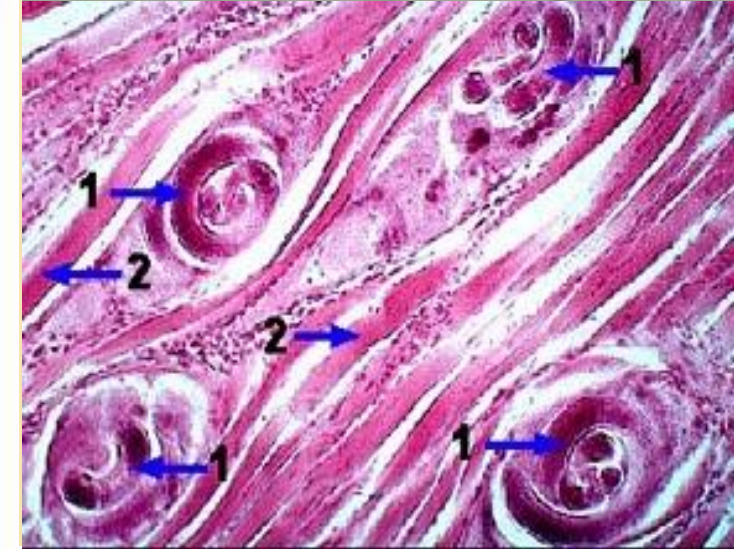
Larvae in
muscle
section →



Trichinella spiralis larva in a squash preparation of the infected muscle. The globular structures at the termini and are remnants of degenerated muscle transverse contract. (K&B Stained by 201)



