

4- *Strongyloides stercoralis*

Strongyloides stercoralis is a human pathogenic parasitic roundworm causing the disease strongyloidiasis.

The common name of *Strongyloides stercoralis* is threadworm or dwarf threadworm.

- Threadworm term refer to *Strongyloides stercoralis* and *Enterobius vermicularis* (Pinworm)
- Dwarf threadworm term refer to *Strongyloides stercoralis* only.
- Dwarf tapeworm term refer to *H. nana*.
- Target organ of *Strongyloides stercoralis* in humans (the adult parasitic stage lives) in tunnels in the mucosa of the small intestine.

Life cycle

Q: How many types of life cycle of *Strongyloides stercoralis* find ?

Three types of life cycle :

1- **free-living** {heterogenic, is advantageous to parasite because it allows reproduction for one or more generations in the absence of a host }.

2- **parasitic** cycles { homogenic }

3- autoinfection .

Q: Explain the **free-living life cycle** of *Strongyloides stercoralis*.

In the **free-living** cycle, adults that mate the female lays eggs first-stage larvae (L1) transform into infective larvae via three molts The males and females die after one generation The larvae develop into free-living adults **or** develop into infective larvae.....

The larvae penetrate the human host skin to initiate the parasitic cycle.

- Infective stage: (L3) **larvae in soil**

- Diagnostic stage: (L1) **larvae in stool**

Q: Explain the **parasitic life cycle** of *Strongyloides stercoralis*.

The infectious larvae penetrate the skin when it contacts soil enter the superficial veins blood lungs, alveoli.....coughed up and swallowed into the gut..... small intestine mucosa of the duodenum and jejunum.... molt twice and become adult female worms live in the epithelium of the small intestine... by parthenogenesis..... produce eggs.... yield larvae..... Only females will reach reproductive adulthood in the intestine..... Female strongyloids reproduce through parthenogenesis..... The eggs hatch in the intestine and young larvae are then excreted in the feces.

- By **parasitic life cycle**, *S. stercoralis* can cause both respiratory and gastrointestinal symptoms.

Q: Explain the **autoinfection life cycle** of *Strongyloides stercoralis*.

The infected larvae penetrate either the intestinal mucosa (internal autoinfection) **or** the skin of the perianal area (external autoinfection).... the lungs the bronchial tree the pharynx small intestine mature into adults.

- **Autoinfection** in humans with helminthic infections is recognized **only in Strongyloides stercoralis and Capillaria philippinensis** infections.

In the case of *Strongyloides*, **autoinfection** may explain the possibility of **persistent infections for many years in persons.** Because of autoinfection, humans have been known to still be infected up to **65 years** after they were first exposed to the parasite

Strongyloidiasis

A parasitic disease caused by nematodes or roundworm, in the genus *Strongyloides*

