



**Medical Analysis
Department**

Nematoda (*Trichuris Trichiura* & *Trichinella spiralis*)

Medical Parasitology II (MA302)

Summer School

Lecture 3

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Trichuris trichiura

Case Study

An 8-year-old girl was brought by her parents with chronic diarrhea, abdominal discomfort, and fatigue for 1 month. She had a history of playing in contaminated soil. Stool microscopy revealed characteristic barrel-shaped eggs with bipolar plugs of **Trichuris trichiura**. She was treated with mebendazole, and the family received education on sanitation and personal hygiene, resulting in complete recovery.

Trichuris trichiura

The name Trichuris means a “hair-like tail” (Greek trichos- hair, oura-tail). This name is not quite correct because it is the anterior end of the worm that is hair-like and not the tail. the name whipworm is more apt as the thick posterior part resembles the stock and the thin anterior end resembles the lash of a whip.

- The helminth causes Trichuris in humans, an intestinal infection caused by invasion of the colonic mucosa.

Epidemiology

Global distribution: It is worldwide in distribution, but is much more common in the tropics. The infection is widespread in tropical Africa, South America and Southeast Asia. Trichuris Infection is found throughout India.

Prevalence: Some 800 million people are estimated to be infected with this worm.

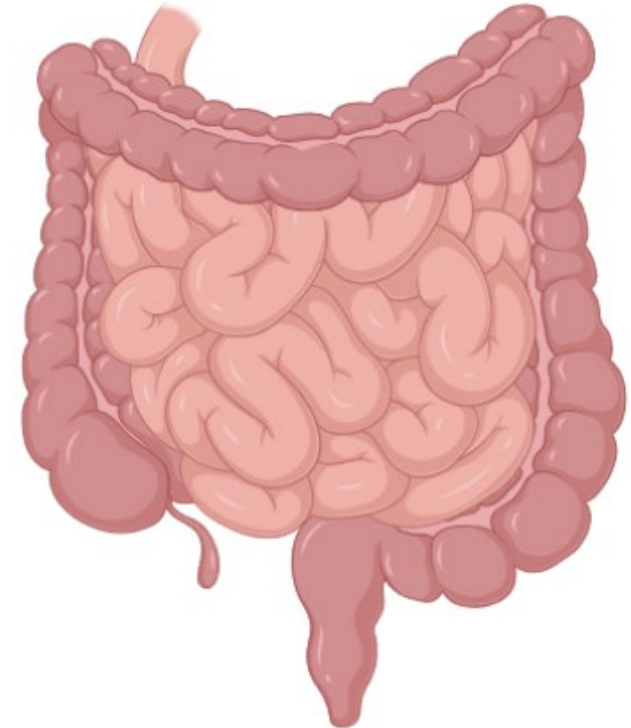
- While whipworm infection is extremely frequent,