Trichinella spiralis Larva free in gastric juice × 175

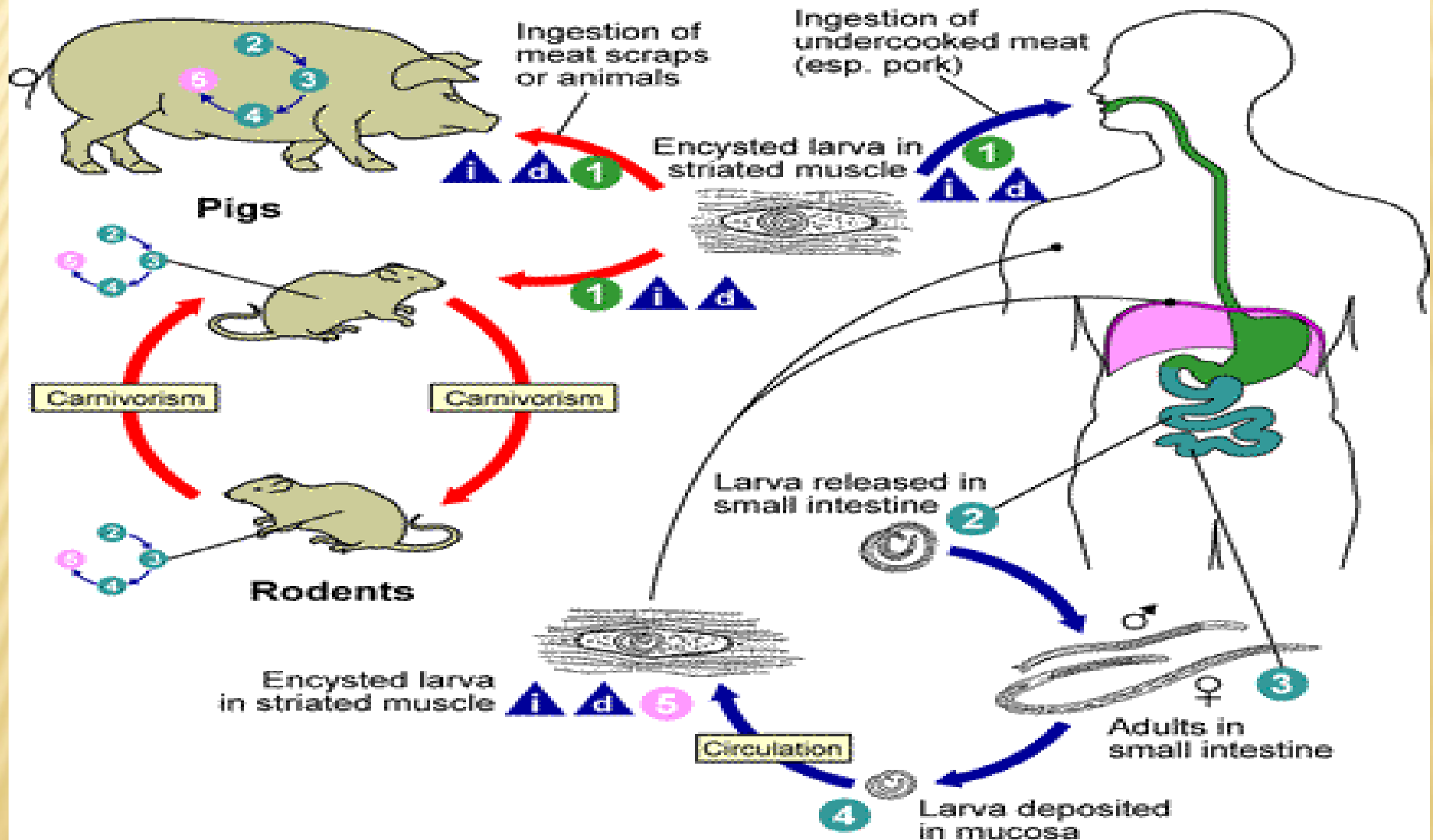


larvae of *Trichinella spiralis*

i = Infective Stage
d = Diagnostic Stage



<http://www.dpd.cdc.gov/dpdx>



It is passed in one host (man, pig or rat).

- Man infection, After ingesting infected meat the capsule of encysted larva is digested, Larva released in duodenum, and molt 4 times to become adult worms, mating, male worm dies and female burrow into tissue of intestine and larvipost.
- Larva penetrate the intestinal wall and migrate through lymphatic vessels to blood stream, survive in skeletal muscles.
- With 1 months larva reach their fully size (1 mm long), encysted trichinae, may remain viable and infective for many years.

Lab diagnosis:

- Serological test: ELISA
- Biopsy of skeletal muscle (demonstrate the presence of larva)
- Detection of larva in blood and CSF
- Increased levels of muscle enzymes: Lactate dehydrogenase, aldolase and creatine phosphokinase, this is due to muscle invasion by the larva.

1--Penetration of the adult females into mucosa. The first symptoms appear between **1- 2 days** after ingestion.

The worms migrating in the **intestinal epithelium**

Inflammation of duodenal and jejunal mucosa:

This causes: **inflammation, nausea, vomiting,**

- × **sweating, and diarrhea**

- × **2- The migrating larvae**

Ten days after infection the larvae will penetrate the muscle fibers, **carried to all parts of body**, This causes

- × muscular pain,

- × difficulty breathing

- × **Per orbital edema and** conjunctivitis

- × heart (myocarditis),

- × lungs (pneumonitis),

- × brain (encephalitis).

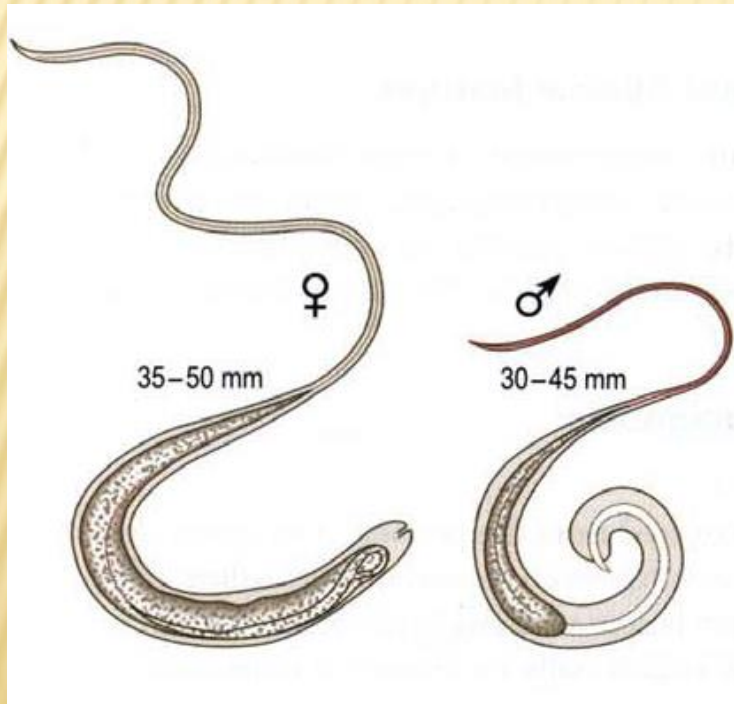
- + **Can be fatal if large numbers of cysts form failure or respiratory or kidney malfunction**



