



Helminths

Cestodes

CYCLOPHYLLIDEAN TAPEWORMS

Taenia Saginata

Kingdom: Animalia

Phylum: Platyhelminthes

Class: Cestoda

Order: Cyclophyllidea

Family: Taeniidae

Genus: Taenia

Species: *T. saginata*

Morphology

Adult Worm of *T. saginata*

The adult worm consists of the head (scolex), neck, and strobila (body). The general features of the adult worm are similar to any cyclophyllidean cestodes

- **Scolex:** The scolex (head) of *T. saginata* is quadrate in cross-section, bearing 4 hemispherical suckers situated at its four angles. The scolex has no rostellum or hooklets. *T. saginata* is, therefore called the **unarmed tapeworm**. The suckers serve as the sole organ for attachment.
- **The neck** is long and narrow. **The strobila** (trunk) consists of 1000 to 2000 proglottides or segments—immature, mature, and gravid.

Morphology of the Larva: *Cysticercus bovis* is the larval form of *T.*

saginata. The cysticerci are found in the muscles of mastication, cardiac muscles, diaphragm, and tongue of infected cattle

Morphology of the eggs :

Dimensions : 31-43 μm

Aspect: round or oval

all Shell: a thick wall with a radial structure Contents: hexacanth larva 3 pairs of hooks of which are not always visible

Color: dark-brown

Life Cycle of Taenia saginata

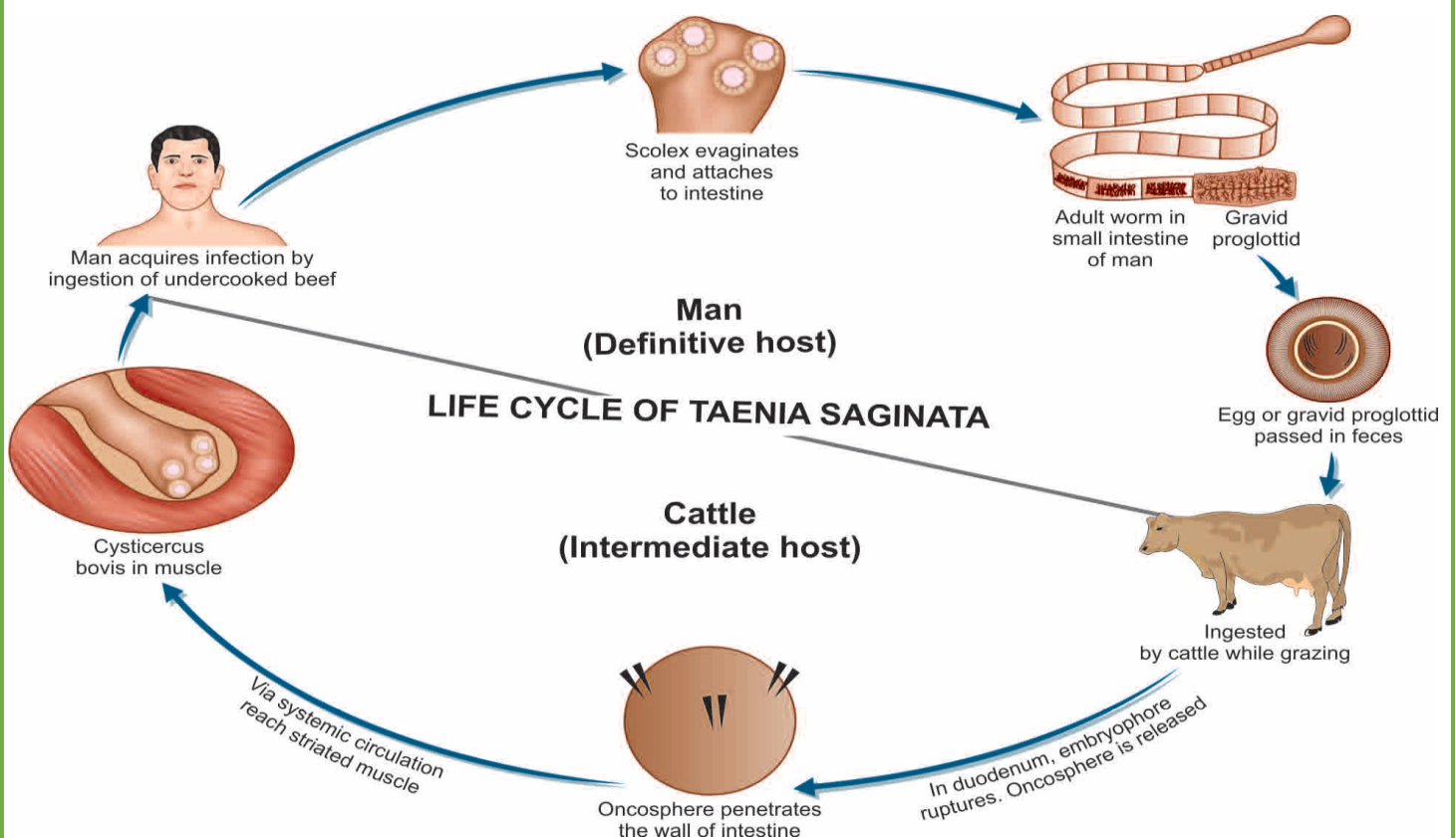
T. saginata passes its life cycle in 2 hosts

