Microbiology sheet

INTRODUCTION TO CESTODES

TAENIA SAGINATA & SOLIUM

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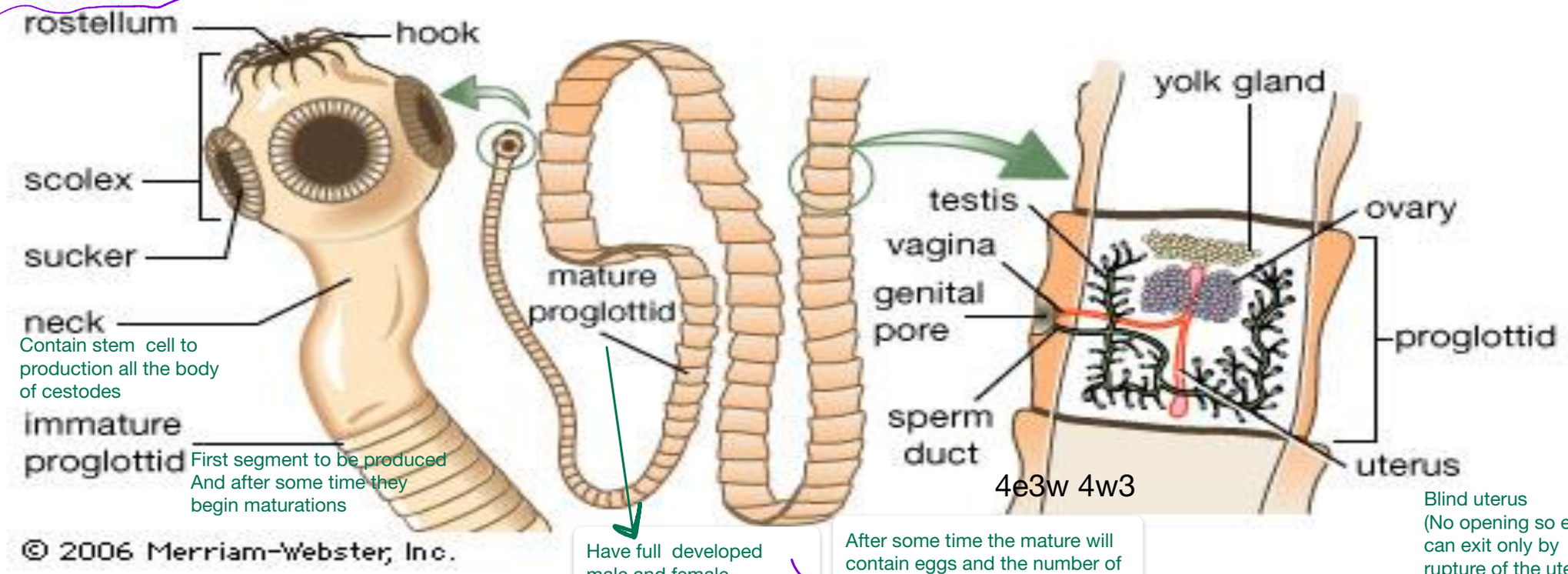
General characters

Contain muscular system and nerve fibers and execratory system
The execratory system composed of : 2 tubes that open in a pore near the neck

The difference bt cestodes and trematode :
Trematode contain digestive system while the cestodes don't.

Projection in head by this can attachment to organ and tissue more penetration



Contain stem cell to production all the body of cestodes

First segment to be produced
And after some time they begin maturations

Have full developed male and female reproductive system
They are found in the middle of parasite body

After some time the mature will contain eggs and the number of eggs will increase by time till the uterus enlarges and causes elongation of the segment
At this stage the segment will be named : garved sigment

4e3w 4w3

Blind uterus
(No opening so egg can exit only by rupture of the uterus)

Adults:

- Flat, ribbon-like, and segmented.
- They have muscular, nervous, and excretory systems.
- Cestodes have neither a body cavity nor an alimentary tract.
- Cestodes are hermaphrodites.

Subclass Cestoda is divided into two orders

Cyclophyllidea

- *Taenia saginata*
- *Taenia solium*

Pseudophyllidea

- *Diphyllobothrium latum*

Cestodes are classified according to habitat into

Intestinal cestodes

(Adult in the small intestine of man)

Man is D.H

Tissue cestodes

(Larvae in the tissue of man)

Man is I.H

No adult in small intestine

Taenia saginata (Beef Bald Tape Worm)

❖ Distribution:

Cosmopolitan where beef is eaten.

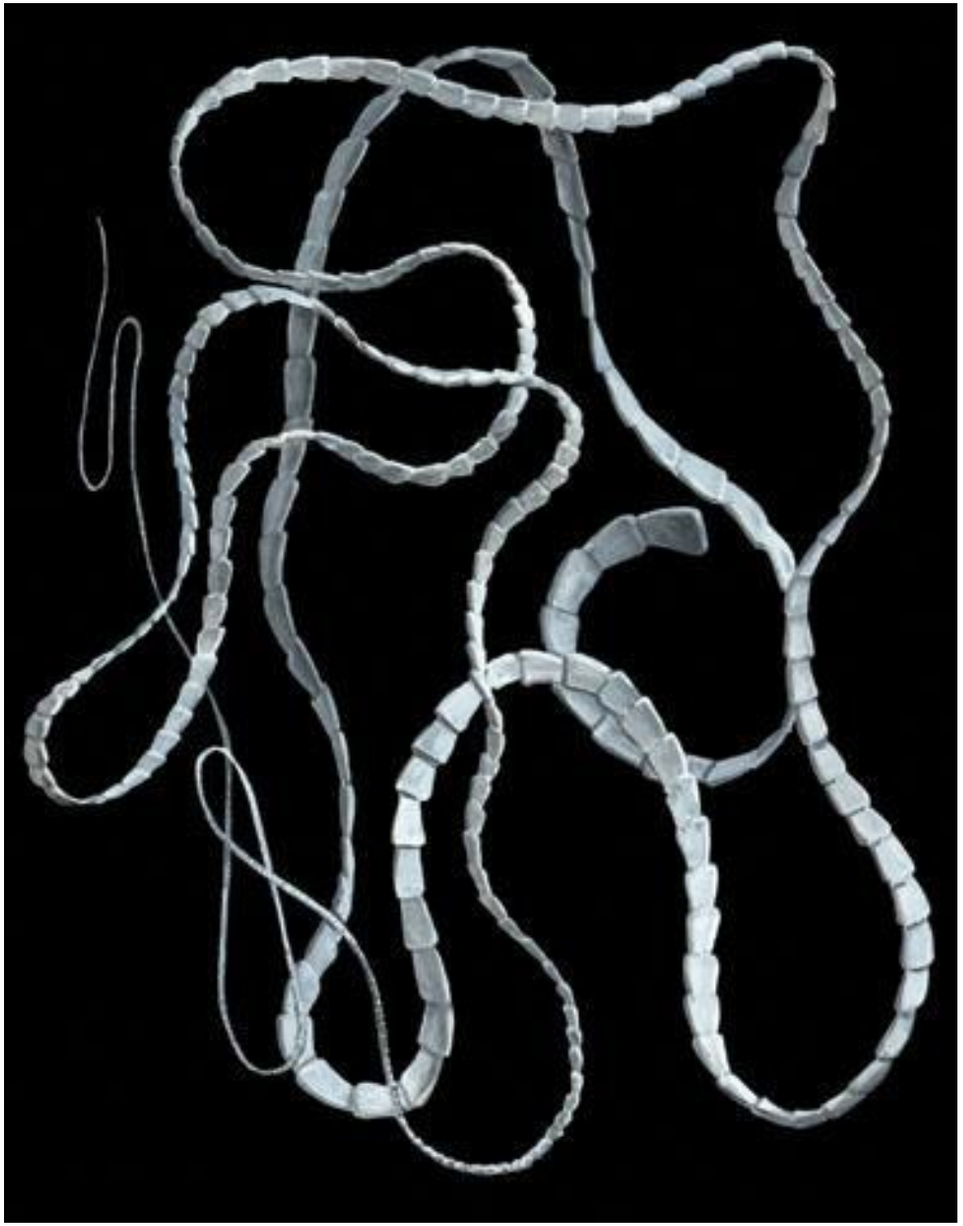
❖ Disease:

1. Taeniasis *saginata*.

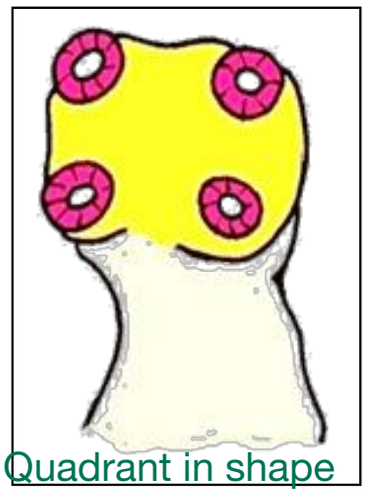
❖ Morphology:

5-10 meters

By naked eye:

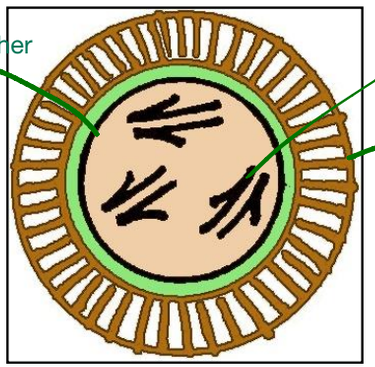


Taenia saginata



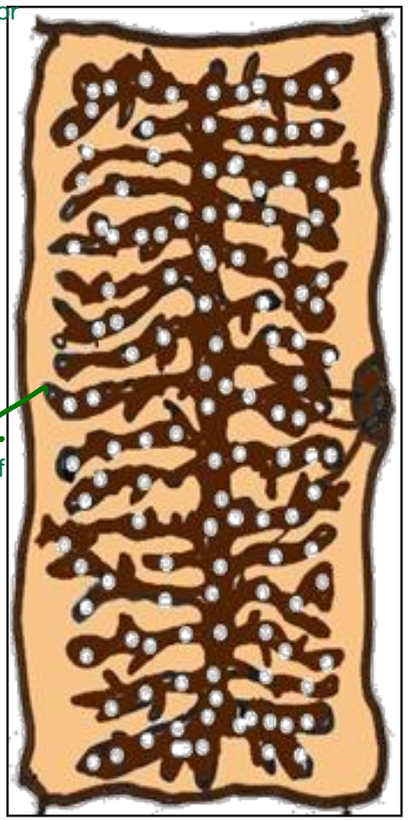
SCOLEx

Quadrant in shape
Contain only 4 suckers



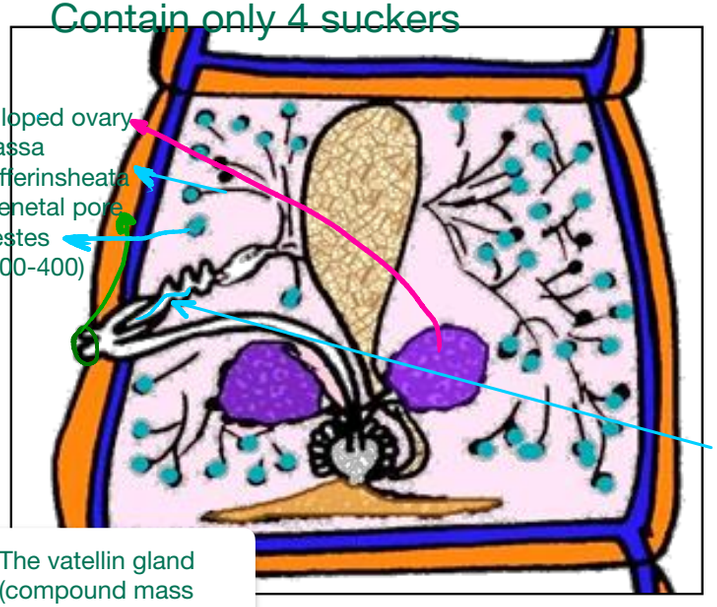
Egg

30 μ
Spherical in shape



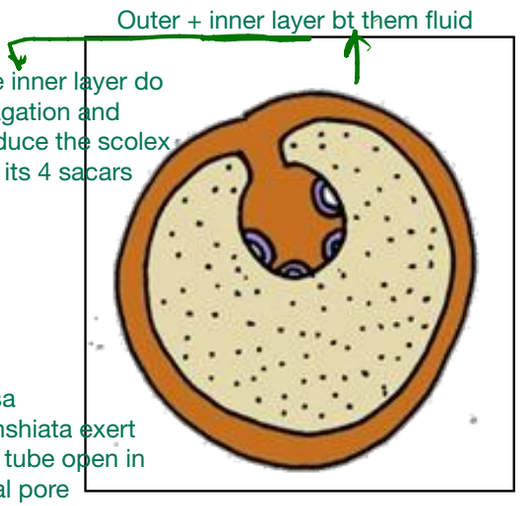
Gravid segment

Elongated
Longer than the border bc of uterus enlargement



The vatellin gland (compound mass behind the ootype)