ORDER: Trichurida

FAMILY: Trichuridae

Trichuris trichiura
Whip worm

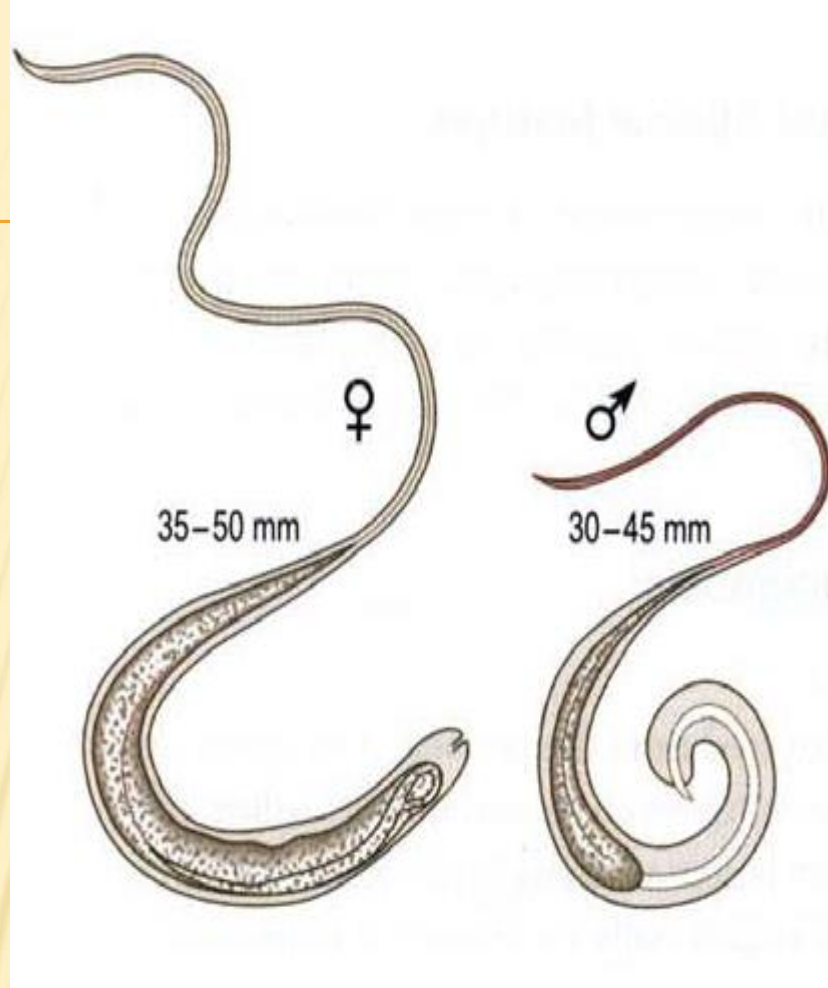


✖ Morphology

- ✖ 1- *Trichuris trichiura* has a narrow anterior esophageal end (lash) and thicker posterior anus (stock).
- ✖ 2- These pinkish white worms are threaded through the mucosa.
- ✖ 3- They attach to the host through their slender anterior end and feed on tissue secretions instead of blood.
- ✖ 4- the adult worms are 3-5 cm long, females are larger than males.
- ✖ The females have a bluntly round posterior end compared to their male counterparts with a coiled posterior end and a single spicule.
- ✖ 5- Their characteristic eggs are barrel-shaped and brown, and have bipolar plugs at either ends, surrounded by double shell, contain unsegmented ovum when freshly passed.

Adult female

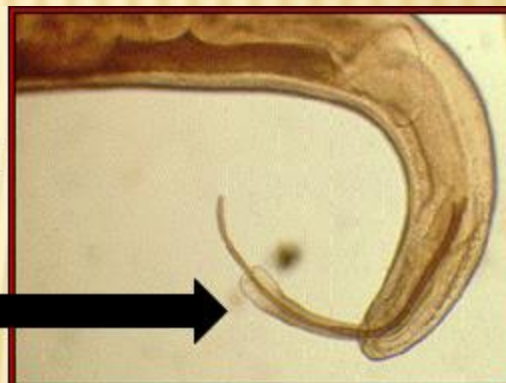
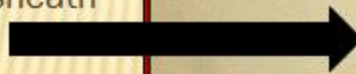
- Longer than the male.
- posterior end is thick and linear,



Adult male

- Shorter than the female.
- posterior end curved and
- has a single spicule enveloped with sheath.

posterior end curved and
has a single spicule
enveloped with sheath



Eggs:

Shape: barrel-shaped



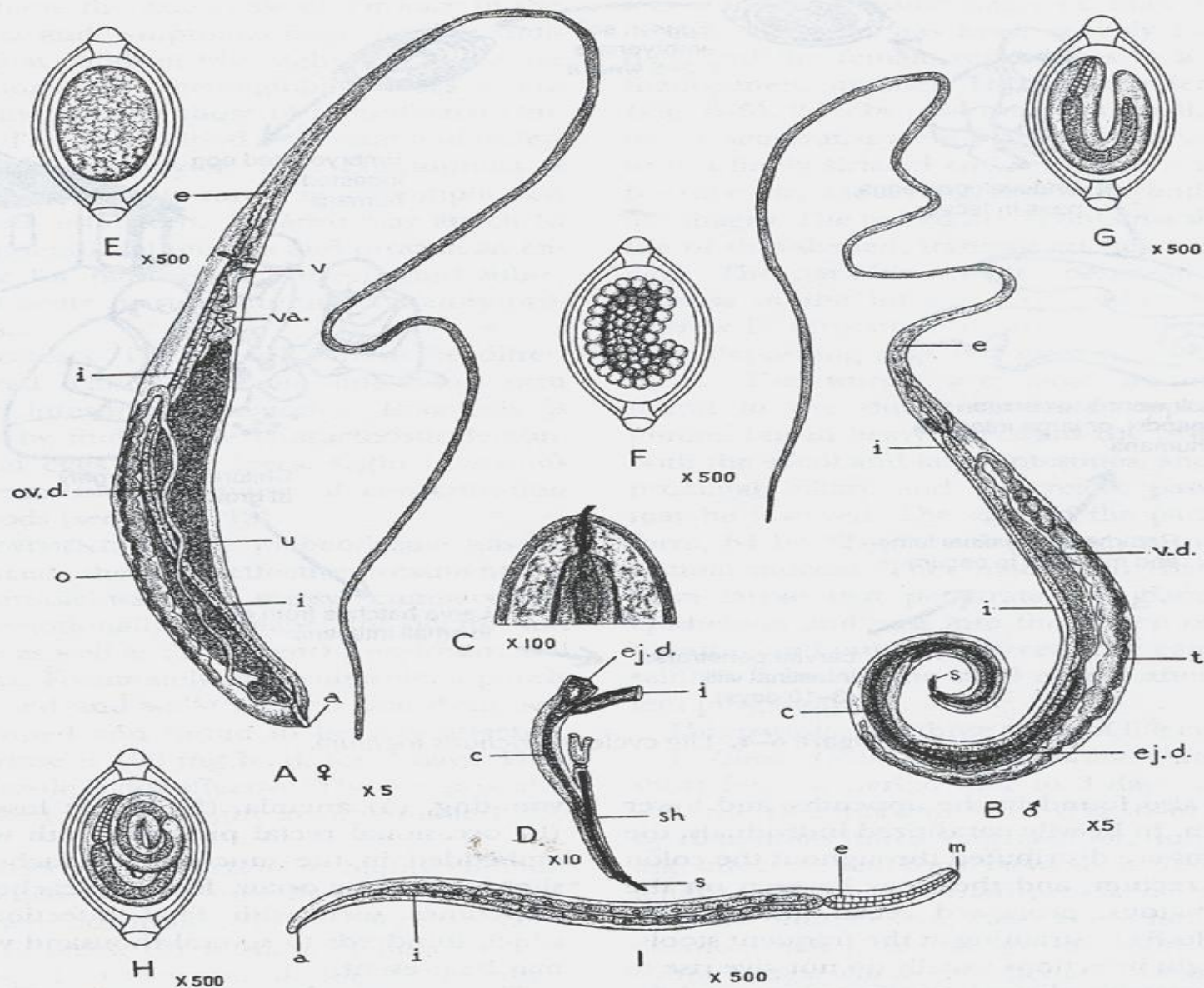


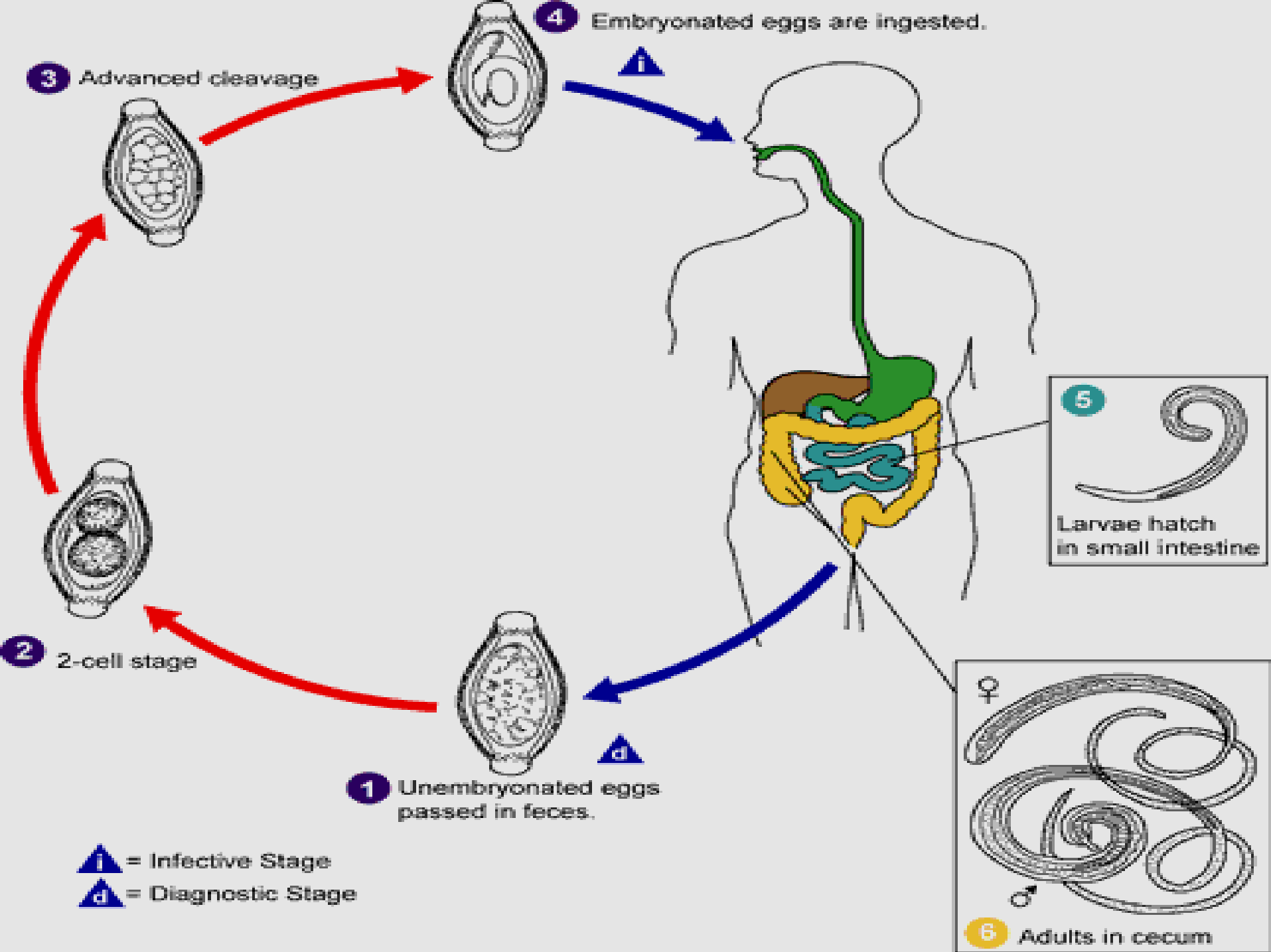
Figure 6-3. *Trichuris trichiura*. **A.** Female. **B.** Male. **C.** Anterior end showing spear. **D.** Cloaca and copulatory organs of male. **E.** Unicellular stage of egg. **F.** Multicellular stage of egg. **G.** Early larva in egg shell. **H.** Mature larva in egg shell. **I.** Newly hatched larva. (A, B, D-I adapted from Leuckart, 1876. C. drawn from photograph by Li, 1933.) a=anus; c=cloaca; e=esophagus; ej.d.=ejaculatory duct; i=intestine; m=mouth; o=ovary; ov.d.=oviduct; s=spicule; sh=sheath of spicule; t=testis; u=uterus; v=vulva; va.=vagina; v.d.=vas deferens.

✖ Life cycle

- ✖ The unembryonated eggs are passed with the stool . In the soil, the eggs develop into a 2-cell stage , an advanced cleavage stage , and then they embryonate ; eggs become infective in 15 to 30 days. After ingestion (soil-contaminated hands or food), the eggs hatch in the small intestine, and release larvae that mature and establish themselves as adults in the colon . The adult worms live in the cecum and ascending colon. The