Class Cestoda (Tapeworms)

INTRODUCTION

They are hermaphroditic and require an intermediate host. The adult found in humans have flat body, white or grayish in color. They consist of an anterior attachment organ or scolex and a chain of segments (proglottids) also called strobilla. The strobilla is the entire body except the scolex. The scolex has suckers or grooves. It has rosetellum, which has 1 or 2 rows of hooks situated on the center of the scolex.

Adult tapeworms inhabit the small intestine, where they live attached to the mucosa. Their food is absorbed from the host's intestine.

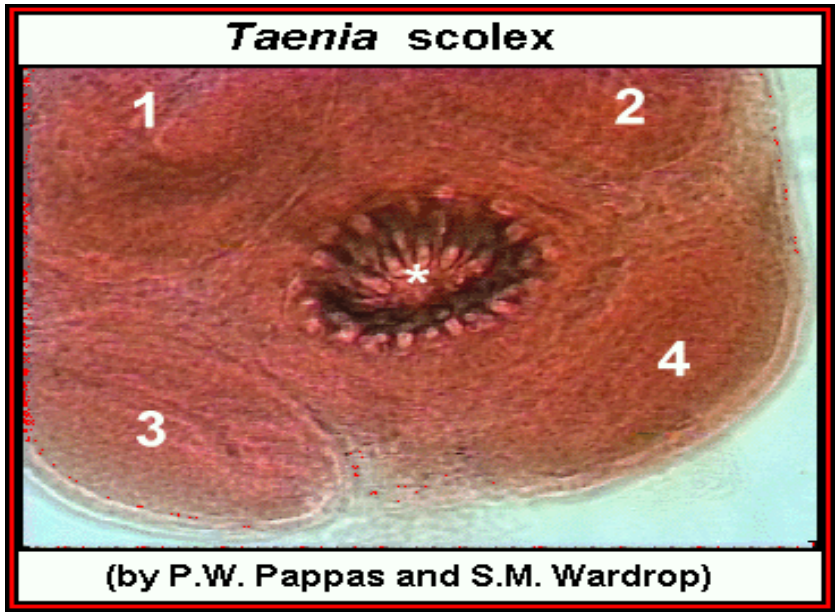
TAENIA SAGINATA (BEEF TAPEWORM)

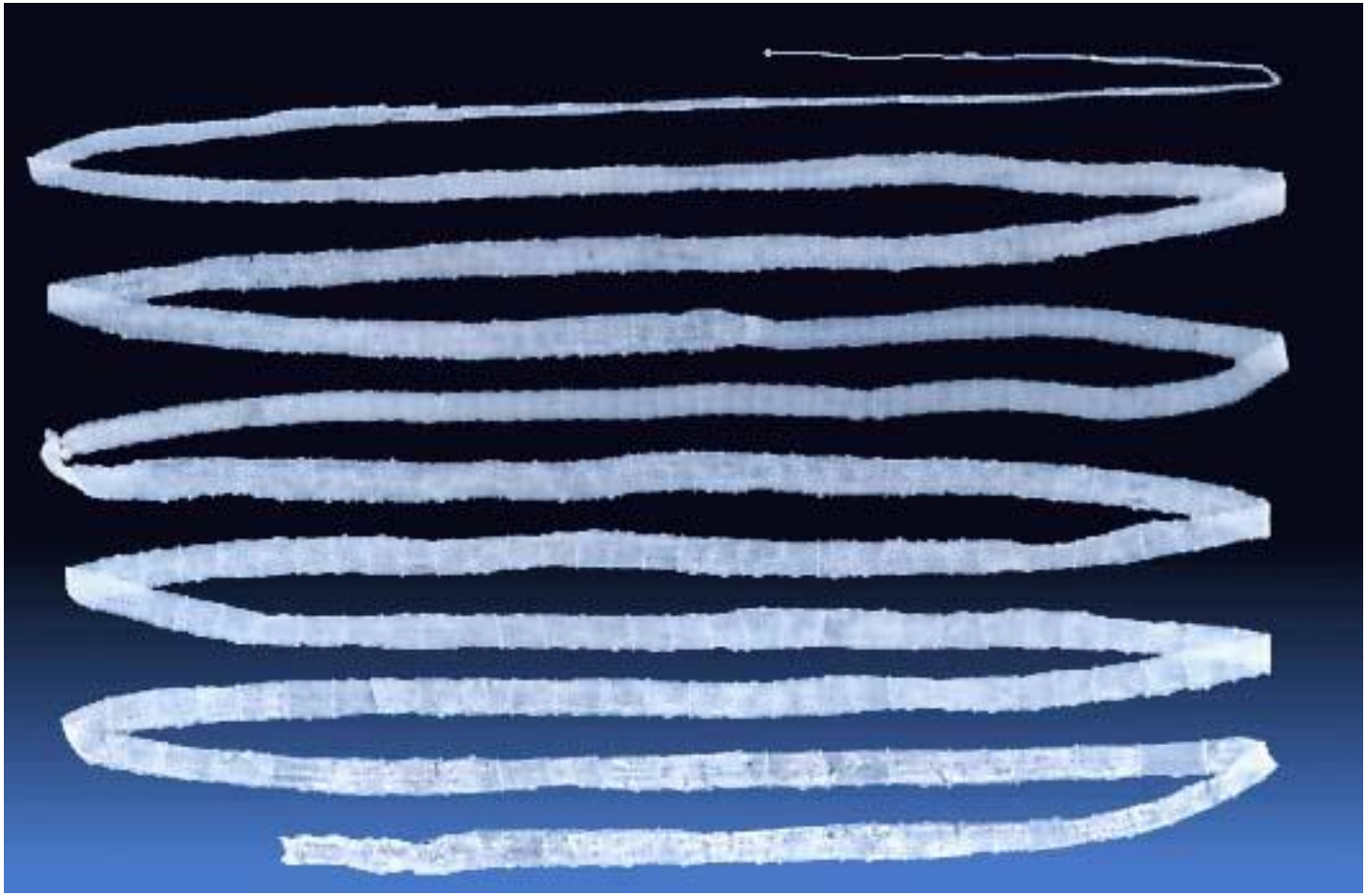
Morphology:

Adult worm measures 5-10 meters in length. The pyriform scolex has 4 suckers but no rostellum. The mature segments have irregularly alternate lateral genital pores. Each of the terminal segments contains only a uterus with 15-30 lateral branches.

Their body is divided into three regions

1. Scolex: the hold fast organ 2. Neck: posterior to the scolex
3. Stobilla: the made up of proglottids



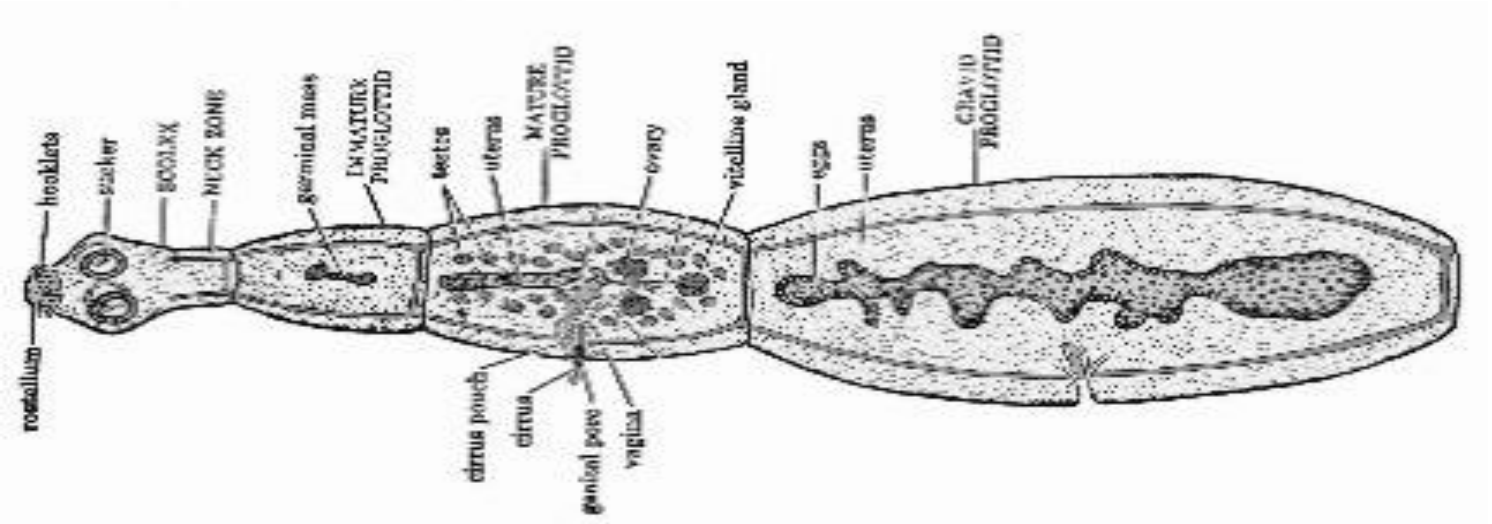


It consists of

Scolex: global, 1mm. With 4suckers, 1rostellum and 25-50 hooklets arranged in a double crown

neck: it's the narrowest part of the body and budding zone containing germinative tissue

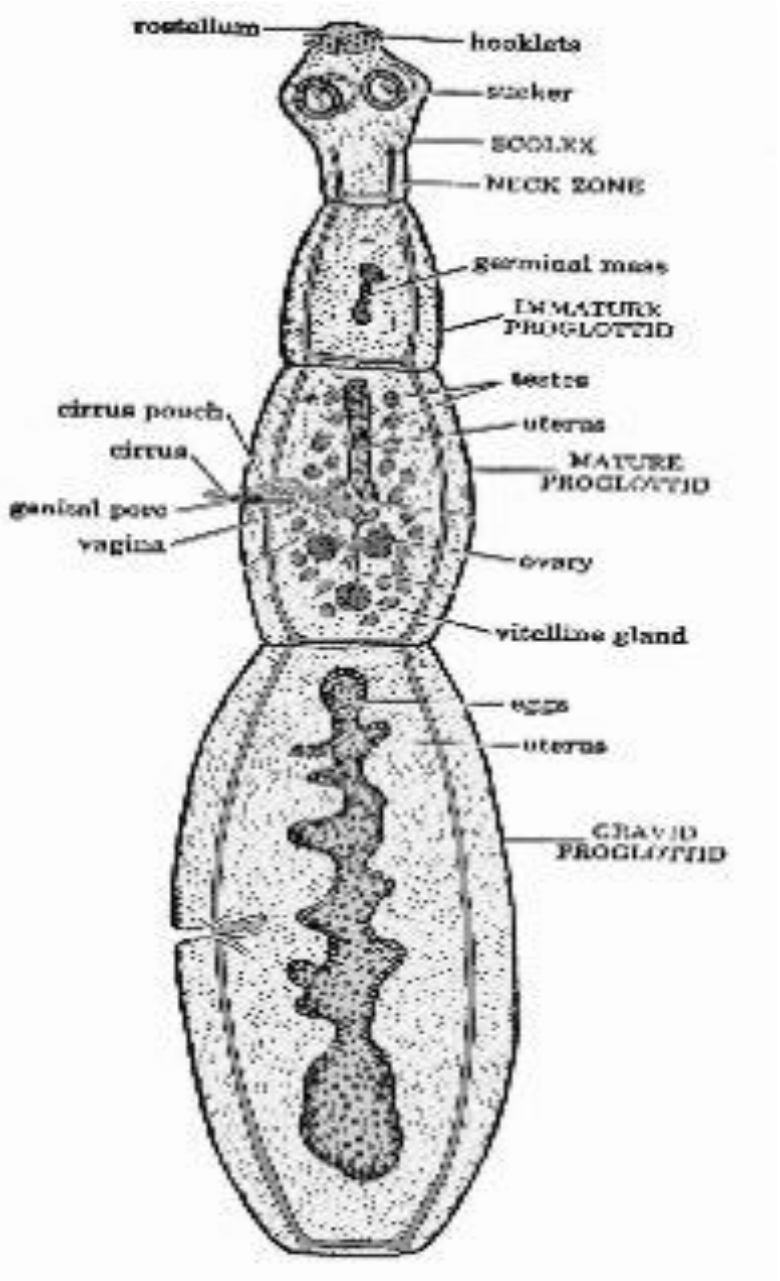
strobila
- immature proglottides:width>length
- mature proglottides: width=length
- gravid proglottides: width<length