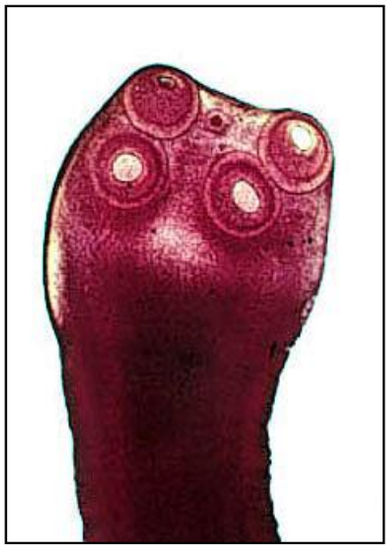
Mature segment



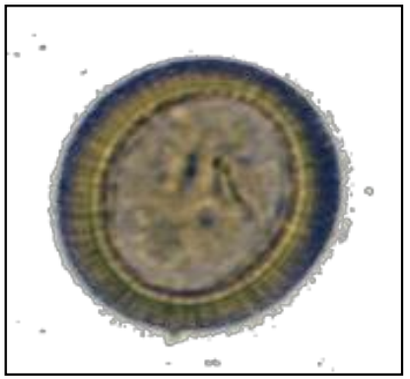
Cysticercus bovis

The only larval stage of taenia saginata

Taenia saginata

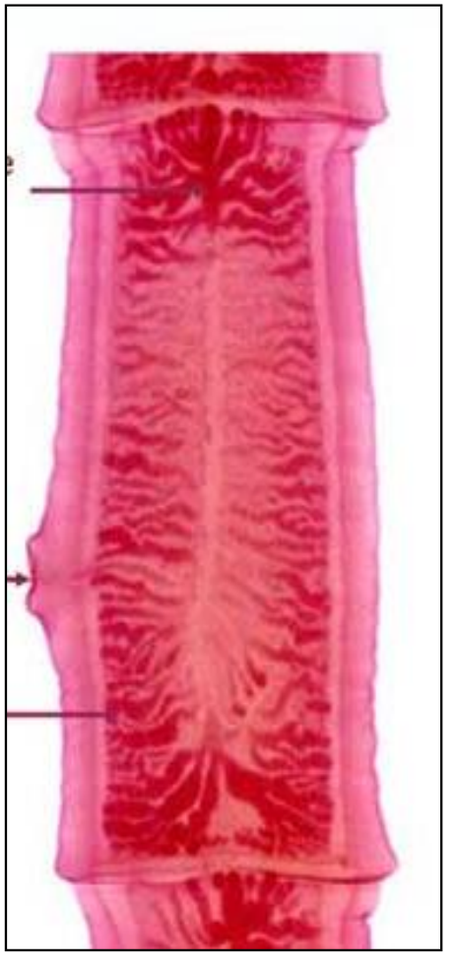


S C O L E x

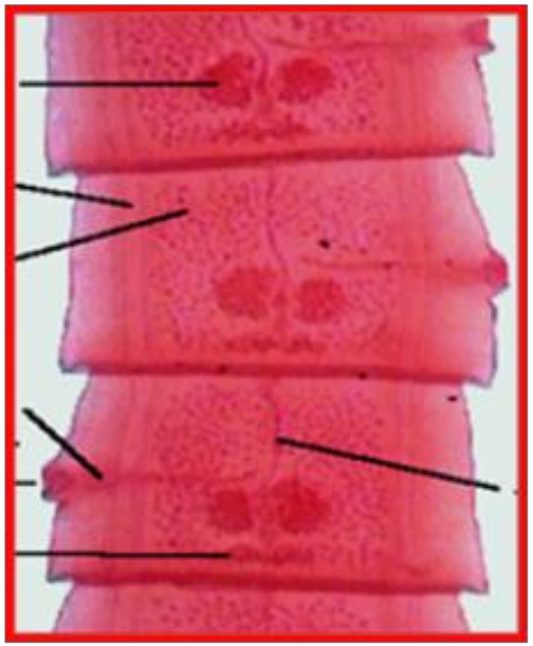


Egg

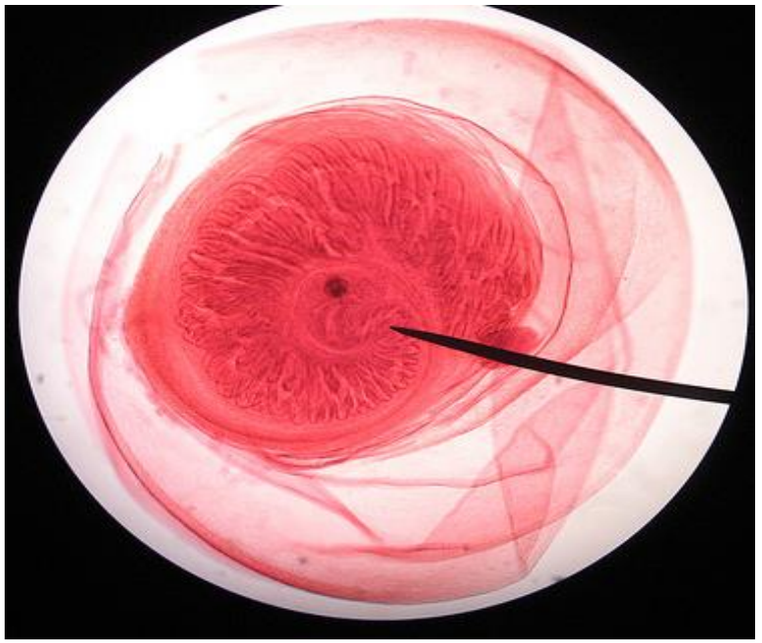
Yellowesh brown



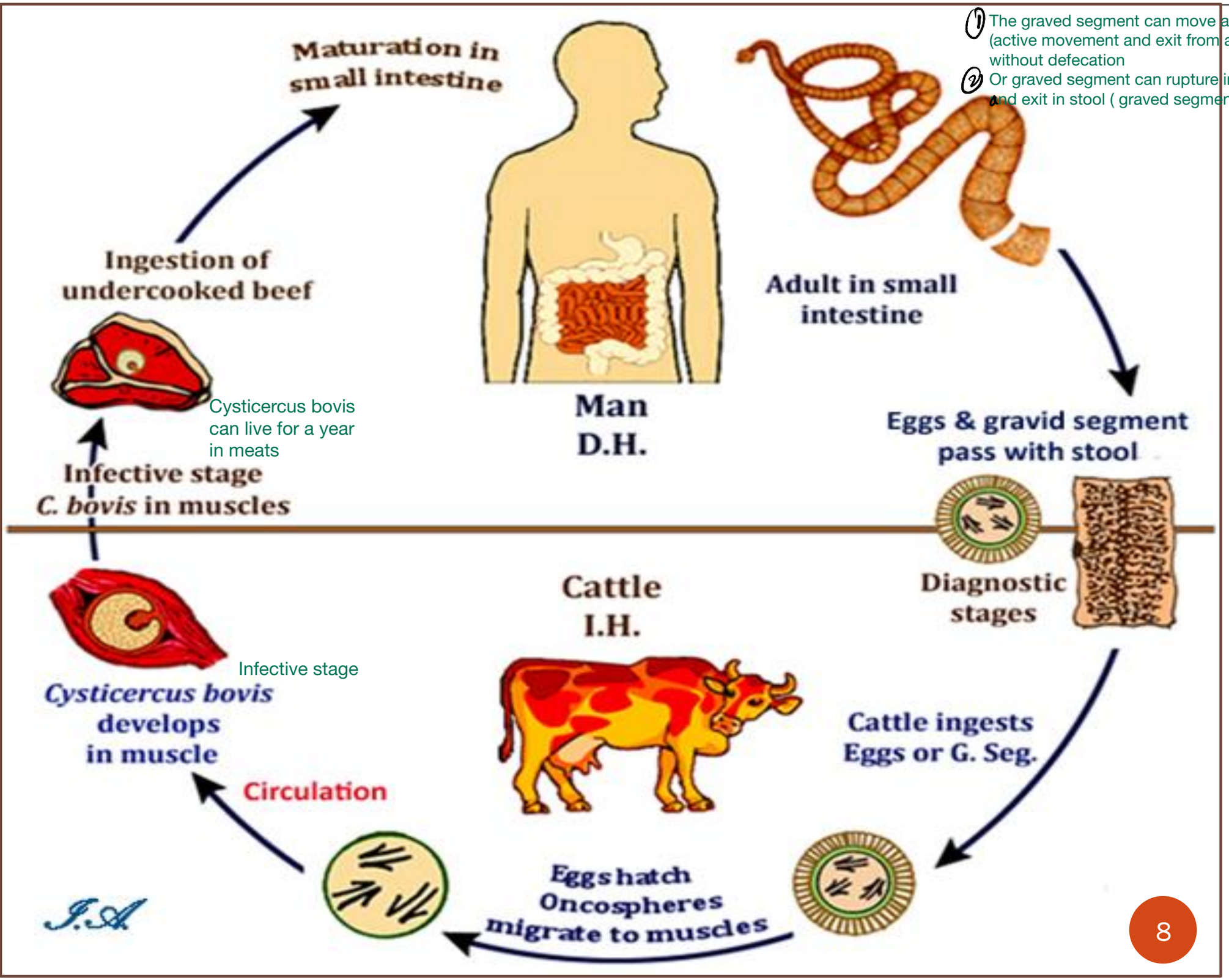
Gravid segment



Mature segment



Cysticercus bovis



1. The graved segment can move alone (active movement and exit from anus without defecation
2. Or graved segment can rupture in man and exit in stool (graved segment eggs)

Mode of Infection

Man infected by eating beef either raw or improperly cooked e.g. steaks, hamburgers or grilled (kabab) containing viable *cysticercus bovis*.

Clinical aspects of taeniasis:

Abdominal pain , nausea, vomitting, diarrhea

- The infection may be asymptomatic.

Even if patient eat a lot of food

- Loss of weight, constant feeling of hunger and abdominal colic mostly occur.
- In *Taenia saginata,* active creeping of gravid segments from the anus causes perianal itching, mental worry and anxiety.
- **Complications:**

- Intestinal obstruction and appendicitis.

Diagnosis

1- Detection of acid-fast eggs by stool examination (direct and concentration methods or peri-anal scotch adhesive tape swab and NIH swab).

Red color

By microscope to count the number of branches

2- Detection of gravid segments in the stool.

3- Detection of copro-antigen in stool.