Whipworm disease is relatively rare



Habitat

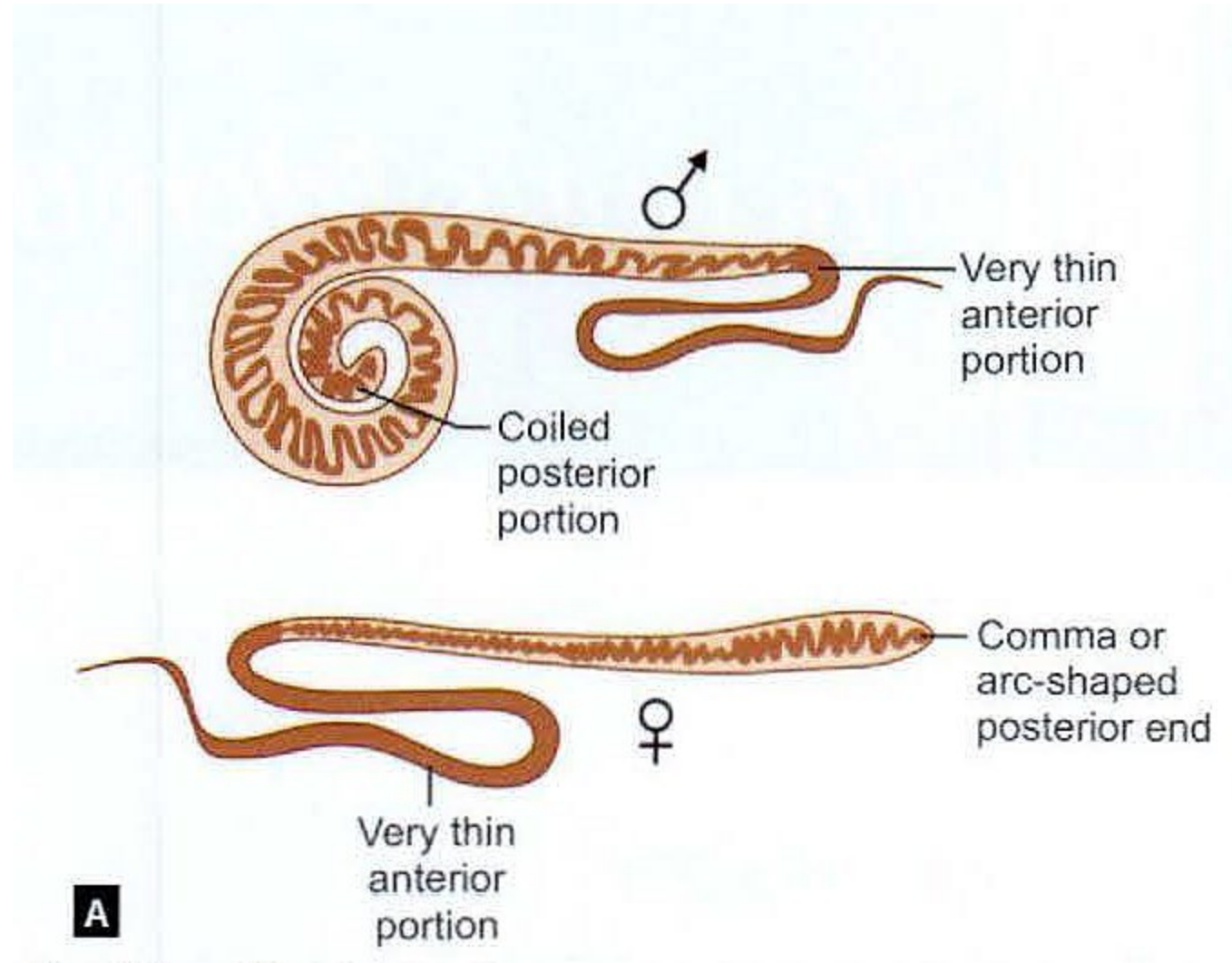
T. trichiura lives in the large intestine. The adult worms are found attached to the wall of the cecum and, less commonly to the vermiform appendix, colon.



Morphology

Adult worm

- The male worm is 30- 45 mm long, while the female is slightly larger, about 40-50 mm.
- The worm is flesh -colored. In shape, it resembles a whip, with the anterior three-fifths ($3/5$) thin and thread-like and the posterior two-fifths ($2/5$) thick and fleshy, appearing like the handle of a whip.
- The anenuated anterior portion, which contains the capillary esophagus, is embedded in the mucosa.
- The posterior part contains the intestines and reproductive organs.
- The posterior end of the male is coiled ventrally, while the hind end of the female is straight, blunt, and rounded.
- The worm has a lifespan of 5-10 years.



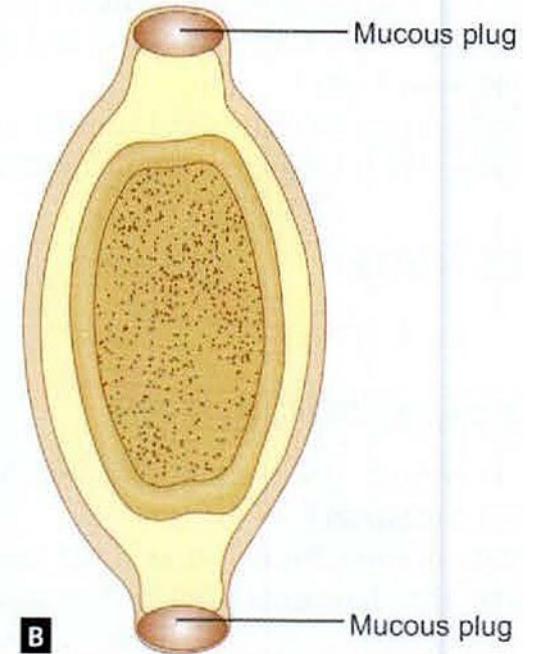


Morphology

Egg

The egg has a characteristic appearance.