Definitive host: Humans are the definitive hosts and harbor the adult worm.

Intermediate host: Cattle (cow or buffalo) are the intermediate host and harbor the larval stage of the worm.

Infective stage: *Cysticercus bovis* (larval stage) is the infective stage to man, while eggs are infective to cattle.

- The adult worm lives in the small intestine of man. The gravid segments from the adult worm break away and are expelled singly. They actively force their way out through the anal sphincter.
 - The eggs or gravid segments are passed out with feces on the ground.
 - The eggs deposited in the soil remain viable for several weeks.
 - They are infective to cattle, which ingest the eggs while grazing.





Taenia Solium

Kingdom: Animalia

Phylum: Platyhelminthes

Class: Cestoda

Order: Cyclophyllidea

Family: Taeniidae

Species: *T. Solium*

Morphology

Adult Worm of *T. Solium*

The adult worm is usually 2-3 meters long.

- **The scolex** of *T. solium* is small and globular about 1 mm in diameter, with 4 large cup-like suckers, and a rounded rostellum, armed with a double row of alternating round and small **dagger-shaped** hooks, 20–50 in number.
- **The neck** is short and half as thick as the head.
- **The proglottides** number less than a thousand. They resemble those of *T saginata* in general. The eggs escape from the ruptured wall of the uterus.

Morphology of the Larva:

Cysticercus cellulosae It is the larval form of *T. solium* and also the **infective form** of the parasite It can develop in various organs of a pig as well as in man. The scolex of the larva, with its suckers, lies invaginated within the bladder and can be seen as a thick white spot. It remains viable for several months

Morphology of the eggs :

Dimensions : 31-43 μm

Aspect: round or oval

Shell: a thick wall with a radial structure

Contents: hexacanth larva (3 pairs of hooks, all of which are not always visible)

Color: dark-brown

Life Cycle of *Taenia solium*

When *T. solium* causes intestinal taeniasis, its life cycle is similar to that of *T. saginata* except



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Definitive host: Man

Intermediate host: Pig

Infective stage: *Cysticercus cellulosae* (larva)

-Humans are infected by consuming inadequately cooked pork containing *Cysticercus cellulosae* (measly pork).