adult worms are fixed in that location, with the anterior portions threaded into the mucosa. The females begin to oviposit 60 to 70 days after infection. Female worms in the cecum shed between 3,000 and 20,000 eggs per day. The life span of the adults is about 1 year.

✖ Diagnosis:-Stool examination:

- ✖ demonstration of adult worm, eggs are easily identifiable by direct smear, because eggs may be difficult to find in light infections, a concentration procedure is recommended.
- ✖ -Blood picture: show eosinophilia up to 25% in early stage of the disease.
- ✖ -Sigmoidoscopy: heavy infections, may show white bodies of the worm
- ✖ - Visual detection of adult worms on prolapsed rectum






PROLAPSED RECTUM



Trichuris trichiura Whipworm

Infectious Agent: nematode	Diagnosis: eggs in stool
Reservoir: Humans	
Transmitted: Ingestion of eggs	
Infection usually asymptomatic	
– May have abdominal pain, diarrhea, flatulence and rectal prolapse in some	



Rectal prolapse

Subclass: Phasmodia
Family: Strongyloididae

Order: Rhabditida
Ex: *Strongyloides stercoralis*

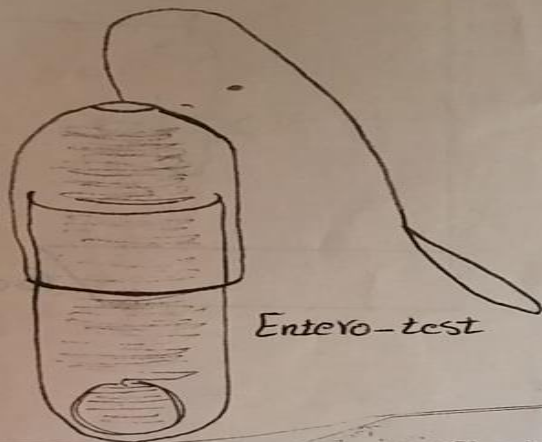
Morphology:

- Females live embedded in mucosa of small intestine majority of them are parthenogenetic.
 - Males, if indeed they exist, are eliminated from the body
 - Females are (2 mm length), while males are shorter and broader .
 - Eggs: (55 to 60 by 30 to 35 μ m), oval transparent thin shelled contain embryonated when discharged in mucosa, usually hatch to larva before leaving the host
 - Larva: 2 types
1. Rhabditiform: are developed directly from gravid females are found in lumen of the bowel, then development could be as follows:
 - a- While in lumen of bowel they metamorphose into filariform larva, penetrate the intestinal mucosa (Internal reinfection) or carried down bowel may be penetrate the perianal skin (external reinfection).
 - b- Larva may voided with feces and development in the soil to filariform or in to free living males and females, mating, eggs hatch to release next generation of rhabditiform larva, they may repeat the life cycle or may develop into filariform larva
 2. Filariform larva penetrate skin of man and carried by blood stream to right heart, lungs, enter lungs alveoli, migrate respiratory tree, swallowed, enter intestinal tract develop in to female and male, the females burrow their way in mucous membrane and lay eggs in tissues.

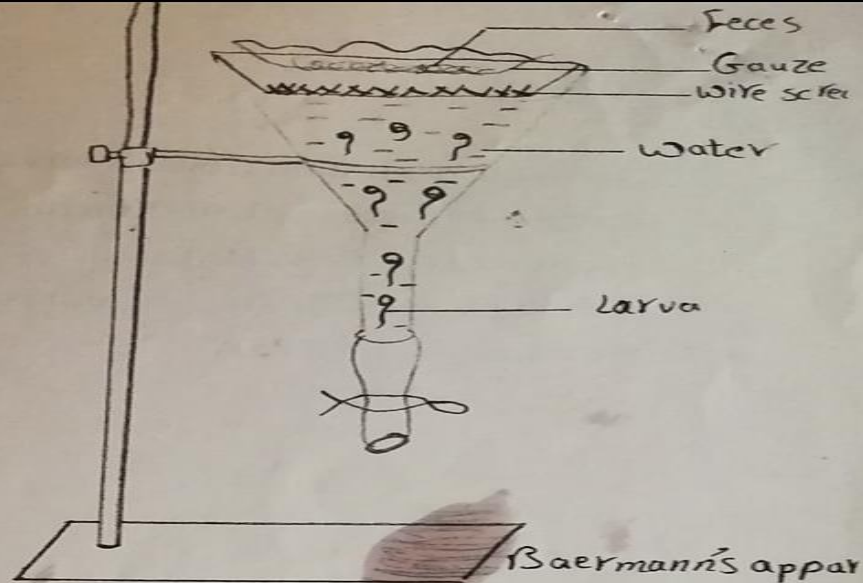
Lab. diagnosis:

1. Stool examination to demonstration characteristic larva, embryonated eggs (Contain well- developed larva).
These done by direct smear, concentration method, Baermann funnel apparatus.