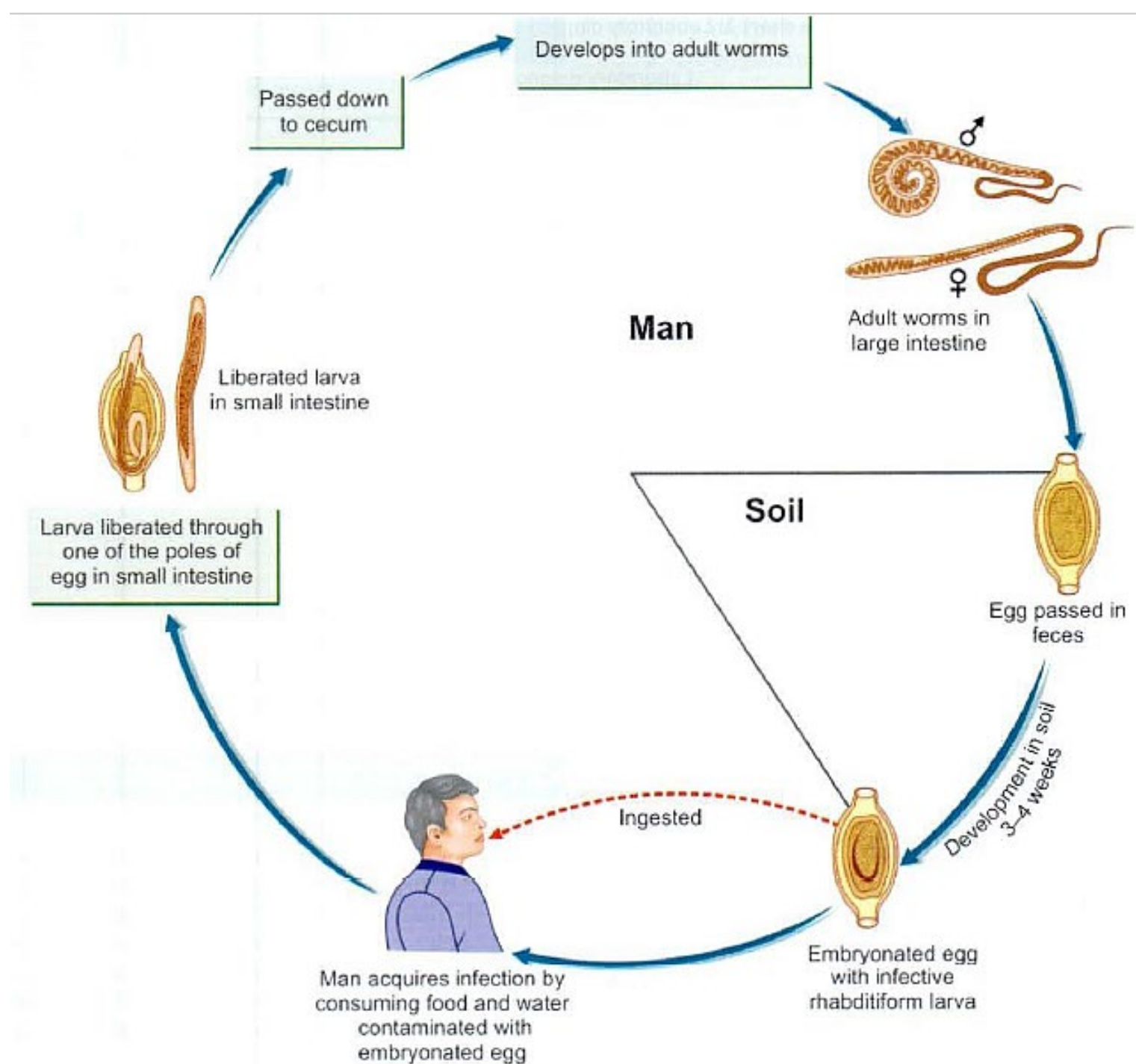
- It is brown in color, being bile-stained.
- It has a triple shell, the outermost layer of which is stained brown.
- It is barrel-shaped and about 50 μm long and 25 μm wide in the middle, with a projecting mucus plug at each pole containing an unsegmented ovum. The plugs are colorless.



Life cycle

- Infection: Humans ingest embryonated eggs from contaminated soil/food.
- Larvae: Eggs hatch in the small intestine, larvae move to the cecum/colon.
- Adults: Mature whipworms embed in the mucosa and produce eggs.
- Environment: Eggs passed in feces become infective in soil (2–3 weeks).
- Cycle repeats when infective eggs are ingested.

Life Cycle

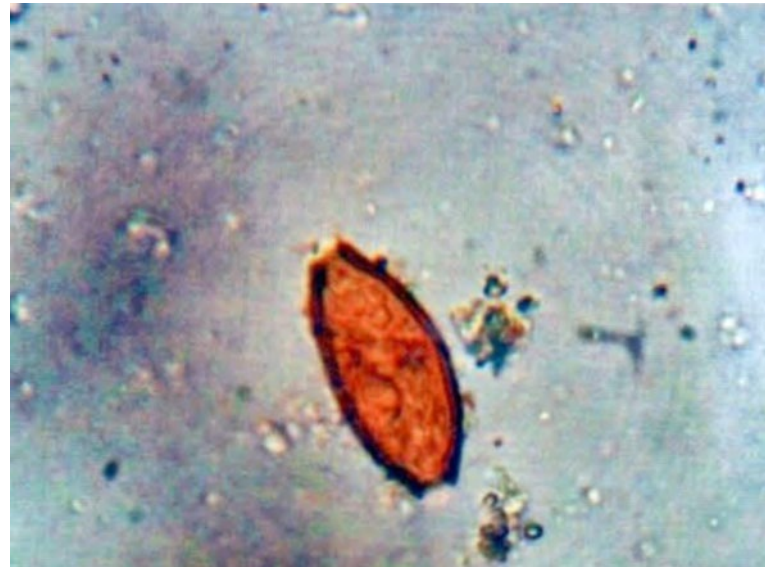


Sign and Symptoms

Infection with *T. trichiura* (trichuriasis, whipworm infection, or trichocephalosis) is asymptomatic, except when the worm load is heavy. Disease may result due to mechanical effects or allergic reaction, such as it can cause gastrointestinal problems (abdominal pain, diarrhea).