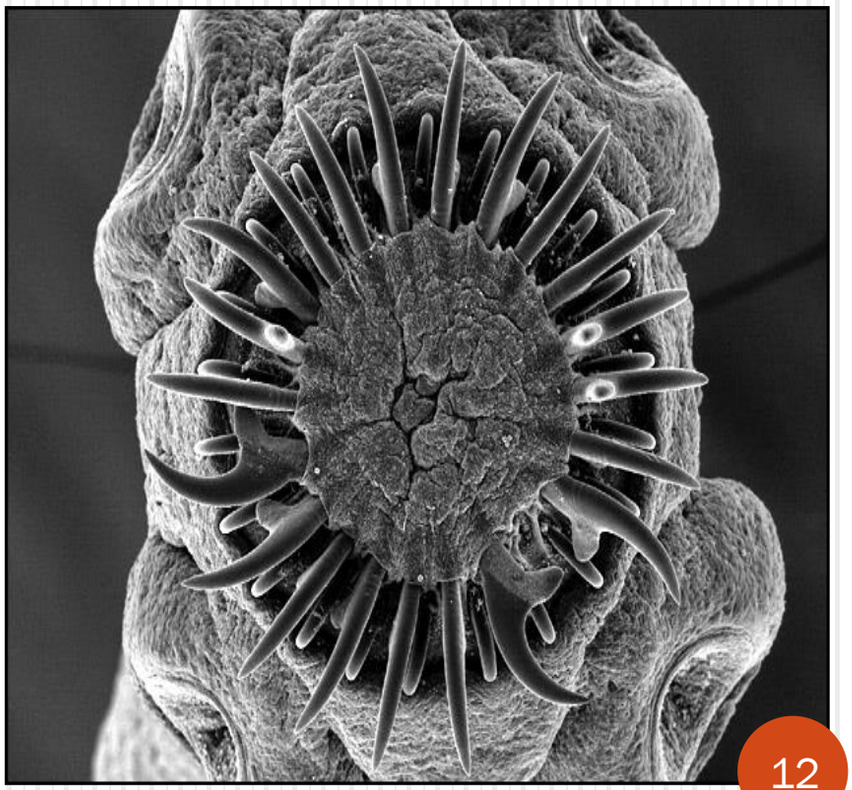
Any parasite in stool called copro antigen

Treatment

1) Praziquantel (Biltracide) drug of choice.

2) Niclosamide (Yomesan).

Taenia solium
(Pork tape worm)



❖ Distribution:

Cosmopolitan where pork is eaten.

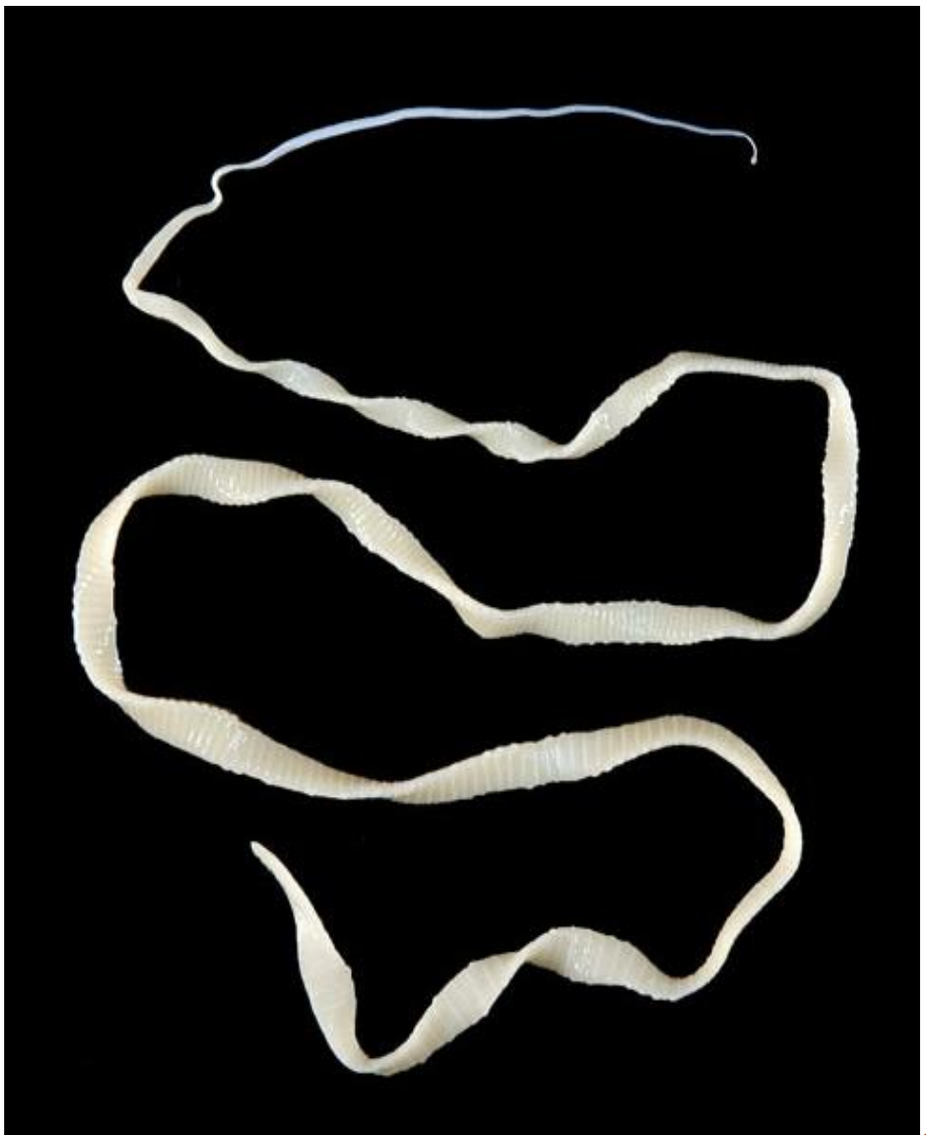
❖ Disease:

1. Taeniasis *solium*.
2. Cysticercosis.

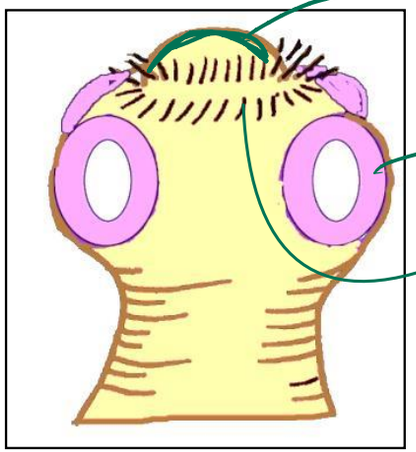
❖ Morphology:

2-4 meters

Half the Teania saginata

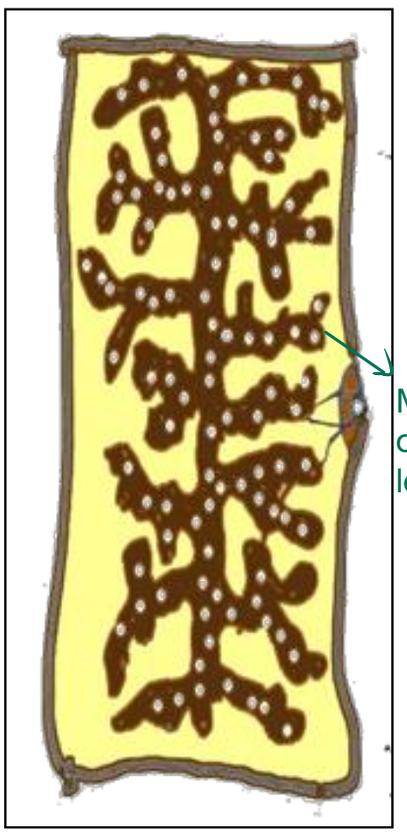


Taenia solium



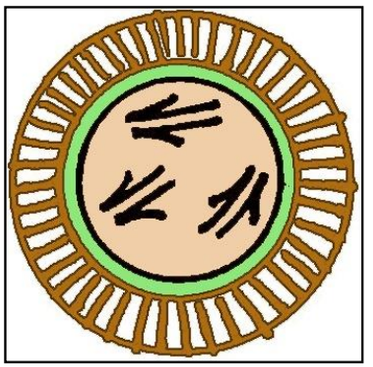
S C O L E x

4 suckers
Rostellum: (protrusion from head for attachment)
2 rows of hocks

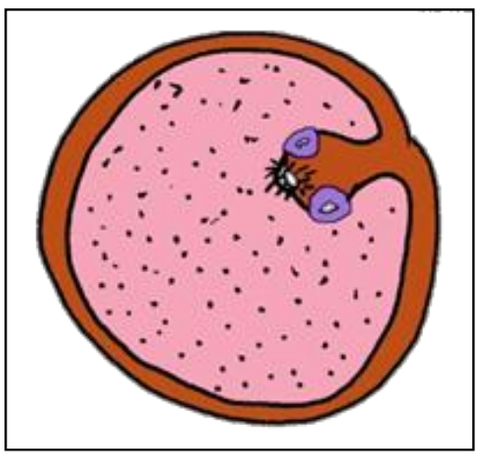


Main branches of uterus are less than 15

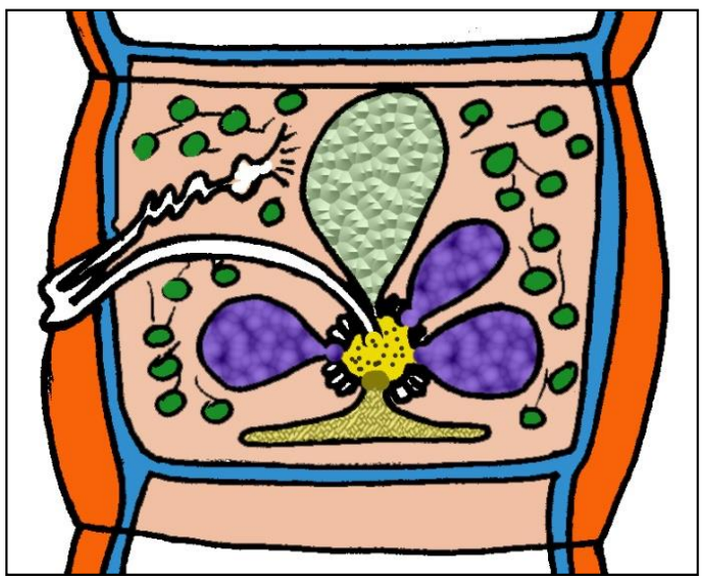
Gravid segment



Egg



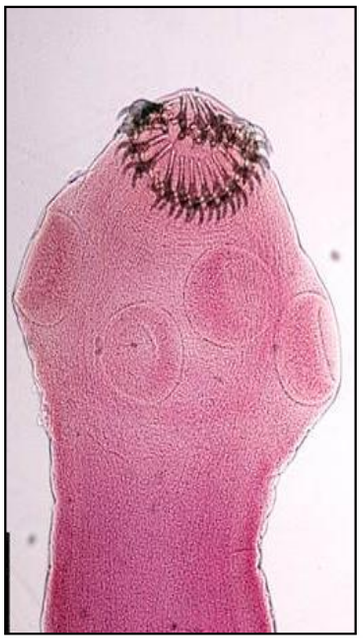
Cysticercus cellulosae



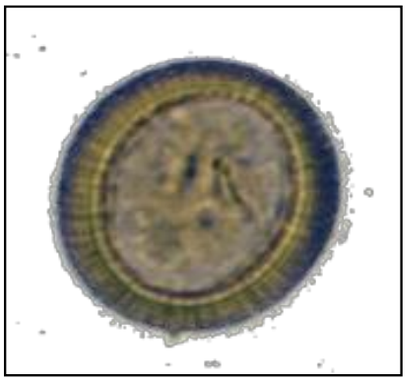
Mature segment

Less number of testis 150-200
3loped uterus

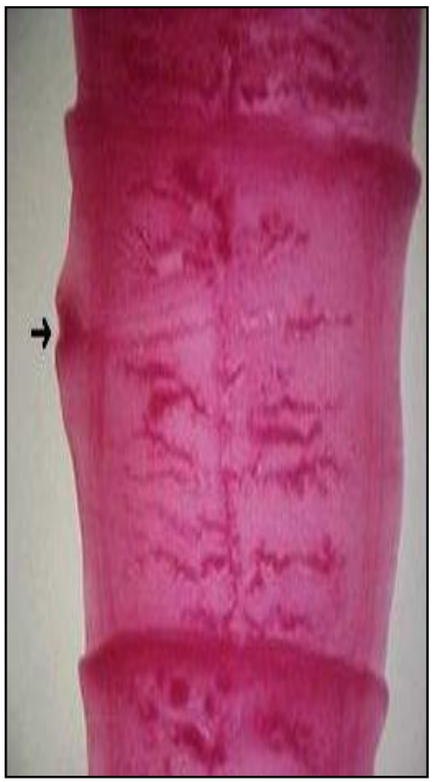
Taenia solium



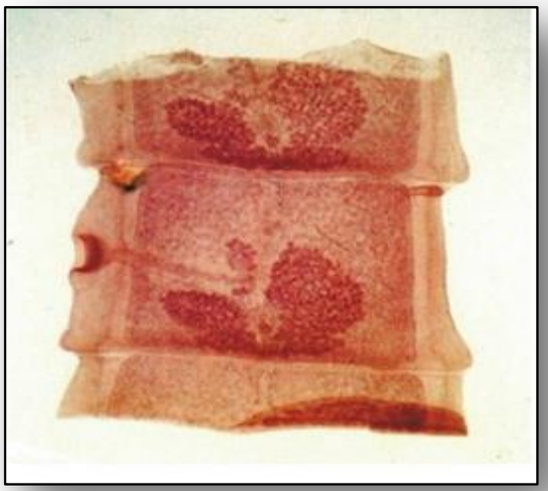
SCOLEx



Egg

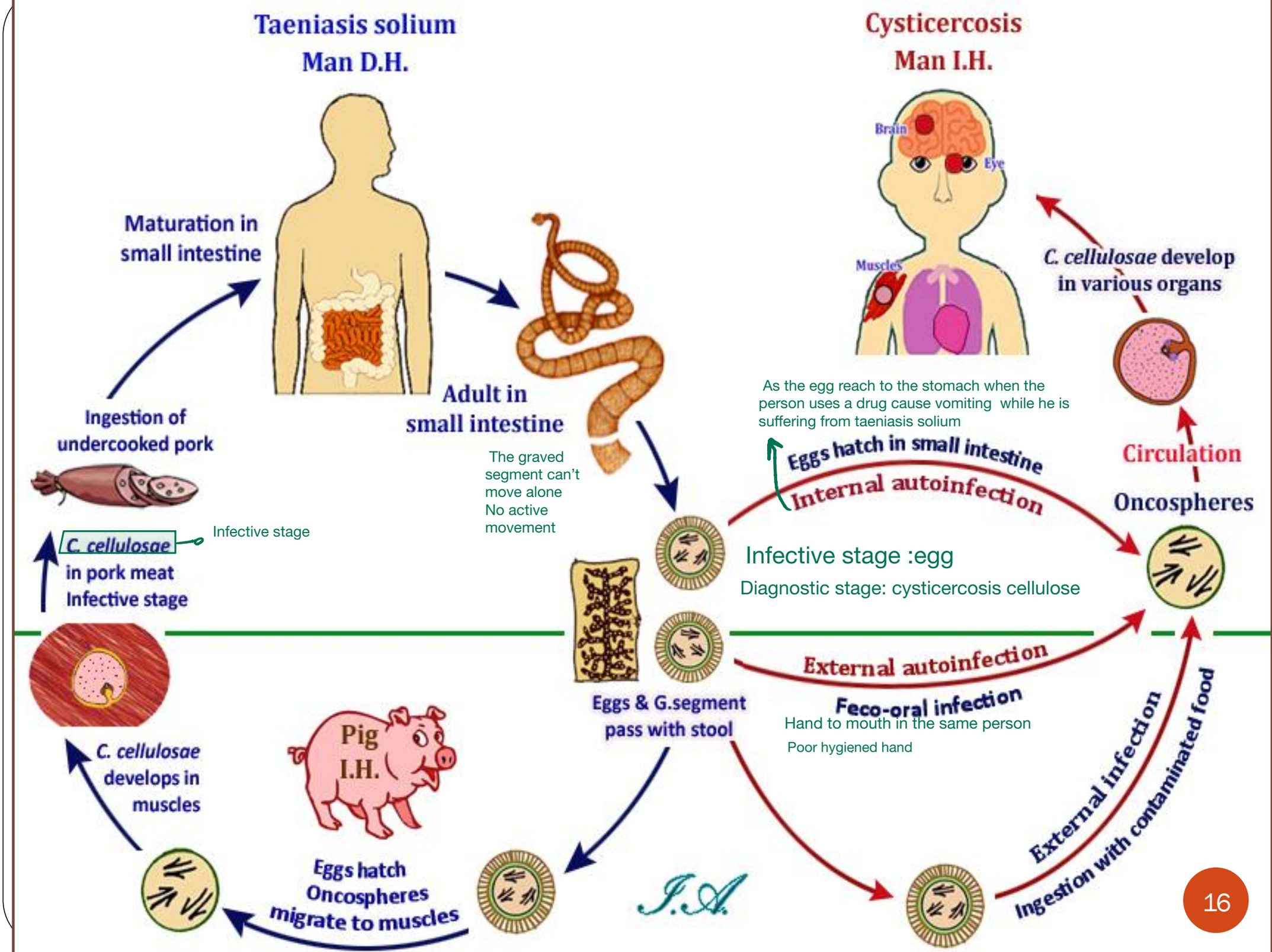


Gravid segment



Mature segment

Cysticercus cellulosae


Taeniasis solium
Man D.H.
Cysticercosis
Man I.H.
Brain
Eye
Muscles
Maturation in small intestine
Adult in small intestine
Ingestion of undercooked pork
C. cellulosae in pork meat Infective stage
Infective stage
The graved segment can't move alone No active movement
C. cellulosae develop in various organs
As the egg reach to the stomach when the person uses a drug cause vomiting while he is suffering from taeniasis solium
Eggs hatch in small intestine
Internal autoinfection
Circulation
Oncospheres
Infective stage :egg