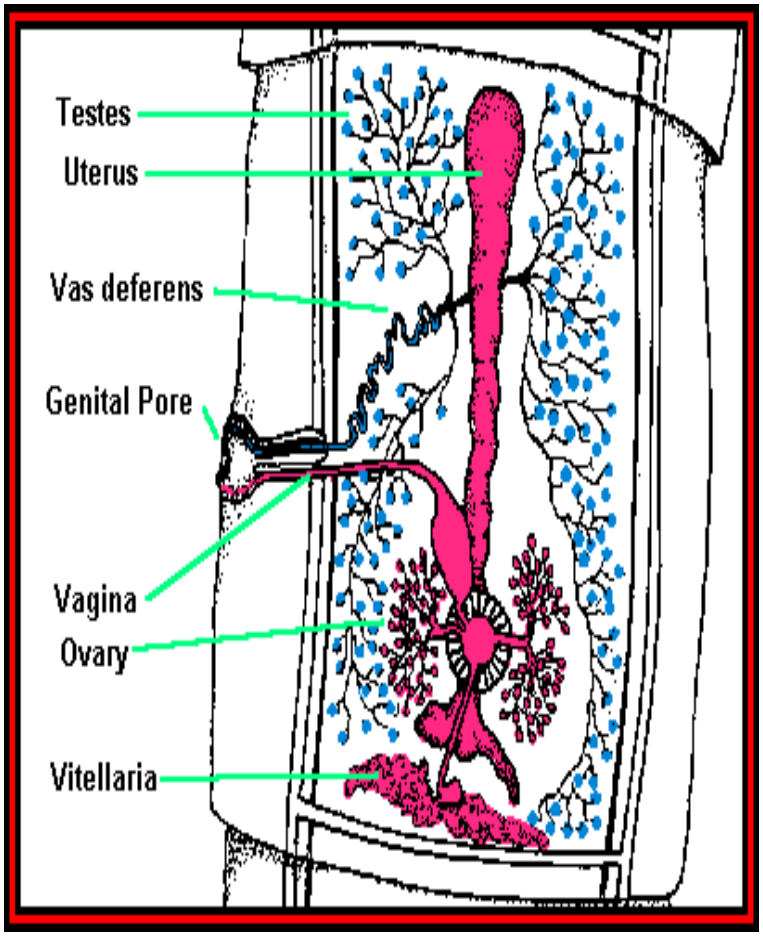
scolex

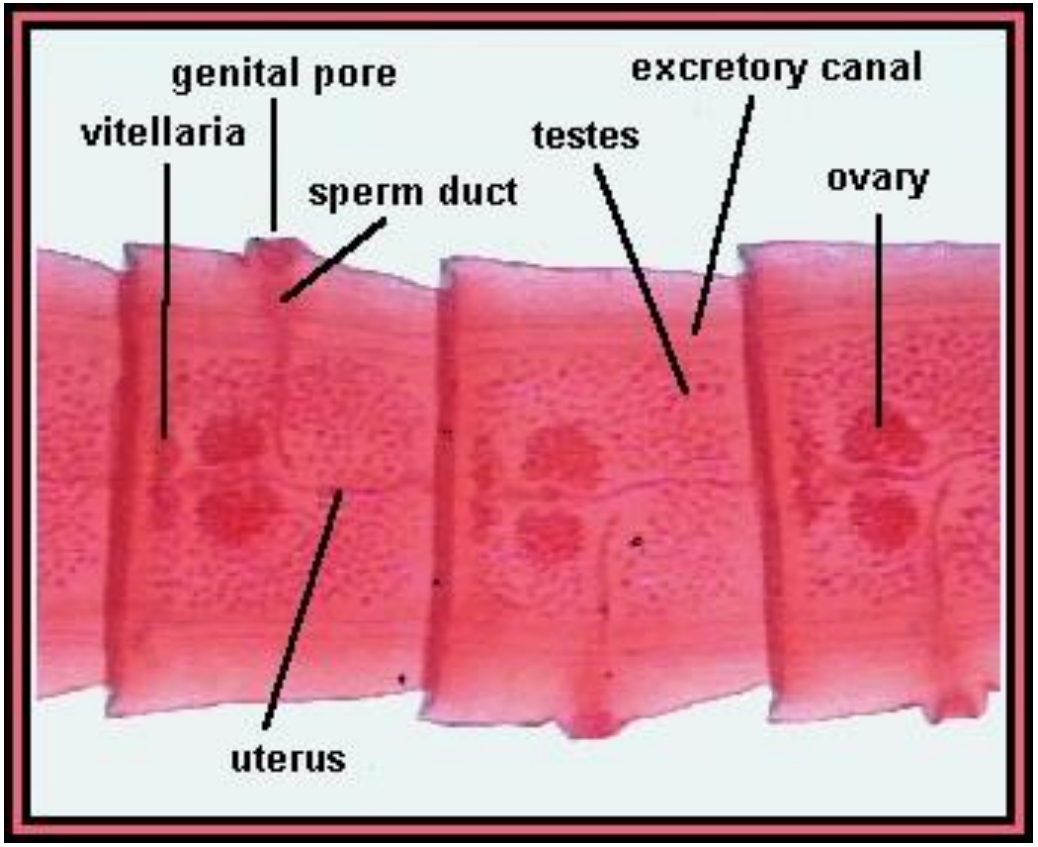
neck

strobila

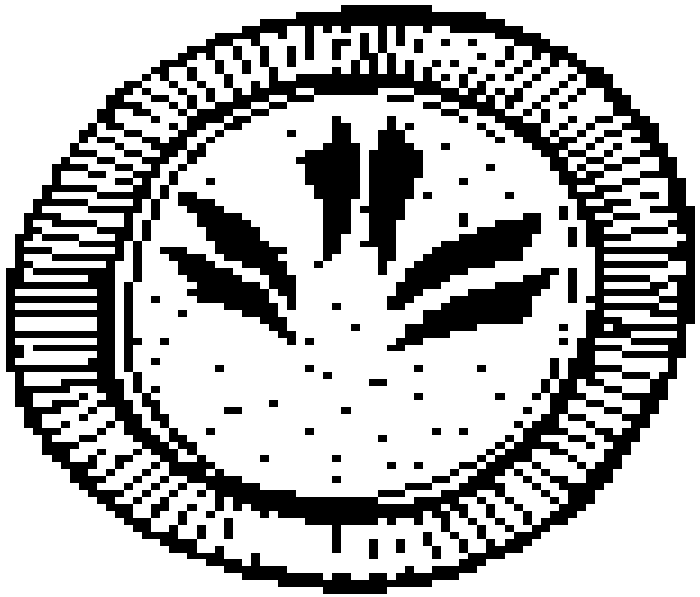


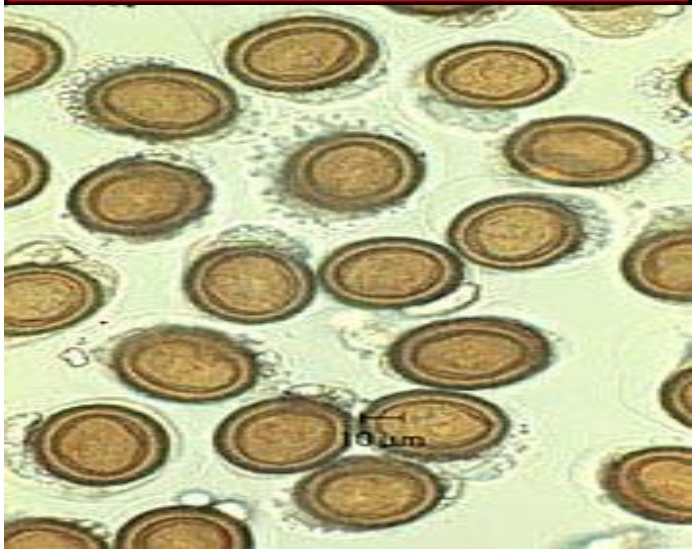
Mature Segments (Proglottids)



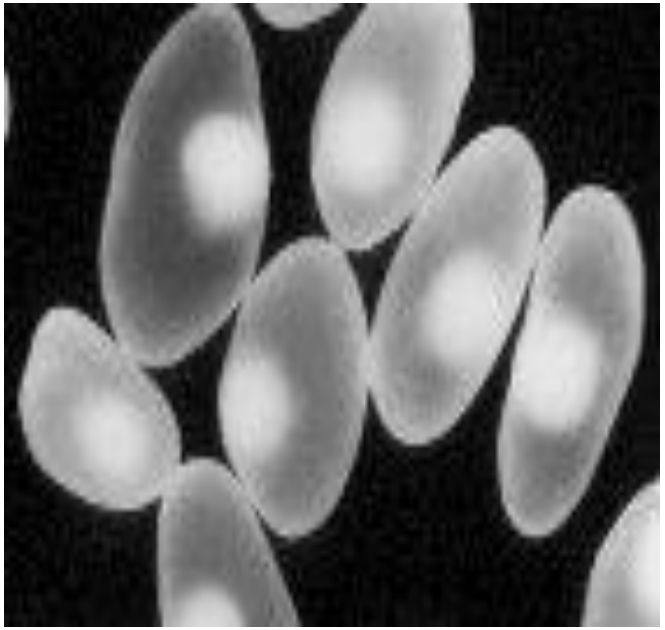


2. Egg, The eggs of *Taenia saginata* and *T. solium* are indistinguishable morphologically. The eggs are spherical, diameter 31 to 43 μm, with a thick radially striated brown embryophore Inside each is an oncosphere with 6 hooklets.