LIFE CYCLE

Common in tropical countries

Risk factors

Contact with soil



Human T-cell lymphotropic virus - 1 infection



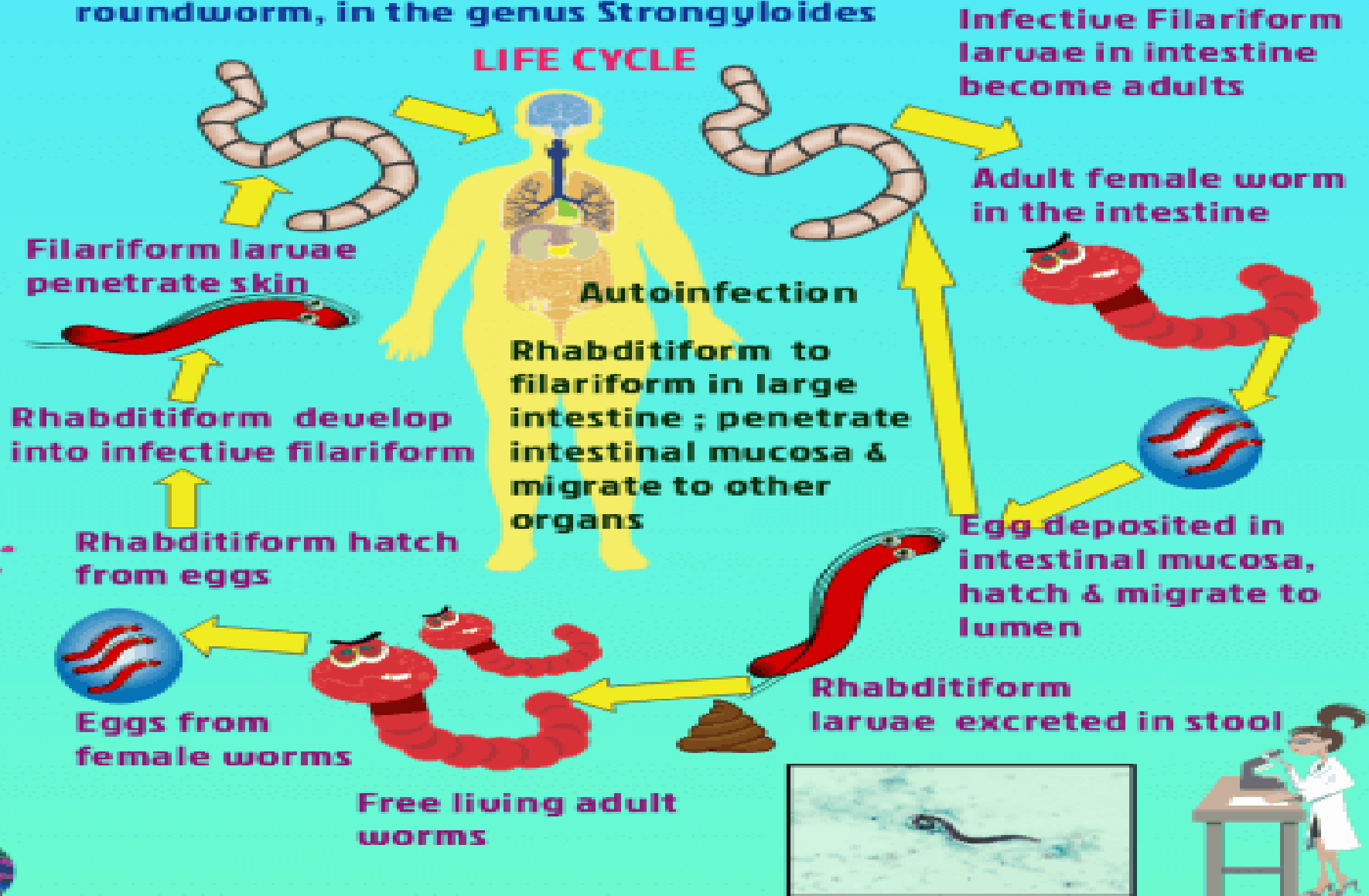
Steroid, immunosuppressive therapy



Organ transplants



Institutionalized population



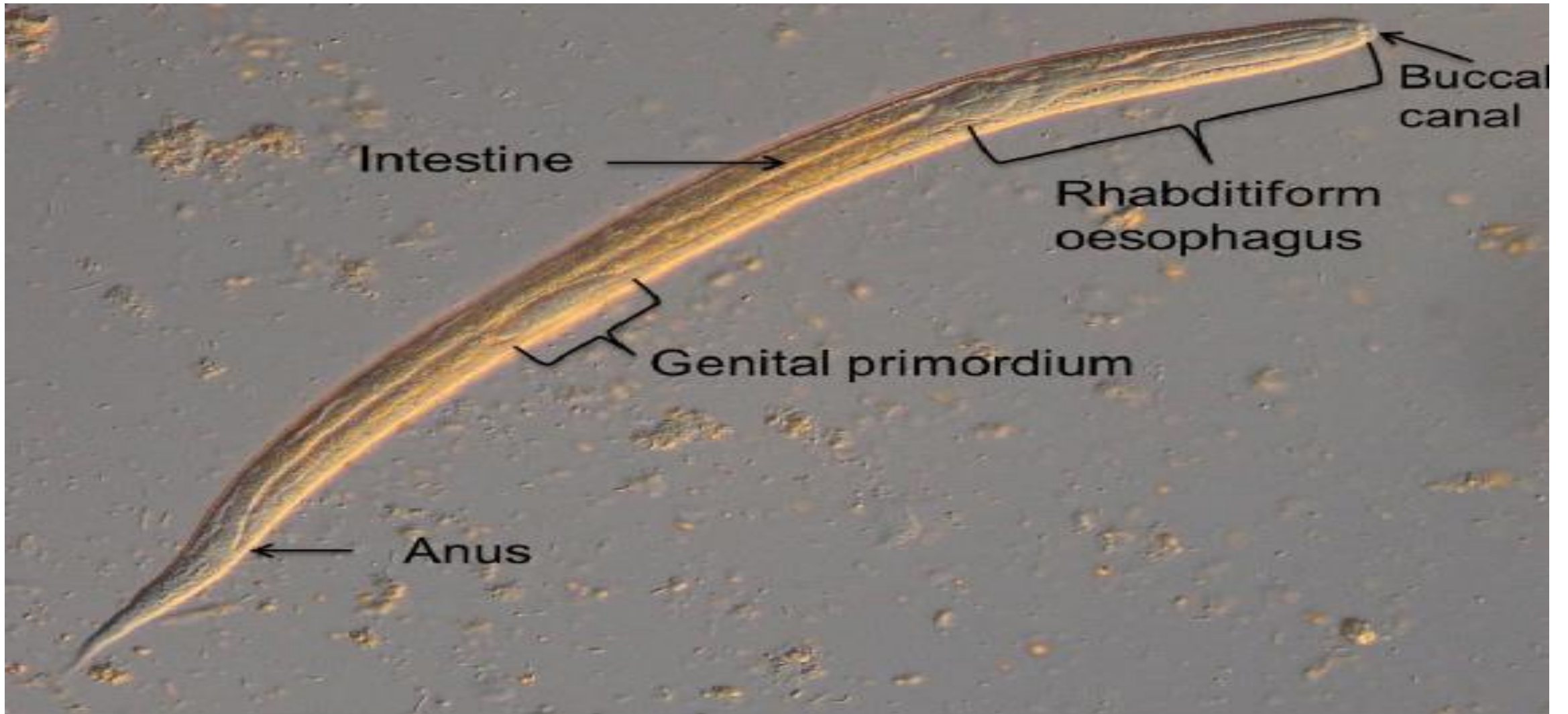
Symptoms

- 1- Many people infected are asymptomatic at first. Symptoms include [dermatitis](#): swelling, itching, [larva currents](#), and mild hemorrhage at the site where the skin has been penetrated.
- 2- If the parasite reaches the lungs, the chest may feel as if it is burning, and wheezing and coughing may result, along with pneumonia-like symptoms ([Löffler's syndrome](#)).
- 3- The intestines could eventually be invaded, leading to burning pain, tissue damage, sepsis, and ulcers. Stools may have yellow [mucus](#) with a recognizable smell. Chronic [diarrhea](#) can be a symptom. In severe cases, edema may result in obstruction of the intestinal tract, as well as loss of [peristaltic](#) contractions.

Diagnosis

- 1- Direct fecal smears.
- 2- Culturing fecal samples on [agar](#) plates.
- 3- Serodiagnosis through [ELISA](#).

Still, diagnosis can be difficult because of the day-to-day variation in juvenile parasite load.



Light microscope photograph , iodine-stained *Strongyloides stercoralis* first stage larva from freshly faeces.

Enterobius vermicularis

Enterobius vermicularis

- The **common name of *Enterobius vermicularis* is pinworm or threadworm or seatworm.**