Laboratory diagnosis

Microscopic identification of whipworm eggs in feces is evidence of infection.



Treatment

Oral albendazole or oral mebendazole



Trichinella spiralis

Case Study

A 35-year-old man presented with fever, muscle pain, facial swelling, and difficulty chewing one week after eating undercooked wild boar meat. Blood tests showed marked eosinophilia, and serological testing confirmed *Trichinella spiralis* infection. He was treated with albendazole and corticosteroids, and advised to avoid consuming undercooked meat, leading to gradual recovery.

Introduction

- *Trichinella spiralis*, tissue nematode, is the causative agent of trichinosis.
- The name *Trichinella* is derived from the minute size of
- the adult (Greek *trichos*-hair, *ella* suffix for diminutive, *spiralis* refers to the spirally coiled appearance of larvae in muscles).

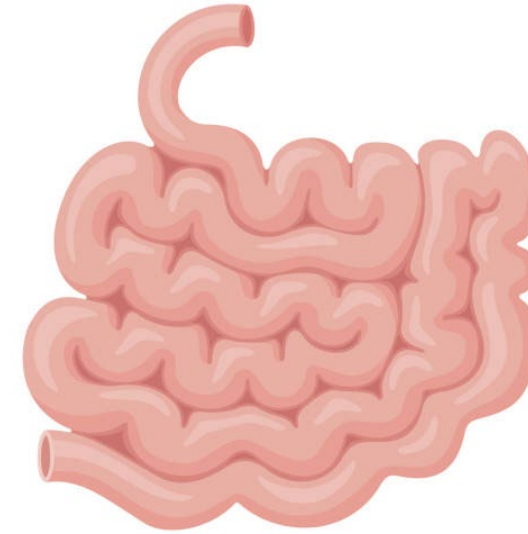
Distribution

The major source of human infection was shown to be the consumption of inadequately cooked pork.

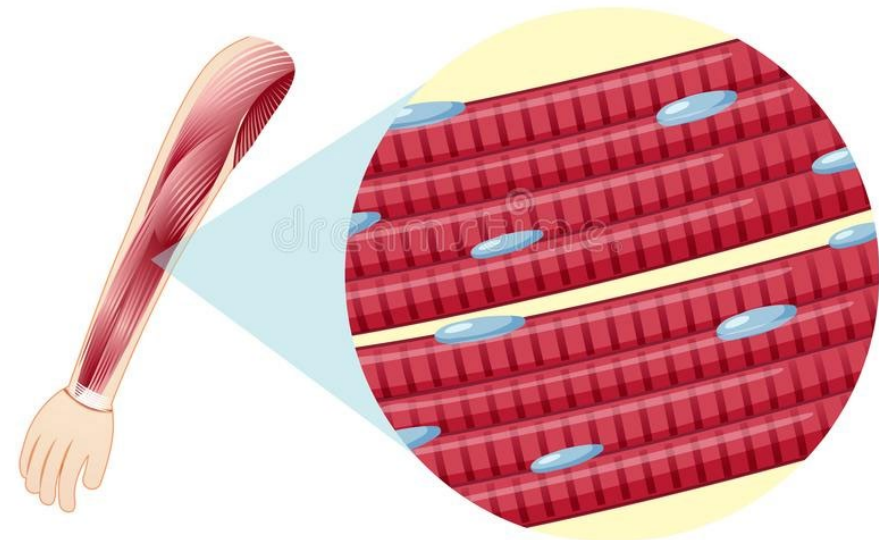
Trichinosis is recognized as an important public health problem in Europe and America, but is much less common in the tropics and oriental countries.

Habitat

- Adult worms live deeply buried in the *mucosa of small intestine (duodenum or jejunum)* of pig, bear, rat, or man.
- The encysted larvae are present in the **striated muscles** of these hosts. There are no free-living stages.