3.Cysticercus bovis. It is a semitransparent and bladder, like a white pomegranate seed about 0.6-1cm. There is fluid and a white scolex with 4 suckers and hooklets inside it.



Under stimulation of bile

The scolex invaginates in the bladder

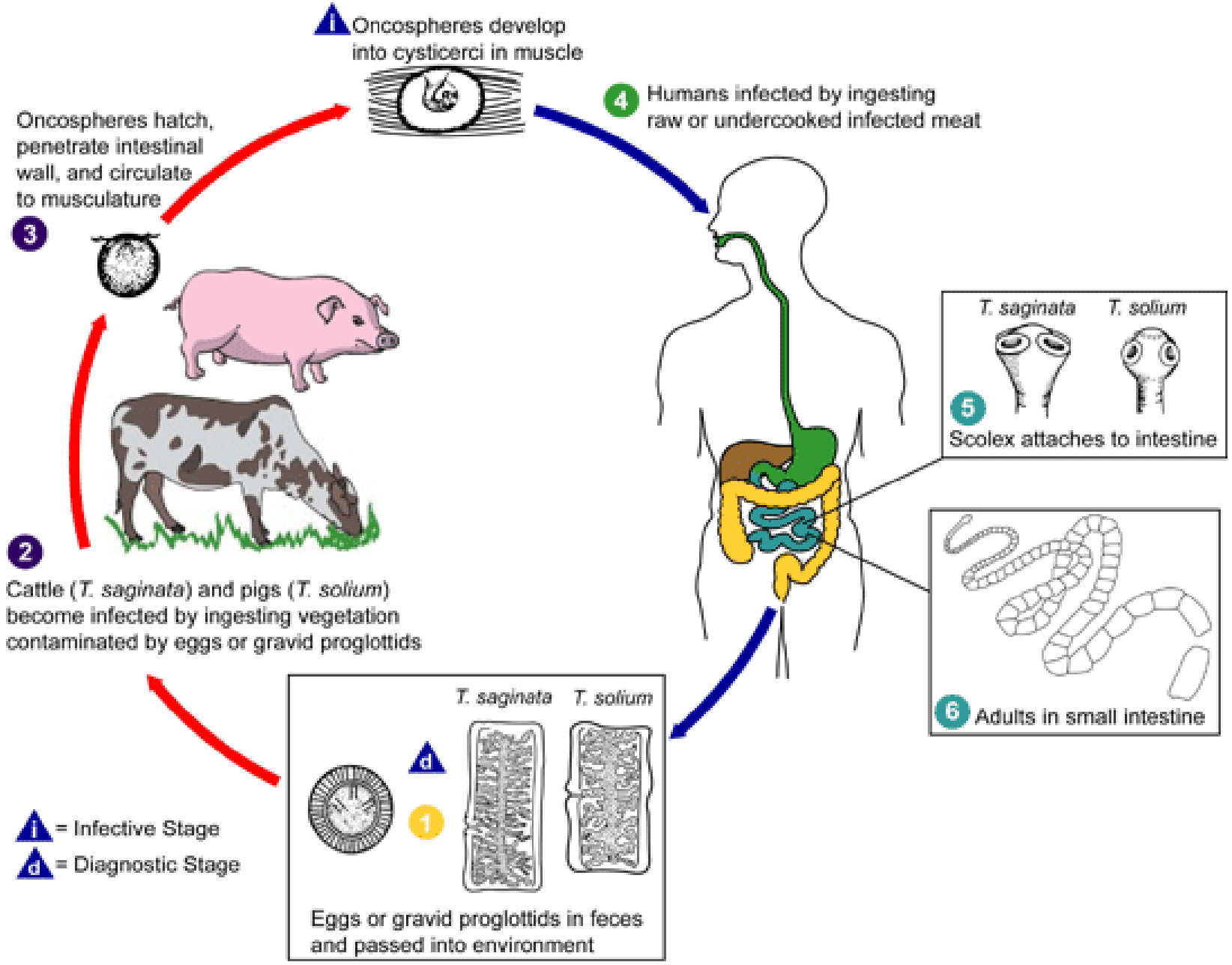
The scolex evaginates

Life Cycle

Humans are the only definitive hosts for *T. saginata* and *T. solium*. Eggs or gravid proglottids are passed with feces ; the eggs can survive for days to months in the environment. Cattle (*T. saginata*) and pigs (*T. solium*) become infected by ingesting vegetation contaminated with eggs or gravid proglottids . In the animal's intestine, the oncospheres hatch , invade the intestinal wall, and migrate to the striated muscles, where they develop into cysticerci. A cysticercus can survive for several years in the animal .

Humans become infected by ingesting raw or undercooked infected meat . In the human intestine, the cysticercus develops over 2 months into an adult tapeworm, which can survive for years.