- **common host of *Enterobius vermicularis* is children and transmitted via the faecal-oral route.**
- **Humans are the only natural host of *Enterobius vermicularis*.**
- Infective stage: **embryonated eggs.**
- Diagnostic stage: **embryonated eggs on per anal folds.**

Life cycle

Life cycle of *E. vermicularis* showing the stages inside and outside of the human body

The life cycle, from egg to adult, takes place in the human gastrointestinal tract of a single. *E. vermicularis* **molts four times**; the first two within the egg before hatching and two before becoming adult worm.

infection occurs via ingestion of embryonated eggs by inadequate hand washing , The eggs hatch in the duodenum the larvae grow rapidly to a size of 140 to 150 μm , migrate through the small intestine towards the colon.

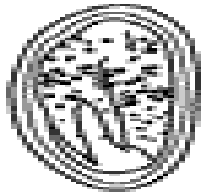
... they moult twice and become adults. The male and female pinworms mate in the ileum

After that the male die, and are passed out with stool.....The gravid female pinworms settle in the ileum, (large intestine) caecum ... appendix ascending colon,..... rectum anus, and while moving on the skin near the anus, the female pinworms deposit eggs either through (Q: how many ways can the female of *E. vermicularis* lay eggs?) (1) contracting and expelling the eggs, (2) dying and then disintegrating, or (3) bodily rupture due to the host scratching the worm. After depositing the eggs, the female becomes opaque and dies. The female emerges from the anus to obtain the oxygen necessary for the maturation of the eggs.