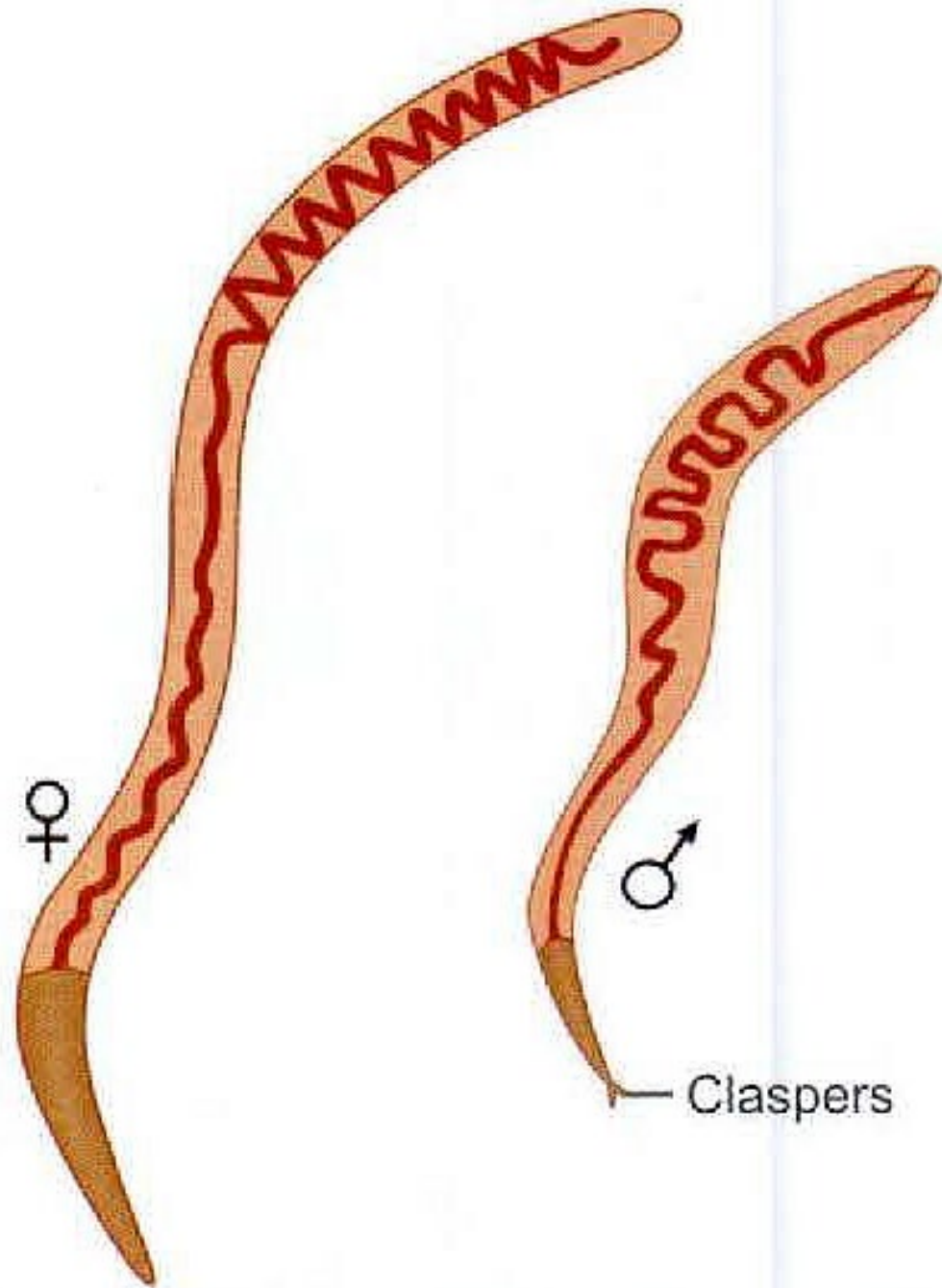
Striated Muscle Tissue



Morphology

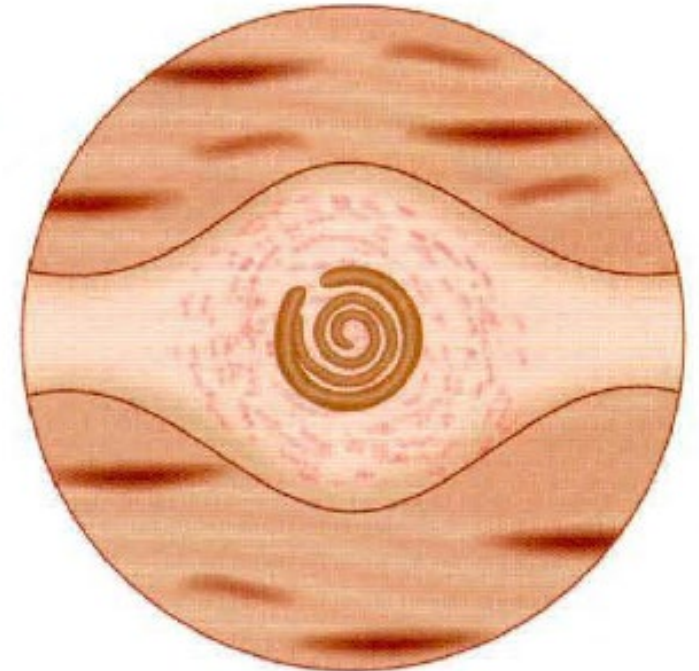
Adult Worm

- The adult *T. spiralis*, a small white worm just visible to the naked eye, is one of the smallest nematodes infecting humans.
- The male measures about 1.5 mm by 0.04 mm and the
- female about 3 mm by 0.06 mm (twice the length of male).
- The anterior half of the body is thin and pointed, well adapted for burrowing into the mucosal epithelium.
- The female worm is viviparous and discharges larva instead of eggs.