The adult tapeworms attach to the small intestine by their scolex and reside in the small intestine. The adults produce proglottids which mature, become gravid, detach from the tapeworm, and migrate to the anus or are passed in the stool (approximately 6 per day)


i Oncospheres develop into cysticerci in muscle
4 Humans infected by ingesting raw or undercooked infected meat
Oncospheres hatch, penetrate intestinal wall, and circulate to musculature
3
T. saginata
T. solium
5 Scolex attaches to intestine
2
Cattle (T. saginata) and pigs (T. solium) become infected by ingesting vegetation contaminated by eggs or gravid proglottids
6 Adults in small intestine
T. saginata
T. solium
d
1
Eggs or gravid proglottids in feces and passed into environment
i = Infective Stage
d = Diagnostic Stage

III. Pathogenesis and Clinical Manifestations

- **1. Taeniasi**s: It is caused by the adult residing in small intestine of the man. The adult irritates the small intestine causing discomforts, such as abdominal pain, anorexia, chronic indigestion, diarrhea, emaciation, eosinophilia and etc.
- **2. Cysticercosis**: It is caused by the cysticerci living in human tissues. The manifestations vary with the number of cysticerci and the tissues and organs involved.

(1) Subcutaneous type:

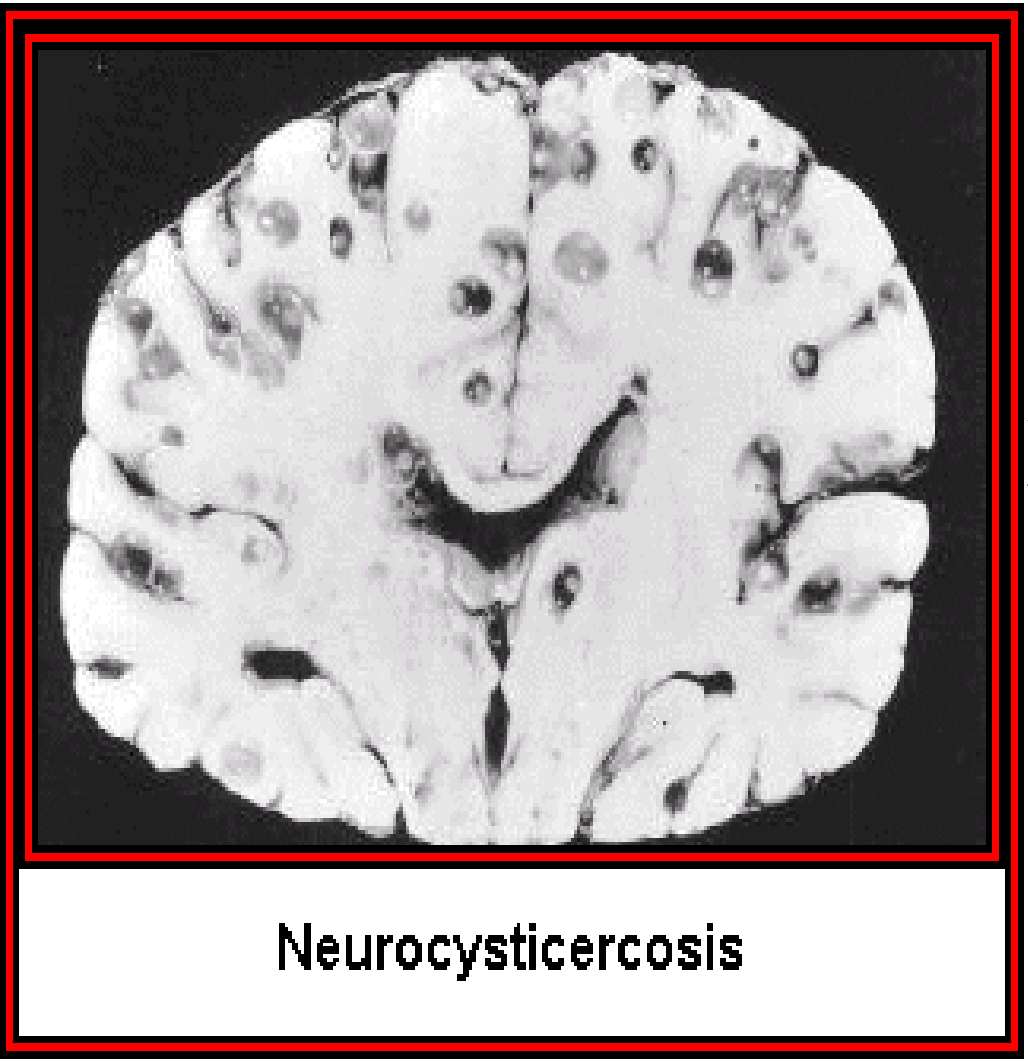
The subcutaneous nodules are usually found in head, limbs, neck, abdomen and back. They are painless.

Note this cysticercus in the tongue

(2) Ocular type:

The cysticercus is usually found in the vitreous body or subretina. Visual disturbance often occurs. The died body of worm may provokes local inflammation causing blindness.

- **(3) Brain type:**



Neurocysticercosis

The symptoms are related to the site of infection. The patients may manifest headache, nausea, vomiting, epilepsy , paralysis , weakness in limbs, diplopia, dizziness, mental disorder. Epilepsy is the most frequent symptoms of brain cysticercosis.

Diagnosis

1.Taeniasis: Confirmative diagnosis of taeniasis is made by finding gravid proglottides or egg in stool.

(1) direct fecal smear

(2) brine floatation technique

(3) cellophane-tape technique

2. Cysticercosis: Biopsy of subcutaneous nodules, X-ray ,CT 0r MR are used for the diagnosis of brain type and ophthalmoscope examination is used for ocular form.

3. Immunological tests are for reference only.

- Treatment and prevention
- 1. Treatment of Taeniasis: Praziquantel may be used.
- **2.** Treatment of cysticercosis: Surgical removal is required for ocular and superficial cysticercoses. Praziquantel may be used to treat brain cysticercosis , but the patients should take praziquantel in hospital.