Diagnostic stage: cysticercosis cellulose
External autoinfection
Feco-oral infection
Hand to mouth in the same person
Poor hygiened hand
Eggs & G.segment pass with stool
C. cellulosae develops in muscles
Pig I.H.
Eggs hatch Oncospheres migrate to muscles
External infection
Ingestion with contaminated food

Pathogenesis and Symptomatology

Taeniasis *solium*: Due to ingestion of undercooked pork containing cysticercus cellulosa (the same clinical pictures as taeniasis *saginata*). But no appendicitis occur

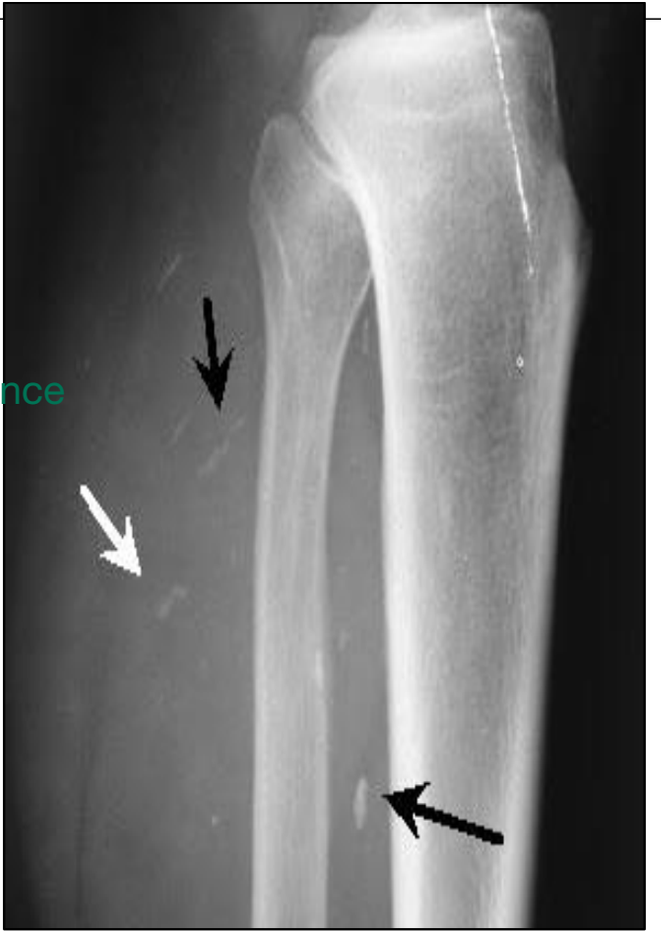
Cysticercosis: It develops when man ingested the *T. solium* eggs with food or drink or autoinfection ➲ development of larvae (cyticercus cellulosa) in his tissues (ms, brain, eye, sucutaneous tissues).

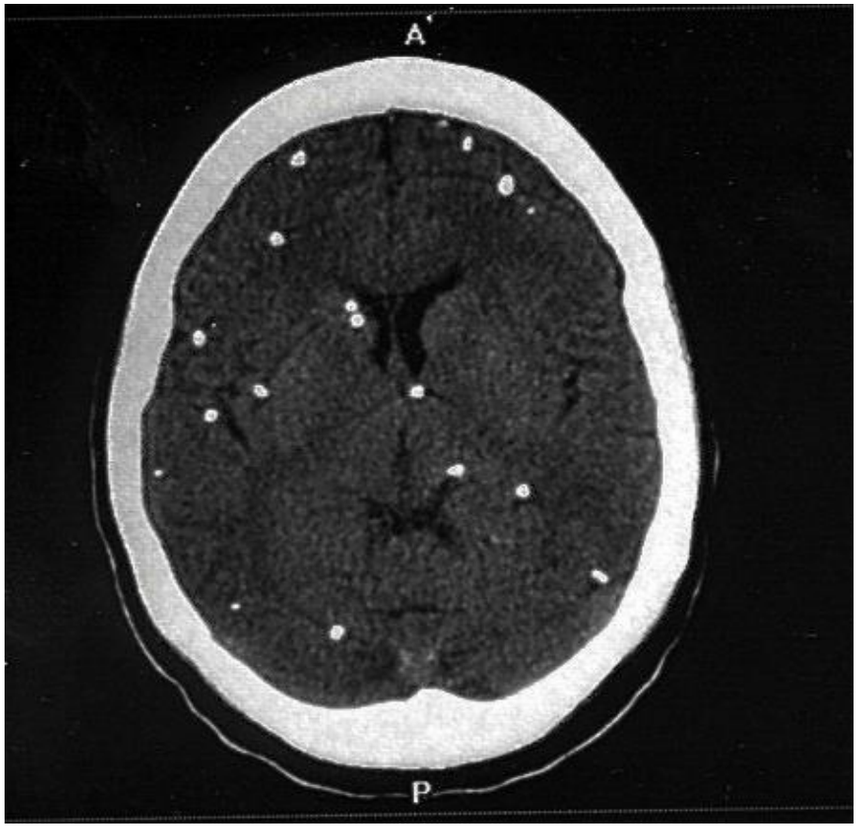
Symtomatology of cysticercosis

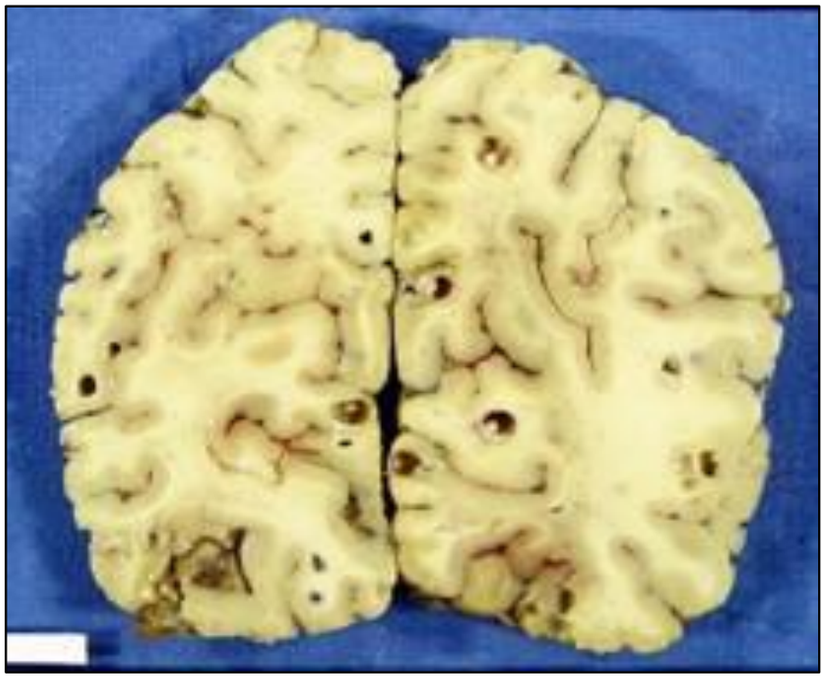
Symptoms depends on the size of cyst, number & site affected:

- **Muscle:** Myositis with fever, muscle swelling ➲ later, progresses to atrophy and fibrosis.
- **Brain :** Increase of intracranial pressure, epileptic fits and headache.
- **Eye :** Retinal oedema, haemorrhage, decreased vision or even visual loss.
- **Subcutaneous tissues:** Firm, mobile painful nodules mainly on the trunk and extremities.