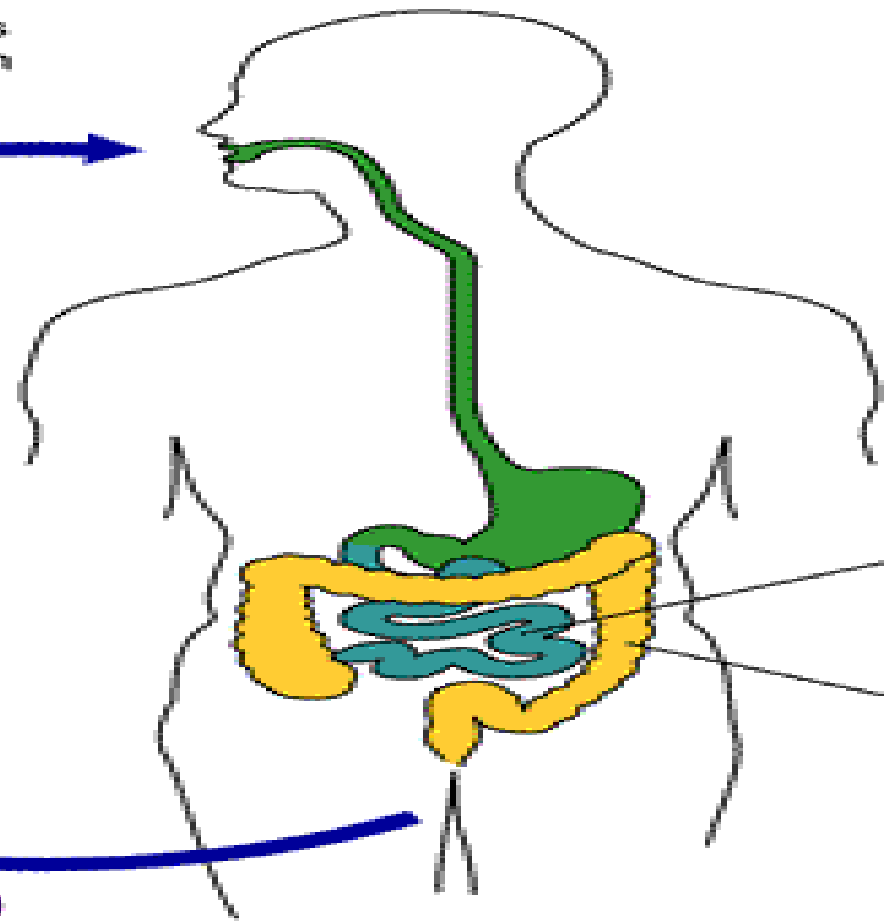


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i Embryonated eggs ingested by human



2



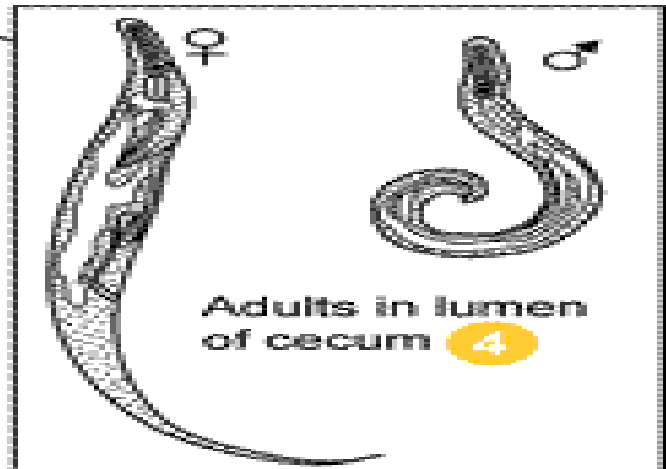
3 Larvae hatch in small intestine



d Eggs on perianal folds
Larvae inside the eggs mature within 4 to 6 hours.



1



Adults in lumen of cecum **4**

5 Gravid ♀ migrates to perianal region at night to lay eggs

i = Infective Stage
d = Diagnostic Stage

Diagnosis

1- Diagnosis depends on finding the eggs or the adult pinworms.