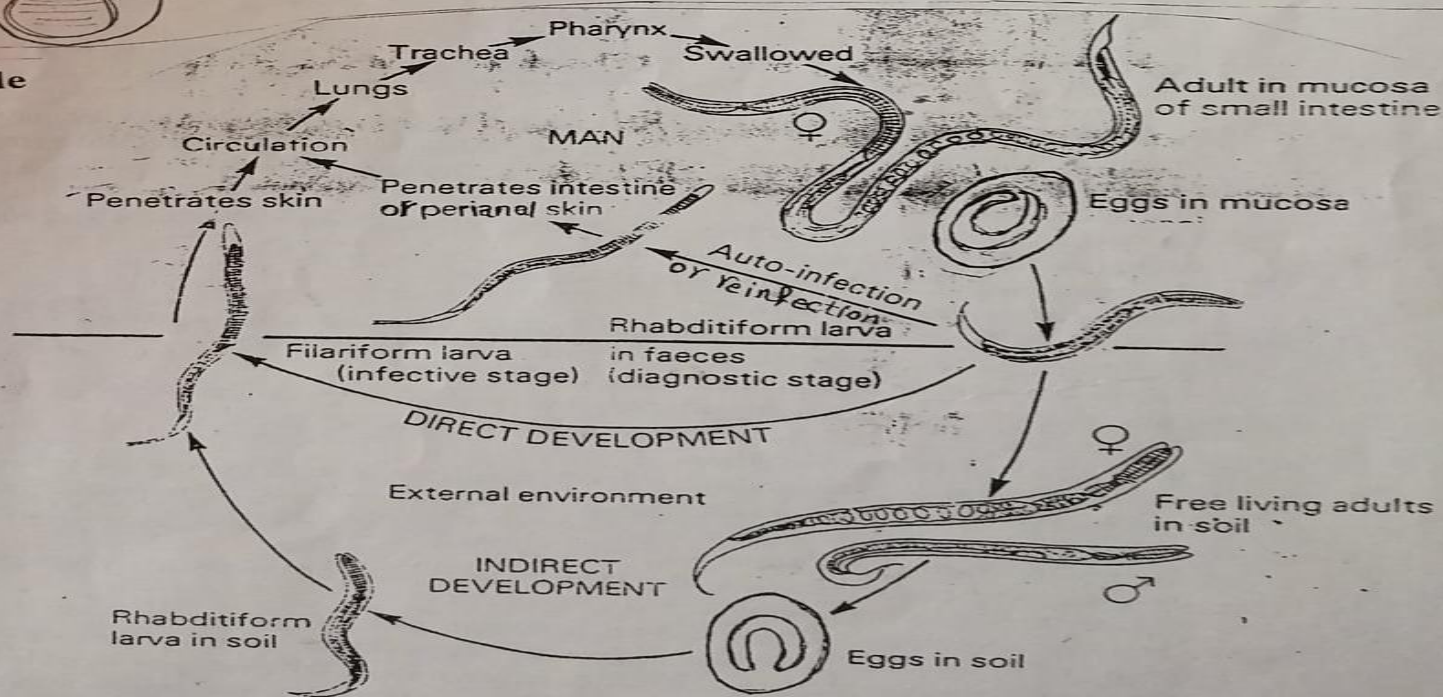
2. Duodenal aspiration (reveals larva).
3. String – capsule method (Entero- test)
4. Sputum exam. (reveals larval)
5. Histological exam. (biopsy and autopsy)
6. Serodiagnosis: ELISA.



Entero-test



Life cycle



Morphology: Egg (Eggs are seldom seen in stools).

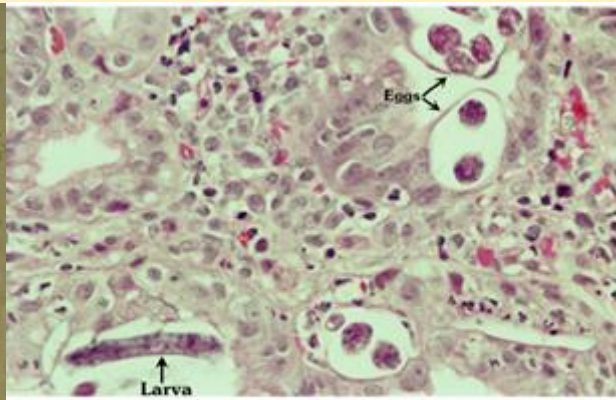
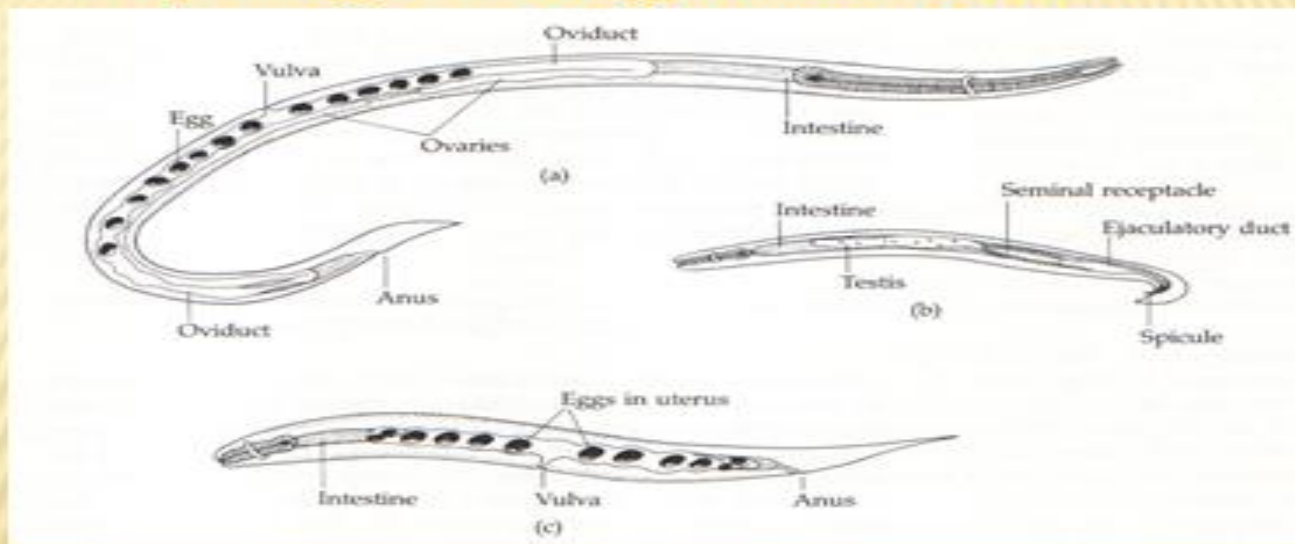