Rice appearance







Diagnosis of taeniasis solium

1- Detection of Non acid-fast eggs by stool examination (direct and concentration methods)

2- Detection of gravid segments in the stool and counting the main lateral branches (less than 15) .

3- Detection of copro-antigen in stool.

Treatment

1) Praziquantel (Biltracide) drug of choice.

2) Niclosamide (Yomesan).

Diagnosis of Cysticercosis

A. Direct methods:

- Biopsy from nodules for detection of larvae.
- CT and MRI for brain infection.
- X ray for calcified cyst.
- Ophthalmoscope for eye infection.
- Surgical removal for detection of the larvae.
- Stool examination for detection of eggs or gravid segments (only in patients having the adult worm).

B. Indirect methods: More important

- Serological tests.
- Eosinophilia.

High eosinophilia Indicate that parasites are present

Treatment of Cysticercosis

According to the site,

1) **Brain cyst:** Anticonvulsant and antiparasitic drugs as praziquantel in combination with corticosteroids to reduce inflammatory reaction.

2) **Subcutaneous cyst:** Surgical excision.

	Taenia saginata	*Taenia solium*
Disease:	Taeniasis saginata	Taeniasis solium
Distribution:	Cosmopolitan where beef is eaten	Cosmopolitan where pork is eaten
Adult : *Size ***Scolex**	• 5–10 meters (average 6 meters) • Quadrate, about 1–2 mm in diameter with no rostellum or hooks	• 2–4 meters (average 3 meters) • Globular, about 1 mm in diameter, has a rostellum with 2 rows of hooks
Gravid segment:	• Longer than broad. • Uterus with 15–30 (18) lateral branches. • Motile, detach singly and may creep out without defecation.	• Longer than broad. • Uterus with 7–13 (9) lateral branches. • Non-motile, detach in groups of about five segments, pass passively with stool.

	Taenia saginata	*Taenia solium*
Egg:*Morphology ***Zeil Neelsen stain** ***Infectivity**	• Spheroid + oncosphere • Acid fast (red) • Not infective to man	• Similar • Non-acid fast (not stained) • Infective to man → cysticercosis
Larval stage:	• *Cysticercus bovis* (scolex without hooks)	• *Cysticercus cellulosae* (scolex with hooks)
Hosts: *D. H. ***I. H.**	• Man • Cattle	• Man • Pigs and man
D.H. Stages:	• Adult	• Adult , larvae or both
Mode of infection:	• Ingestion of undercooked beef containing *Cysticercus bovis* (Taeniasis)	• Ingestion of undercooked pork containing *Cysticercus cellulosae* (Taeniasis) • Egg ingestion (Cysticercosis)

❖ Prevention of cysticercosis

- Early and effective treatment of persons harbouring the adult worms to avoid the risk of autoinfection.
- In patients harbouring the adult parasite no nauseating drugs are to be given to avoid vomiting and antiperistaltic movements, which may lead to the development of cysticercosis.
- Avoid the use of human excreta as manure.
- Personal cleanliness, insect control and avoiding eating raw vegetables without proper washing.

ELSEVIER

Taenia Saginata in the Small Intestine

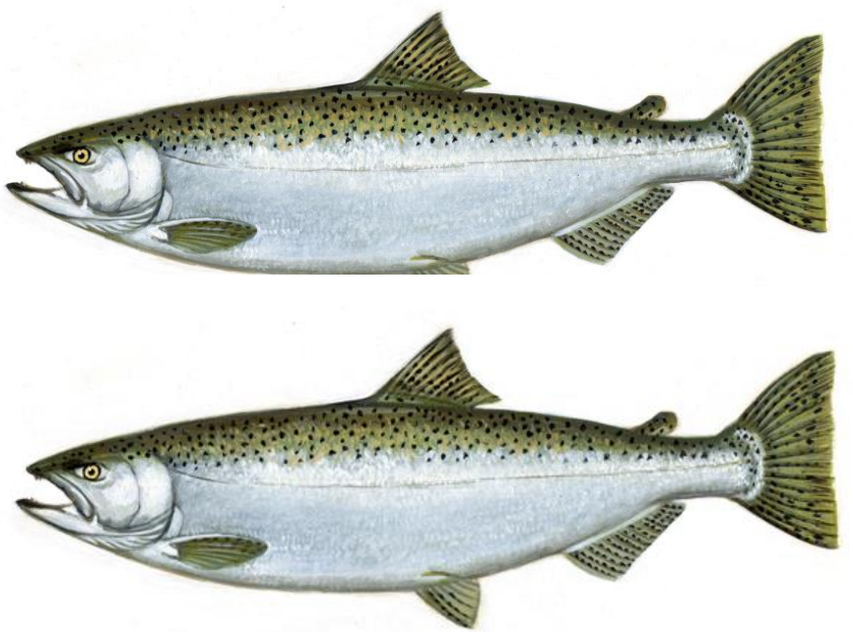
Mesut Akarsu
Dokuz Eylul University
İzmir, Turkey

Diphyllobothrium latum
Broad fish tape worm

- **Disease**: Diphyllobothriasis.

- **Geographical distribution:**

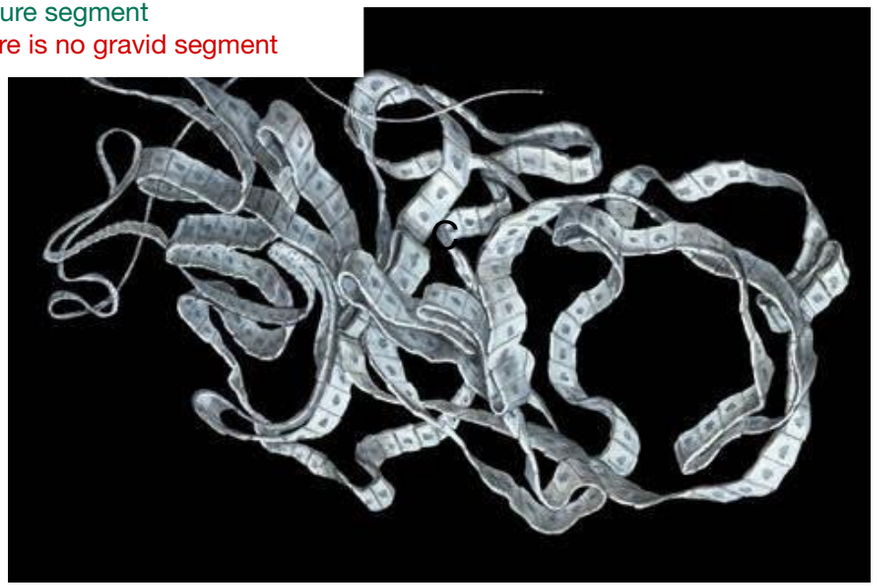
It is prevalent in Northen Europe mostly in Scandinavia and Russia, where pickled or insufficiently cooked salmon fish is prominent in the diet.