3.Niclosamide may be used.

TAENIA SOLIUM (PORK TAPEWORM)

Adult worms live in human small intestine causing taeniasis. Larval stage (Cysticercus bovis) lives in pigs tissues. This disease is prevalent all over the world.

Morphology:

Adult worm measures about 3 meters in length. The globular scolex hasrostellum with 2 rows of hooklets. There are <1000 proglottids.Gravid proglottid liberates about 30,000-50,000 eggs.

I. Morphology:

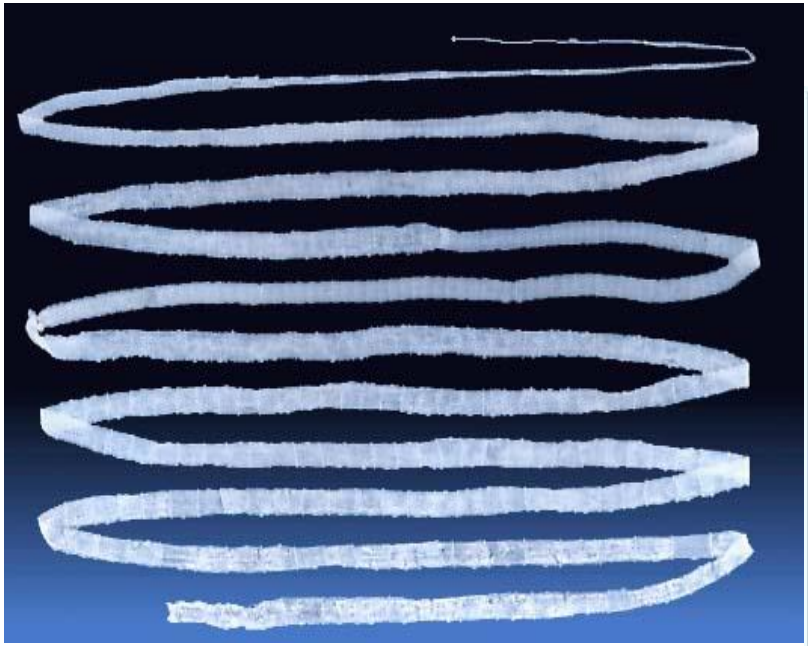
1. The biological differences between T. solium and T. saginata

Adult	T. solium	T. saginata
length	2-4 meters	4-8 meters
scolex	1mm in diameter with 4 suckers and hooklets	2mm in diameter, with 4 suckers but no hooklets
Number of segment	700 to 1000	1000 to 2000
Mature proglottid	3 lobes of ovary	2 lobes of ovary
Gravid proglottid	7-13 uterine lateral branches on one side	15-30 uterine lateral branches on one side
Number of gravid proglottid detached	usually several segments	usually single segment
Mode of proglottids passing out	passively expelled	actively migrate out of anus
Cysticercus	scolex with hooklets found in man and pig	no hooklets on scolex only found in cattle
Disease caused in man	taeniasis and cysticercosis	taeniasis