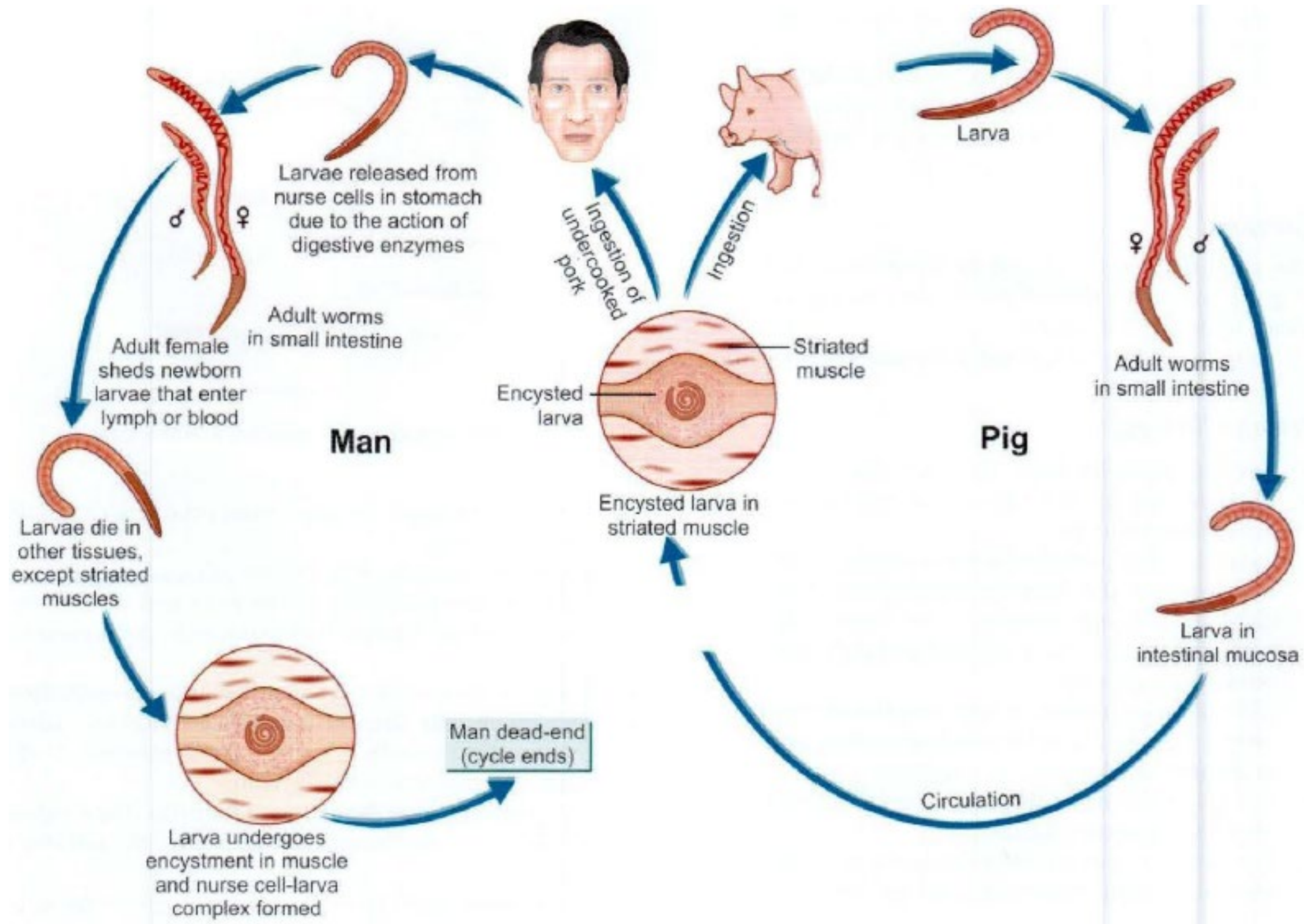
Morphology

- The larva becomes encysted in the striated muscle fiber and at the time of encystment measures 1 mm in length by 36 μm in diameter.
- The larva in the cyst is coiled and hence, the name spiralis.