Composed of;
Head
Neck
Immature segment
Mature segment
There is no gravid segment

Adult

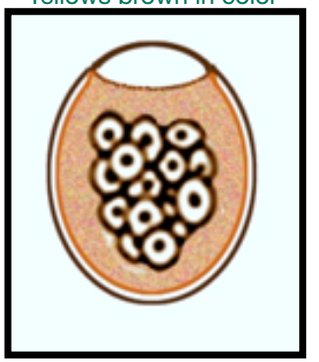
3-10 meters



Contain:
organ of attachment
(2 grooves + 2 bothria)

It is elongated
Globular
Has no suckers

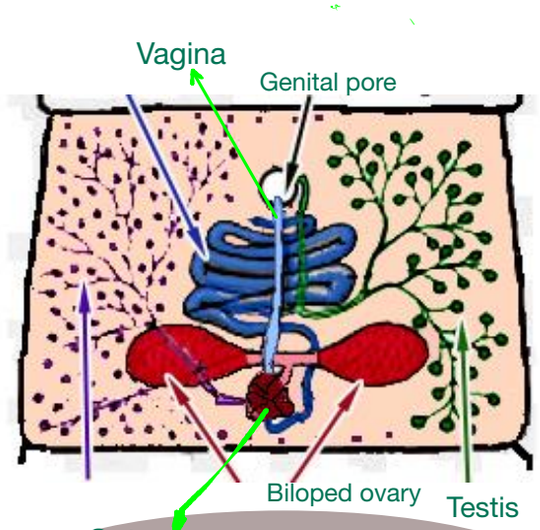
Oval egg
Operculated
Yellows brown in color



Egg

70x50 µm

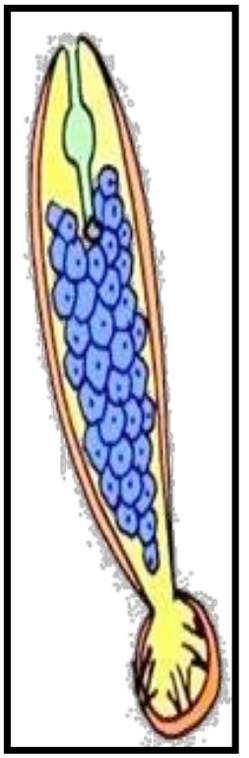
scolex



Mature seg.

p l e r o c e r c o i d

Worm like
Has many kinks

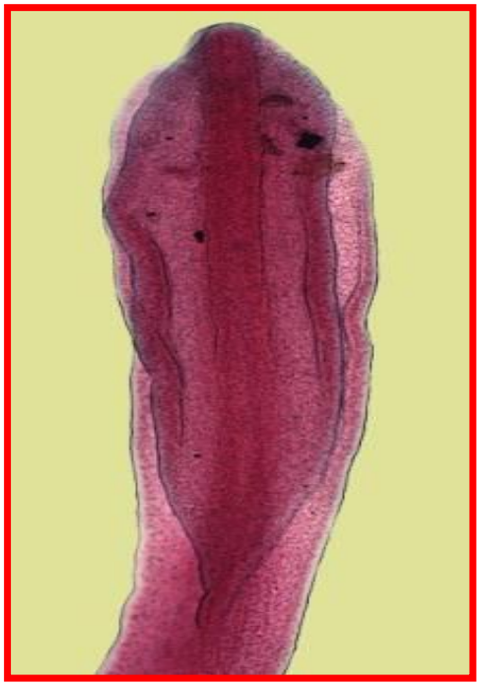


P r o c e r c o i d

Elongated
Contain
2 grooves +
2 bothria
+ contain
many
germinal
cells

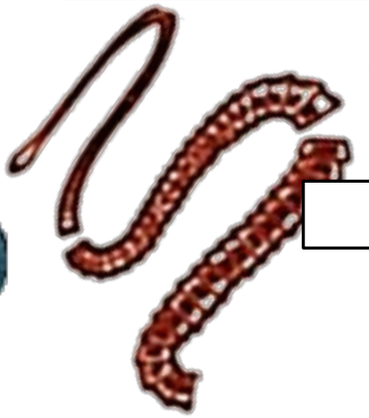
Coracidium

1st larval stage
Rounded structure contain oncospher and covered with cillia



Life Cycle of *Diphyllobothrium Latum*

Adult in small intestine



Eggs laid by adult

+ sometimes the mature segments

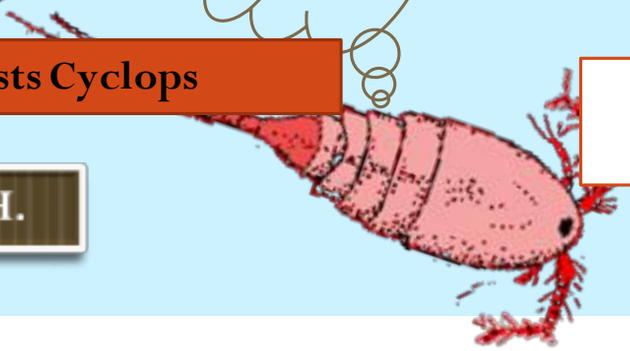
EGGS pass outside with stool to fresh water

FRESH WATER

Eggs mature in two weeks

Coracidium Excit through operculum

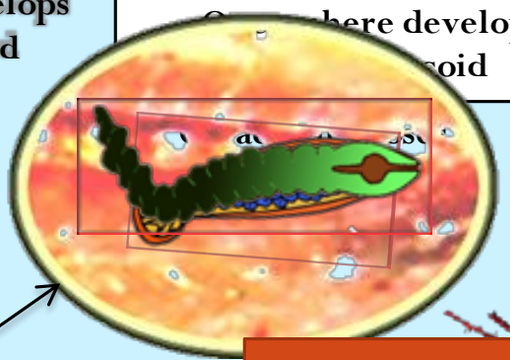
Cyclops I.H. Ingests Coracidium



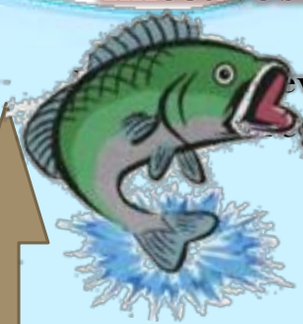
Fish ingests Cyclops

I. H.

Coracidum is transferred to prosercoid inside the cyclop then salmon fish eats the cyclop then procercoid is transferred to plerocercoid



here develops oid



velops oid

Plerocercoid Infective stage

Ingestion

Infective stage

Plerocercoid releases

maturation in Small intestine

Adult do attach to intestine by bothria

D. H.

Clinical picture

Nausea , abdominal pain, intestinal obstruction,vomiting ,diarrhea

- Many patients may be clinically free showing no symptoms.
- Vague abdominal pain, diarrhoea and nausea may be present.

Complications:

- In some patients, serious **megaloblastic anaemia** develops due to vitamin B_{12} deficiency because the worm absorbs a large amount of vitamin B_{12} and also affects the normal absorptive mechanism for vitamin B_{12} in the jejunum.
- Intestinal obstruction.
- Neurological manifestations e.g. headache, insomnia and convulsions are caused by absorbed toxins.

Diagnosis:

- Detection of the characteristic eggs in stool samples.
- Mature Segments may be detached and observed in the stool.

Treatment:

- Praziquantel is the drug of choice (Single dose of 10 mg/kg.).
- Niclosamide (Yomesan) is also effective.

Differences between Cyclophyllidea & Pseudophyllidea

Differences are:

	cyclophyllidea	Pseudophyllidea
• Scolex.		Elongated Bothria+grooves
• Mature segment.	Quadrant suckers , rostelum,hock Blind uterus(closed uterus)	Uterus containing opening
• Gravid segment.	Yes	No
• Eggs.	Mature egg contain embryo	Immature egg
• Intermediate host.	Cattle in taenia saginata Pig in taenia solium.	Fish (salmon)
• Larval stages.	Cycticercus bovis in taenia saginata Cycticrus cellulosae in taenia solium	Corseedium, procercoid,plerocercoid

Post lecture quiz???

- **Put true or false:**
  - Eggs of *Taenia solium* and *saginata* couldn't be morphologically differentiated (✓).

By zeil nestin stain

- **Explain why?**
  - Nauseating drugs are contraindicated in cases of infection with *Taenia solium*

To avoid internal auto infecton
And occurrences of cystecrosis

- **Differentiate between *Taenia solium* and *saginata***


Thank you.