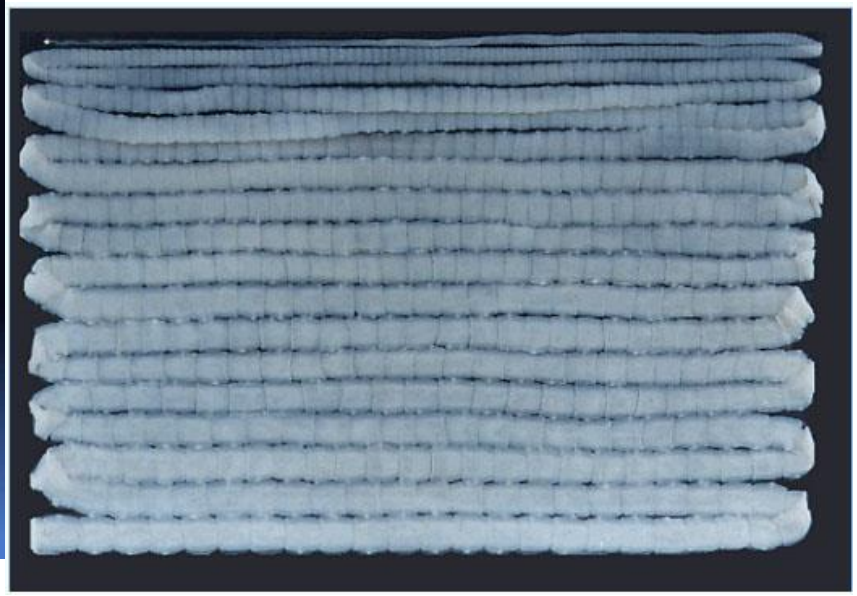
2. Egg: same as that of T solium

Differences between T. solium and T. saginata

1. Body length



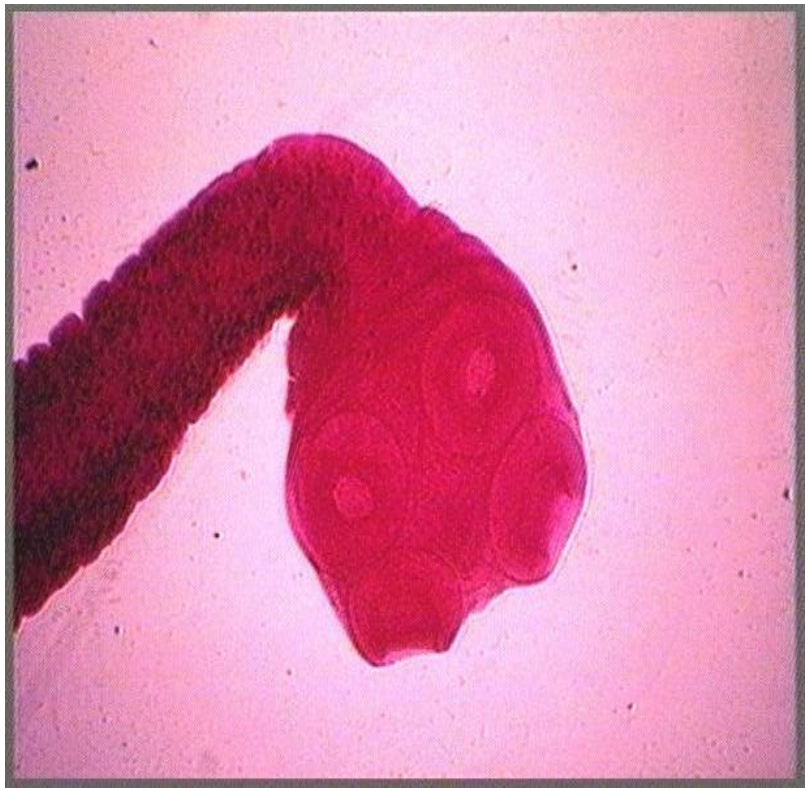
T. solium



T. saginata

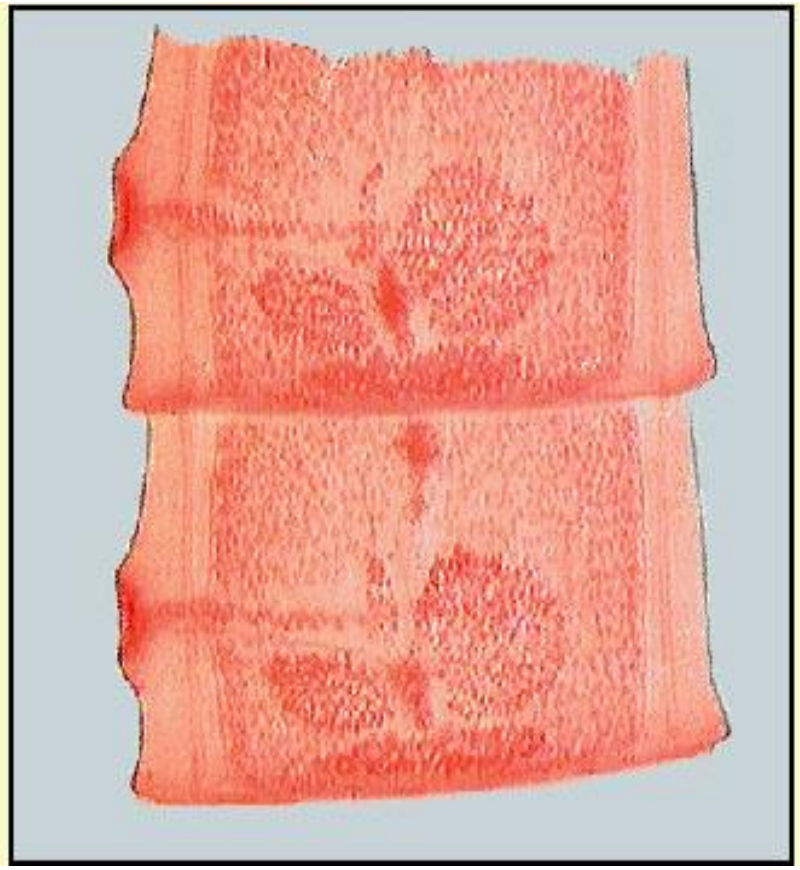
2. scolex

T. solium



T. saganita

3. Mature proglottid

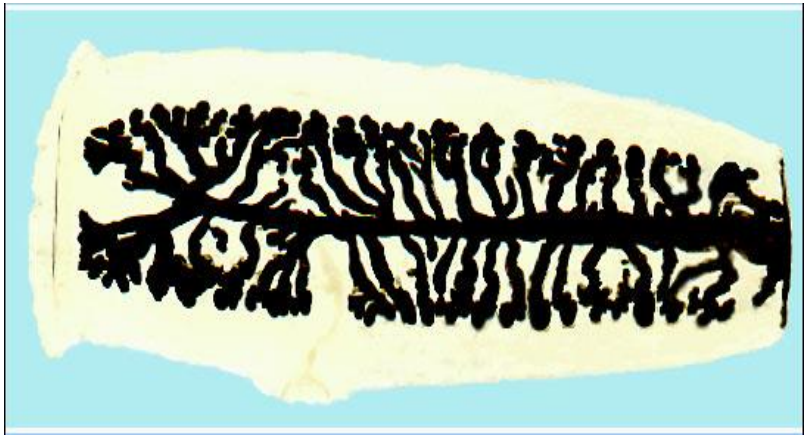


T. solium

T. saginata

4. Gravid proglottid

T. solium



T. saginata

Life cycle

The intermediate host is cattle and The others same as those of T. solium.

Pathogenesis:

Usually only single worm is present and the patient is no symptom. Some patients may complain of migrating proglottids from anus with pruritus at the perianal region. Abdominal discomfort, nausea, vomiting, constipation or diarrhea may occur.

Diagnosis

Finding of gravid proglottids or eggs at the perianalregion by cellophane tape method.

Treatment:

Same as that of T. solium