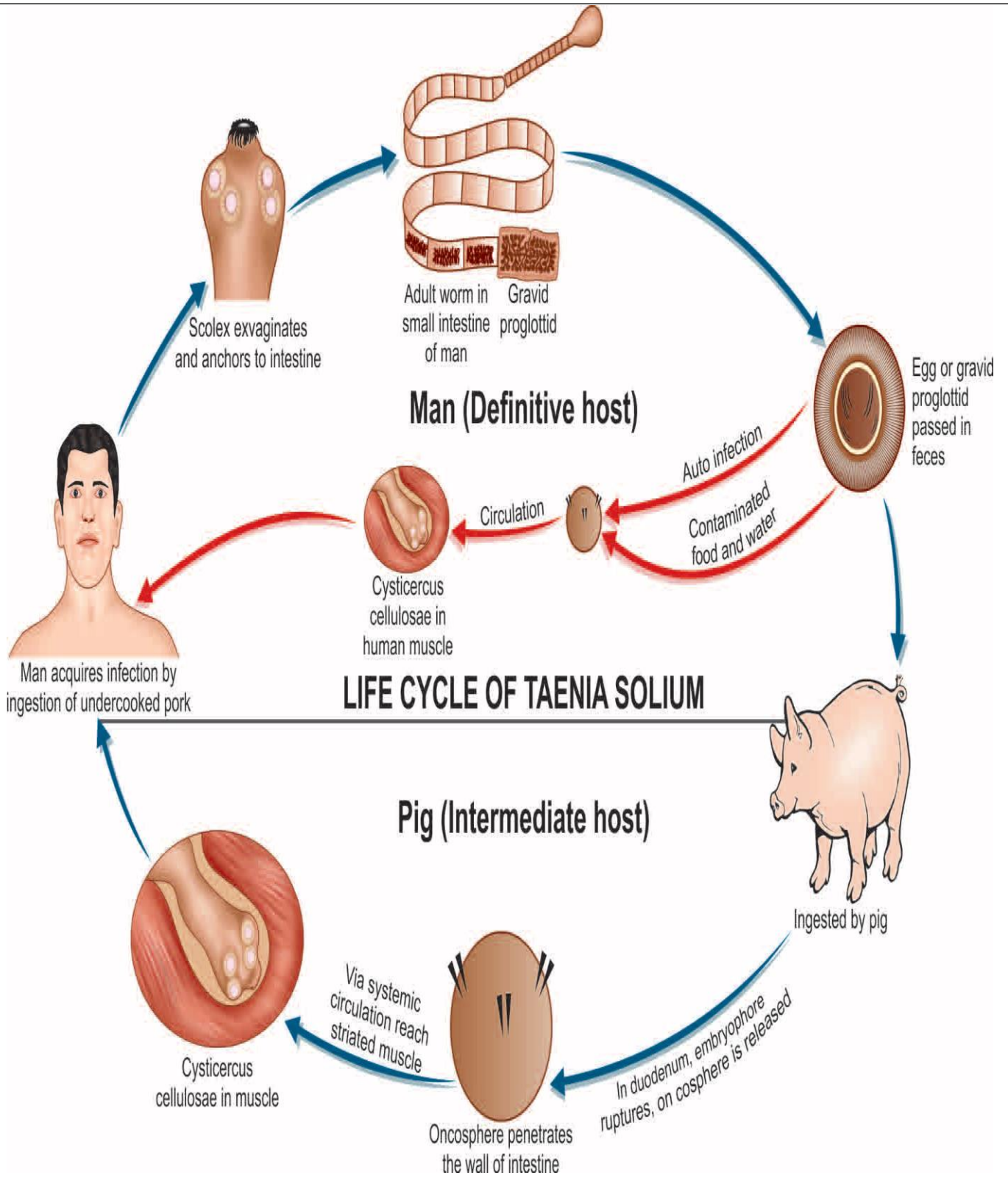
- Man harboring adult worms may autoinfect oneself either by unhygienic personal habits or by reverse peristaltic movements of the intestine.