2- adult pinworms diagnosis by { the light-yellowish thread-like adult pinworms during the night when they move near the anus, or on toilet paper} Or by colonoscopy

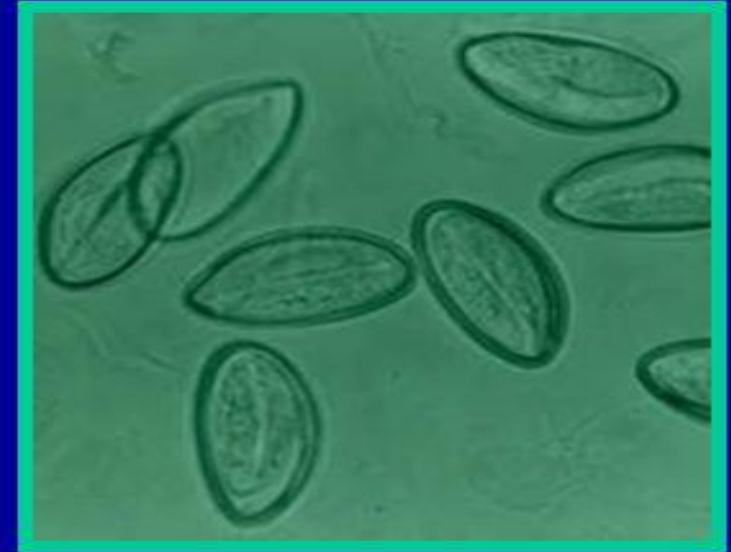
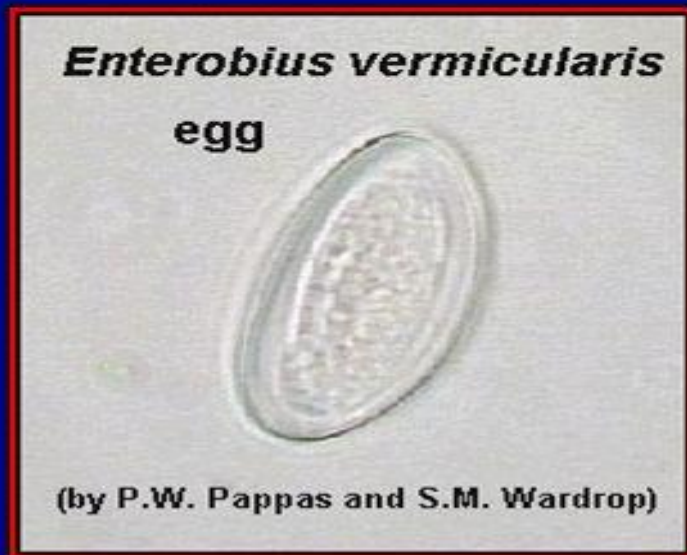
3- The eggs diagnosis by using a low-power microscope **or** by Transparent adhesive tape (Scotch Tape) applied on the anal area will pick up deposited eggs, and diagnosis the tape with a microscope.

- This test is most successful if done every morning for several days, because 1- the females do not lay eggs every day 2-the number of eggs vary.

Morphology II

- **Egg**

Oval, clear and colorless. 50 to 60 μm in length. Flattened on one side. Contains a larva.



6- *Trichinella spiralis*

Trichinella spiralis

is {viviparous, pork worm, smallest, unusual lifecycle, live [larvae](#)} [nematode](#) *Trichinella spiralis*..... infected humans

The [pork worm](#) is ... *Trichinella spiralis*

The [pork tapeworm](#) is *T. soillum*

Q: How can human infect with *Trichinella spiralis* ?

By eat (ingest) infected meat of (pork, horse, fox, cat, bears)

Lifecycle

human eats the infected meat (larvae) of pig the larvae are released (due to stomach pH), and migrate to the small intestineburrow into the intestinal mucosa... mature female produce up to 1,500 larvae..... female dies, she passes out of the host.... The larvae enter the circulation and migrate to the muscle cell and encyst.

- Infective stage: encysted larvae in striated muscle.

- Diagnostic stage: encysted larvae in striated muscle

Symptoms

- 1- The [migration of adult worms](#) in the intestinal [epithelium](#) can cause [traumatic damage](#) to the host tissue,
- 2- The [waste products](#) they excrete can an [immunological reaction](#).
- 3-Nausea, vomiting, sweating, and diarrhea. [Edema](#), Pain and fever may occur.
- 4- [Intense muscular pain](#), difficulty breathing, weakening of pulse and blood pressure, heart damage, and various nervous disorders may occur, eventually leading to death due to heart failure, respiratory complications, or kidney malfunction, all due to [larval migration](#).
- 5- In some cases, accidental migration to specific organ tissues can cause [myocarditis](#) and [encephalitis](#) that can result in death.

Diagnosis

[Muscle biopsy](#) may be used for trichinosis detection. Several [immunodiagnostic tests](#) are also available.