Life cycle

- Infection: Humans acquire infection by eating undercooked meat (commonly pork) containing encysted larvae.
- Larval release: In the small intestine, cysts are digested, and larvae are released.
- Adults: Larvae mature into adults in the intestinal mucosa, where females produce new larvae.
Migration: Newly born larvae enter the bloodstream and spread to striated muscles.
- Encystment: They coil inside muscle fibers, forming cysts that can remain infective for years.
- Cycle continues when another host eats the infected meat.



Signs and symptoms

- **Intestinal phase:** diarrhea, abdominal pain, fever.
- **Muscle phase:** muscle pain, swelling around the eyes, headache, and fever.
- **Severe cases:** breathing/swallowing difficulty, heart or nervous system problems.

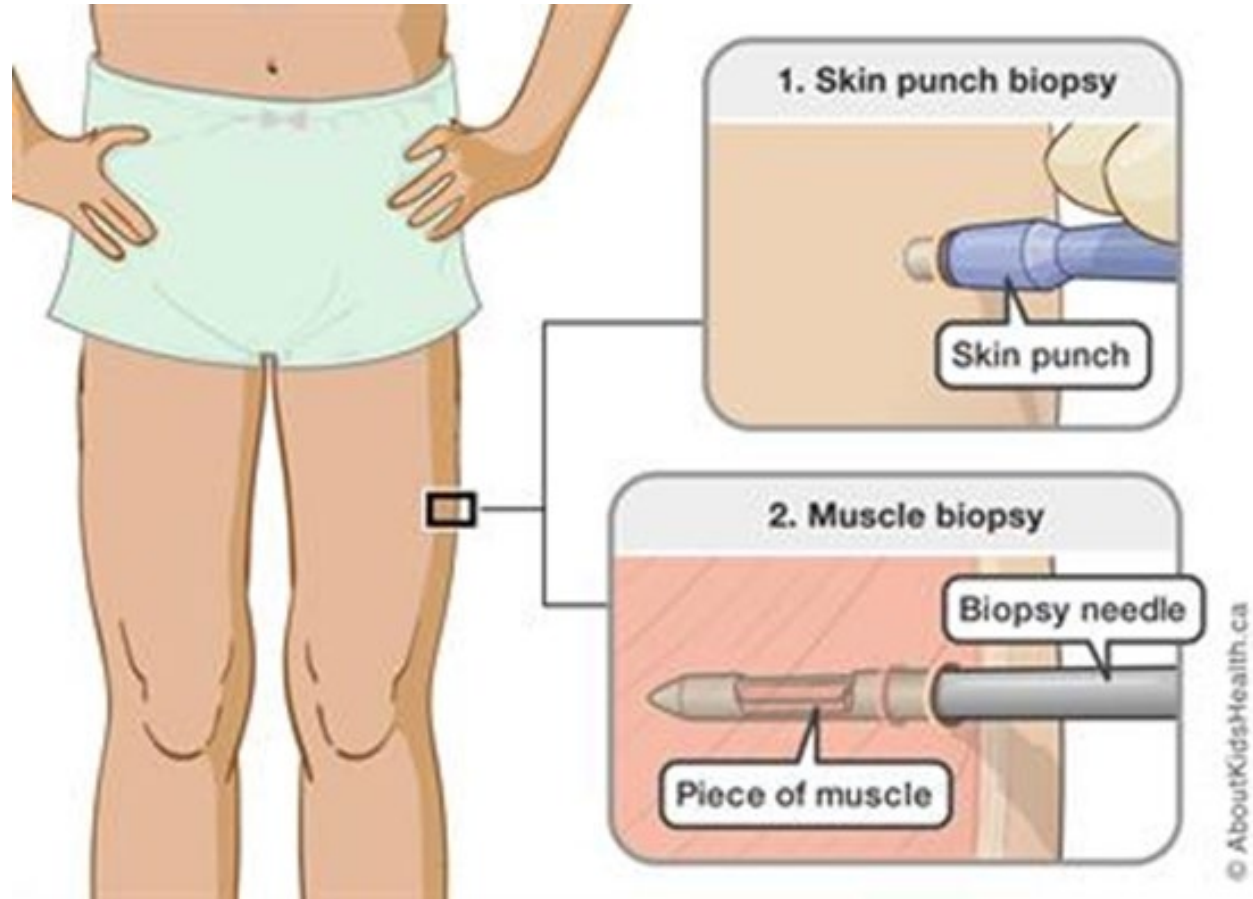
Diagnosis

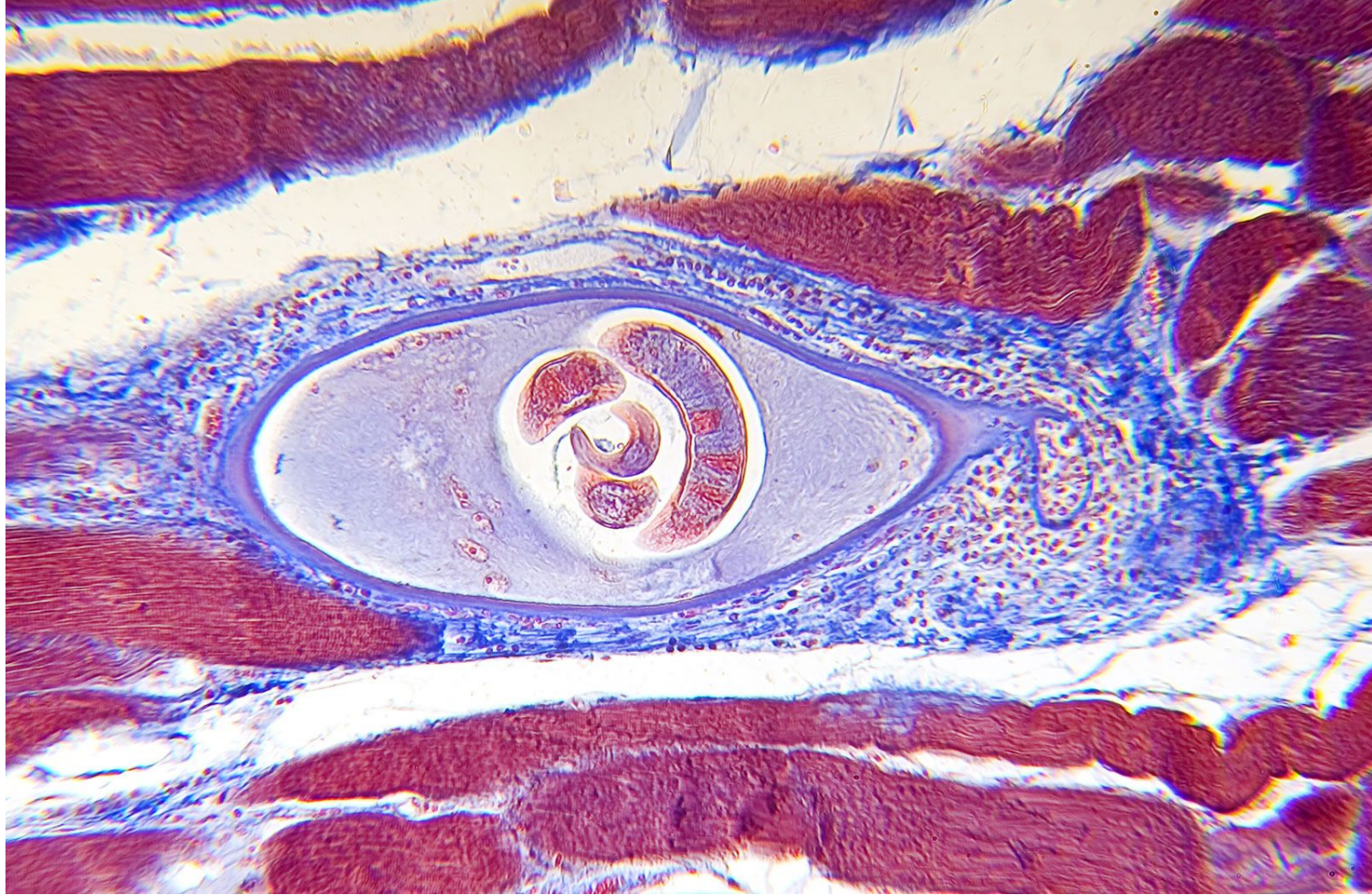
Direct methods

- Detection of spiral larvae in muscle tissue by performing **muscle biopsy**. Deltoid, biceps, gastrocnemius, or pectoralis muscles are usually selected for biopsy.
- Detection of adult worms and larvae in the stool during the diarrheic stage.
- **Xenodiagnosis:** For xenodiagnosis, biopsy bits are fed to laboratory rats, which are killed in a month or so, later. The larvae can be demonstrated more easily in the muscles of such infected rats.

Indirect Methods

- **Blood examination:** It shows eosinophilia (20-95%).
- **Serology:** Elevated serum immunoglobulin E (IgE). *T. spiralis* antibody can be detected by enzyme-linked immunosorbent assay (ELISA) test using TSL-1 secreting antigens obtained from the infective stage Larvae





Treatment

- **Mild cases:** Supportive treatment consisting of bedrest, analgesics, and antipyretics.
- **Moderate cases:** Albendazole 400 mg BID for 8 days or mebendazole 200-400 mg TID for 3 days, then 400 mg TID for 8 days.
- **Severe cases:** Add glucocorticoids like prednisolone to albendazole or mebendazole

References

- Paniker, C. K. J. & Ghosh, S. 2021. *Paniker's textbook of medical parasitology*, New Delhi, Jaypee Brothers Medical Publishers.
- <https://www.cdc.gov/pinworm/hcp/clinical-overview/index.html>