When *Taenia* leads to cysticercosis, the life cycle is as follows:

Definitive host and Intermediate host: Both man



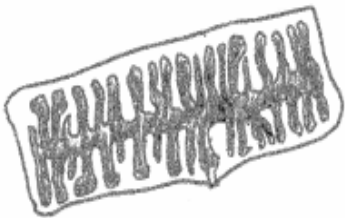
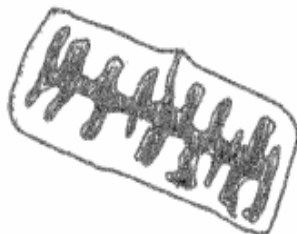


Infective stage: Eggs of *T. solium* (not larva)

- **Mode of infection:** Man acquires infection by ingesting eggs with contaminated food and water.
- Autoinfection: A man harboring an adult worm may autoinfect oneself, either by unhygienic personal habits or by reverse peristalsis of the intestine.
 - The further development of the eggs is similar in men and pigs.
- The oncospheres are released in the duodenum or jejunum and penetrate the intestinal wall.
- They enter the mesenteric venules or lymphatics and are carried in systemic circulation to the different parts of the body.





Differential diagnosis of *T. saginata* / *T. solium*

<u><i>Taenia saginata</i></u>	<u><i>Taenia solium</i></u>
<p><u>Scolex :</u></p> <p>Unarmed tapeworm</p>  <p>Diameter: 1-2 mm 4 suckers No rostrum No hooks</p>	<p><u>Scolex :</u></p> <p>Armed tapeworm</p>  <p>Diameter: 1 mm 4 suckers Rostrum with hooks</p>
<p><u>Length of the adult worm :</u></p> <p>Average of 5 to 10 m</p>	<p><u>Length of the adult worm :</u></p> <p>Average of 3 to 5 m</p>
<p><u>Mature segment :</u></p>  <p>Very motile at excretion. 15 to 32 fine, unilateral ramifications. Length of each segment: 12-15 mm</p>	<p><u>Mature segment :</u></p>  <p>Almost immobile at excretion. 7 to 16 larger, unilateral ramifications. Length of each segment: 10-12 mm</p>
<p><u>Morphology of the cysticercus :</u></p> <p><i>Cysticercus bovis</i> (in cow) in muscular tissue. No hooks. Usually few cysticerci present.</p> 	<p><u>Morphology of the cysticercus :</u></p> <p><i>Cysticercus cellulosae</i> (in pig and man) in muscular tissue or in the central nervous system. Hooks present. Usually lots of cysticerci present.</p> 



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Pathogenicity and Clinical Features

Intestinal Taeniasis

It can be caused by both *T. saginata* and *T. solium*.

When the infection is symptomatic, vague abdominal discomfort, indigestion, nausea, diarrhea, and weight loss may be present. Occasional cases of acute intestinal obstruction, acute appendicitis, and pancreatitis have also been reported.

Cysticercosis

- The clinical features depend on the site affected
 - 1- **Subcutaneous nodules** are mostly asymptomatic
 - 2- **Muscular cysticercosis** may cause acute myositis
 - 3- **Neurocysticercosis** (cysticercosis of brain) is the most common and most serious form of cysticercosis.

Laboratory Diagnosis

Stool Examination

Eggs

- Microscopic examination of feces shows characteristic eggs of *Taenia* in 20–80% of patients. Formol ether sedimentation method of stool concentration is useful. Eggs can also be detected by **cellophane swab**
- Species identification can be done by examining with a hand lens, the gravid proglottid pressed between 2 slides when branching can be made out. (15–20 lateral branches in *T. saginata*; under 13 in *T. Solium*).
- **Scolex** Definitive diagnosis can also be established by demonstration of unarmed scolex in the case of *T. saginata* after antihelminthic treatment.

Laboratory Diagnosis of Cysticercosis

Biopsy

Definitive diagnosis of cysticercosis is by biopsy of the lesion and its microscopic examination to show the invaginated scolex with suckers and hooks.

Other Diagnosis X-ray, CT Scan, MRI, and serology.