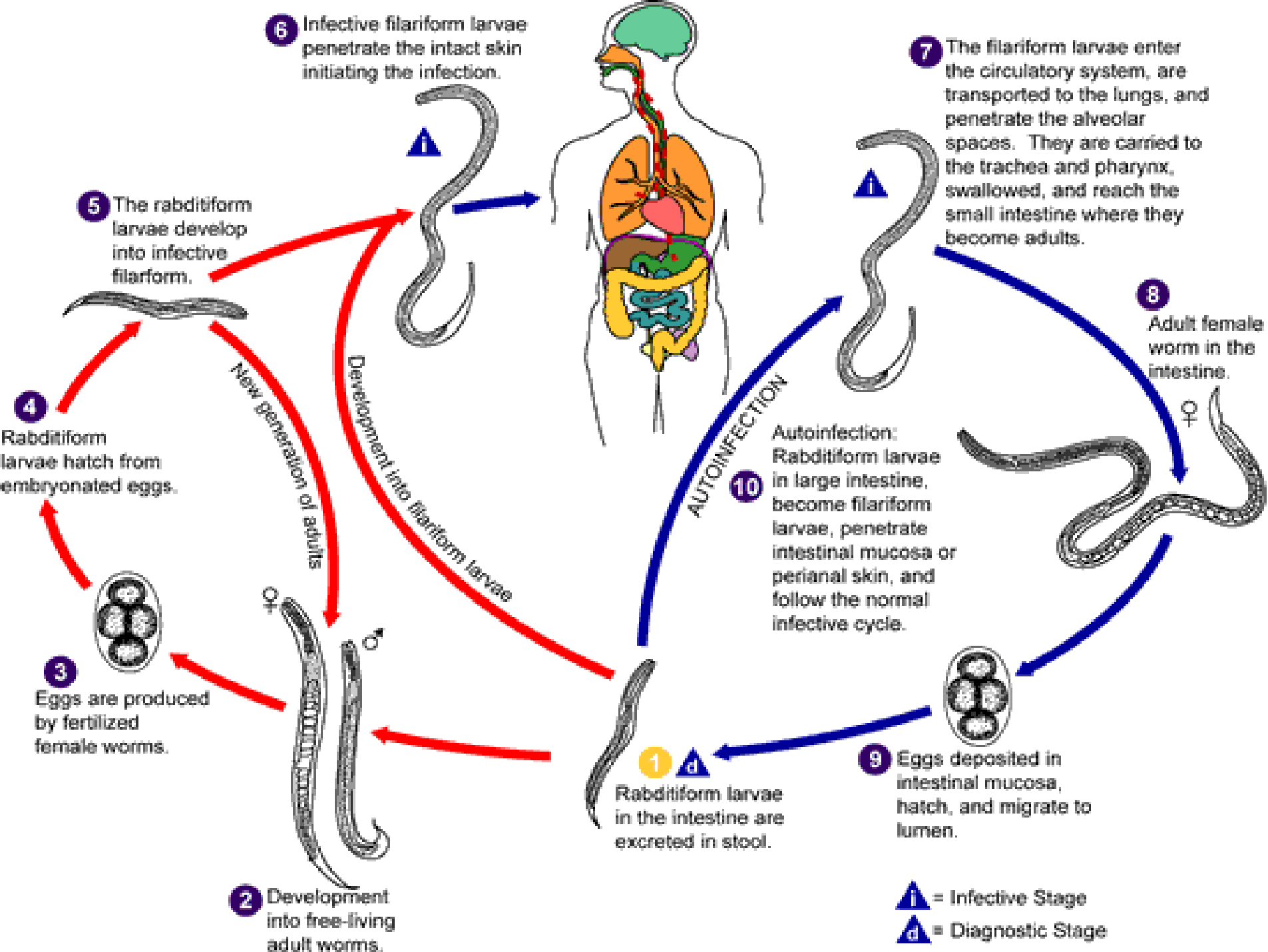
Figure 3: High power view showing details of intramucosal eggs and larvae (H and E x 400)



Morphology of *Strongyloides stercoralis*



- a) parasitic female
- b) free-living male
- c) free-living female



Cutaneous reaction due to skin penetration

