

# Introduction to Cestodes



## *Taenia saginata & solium*

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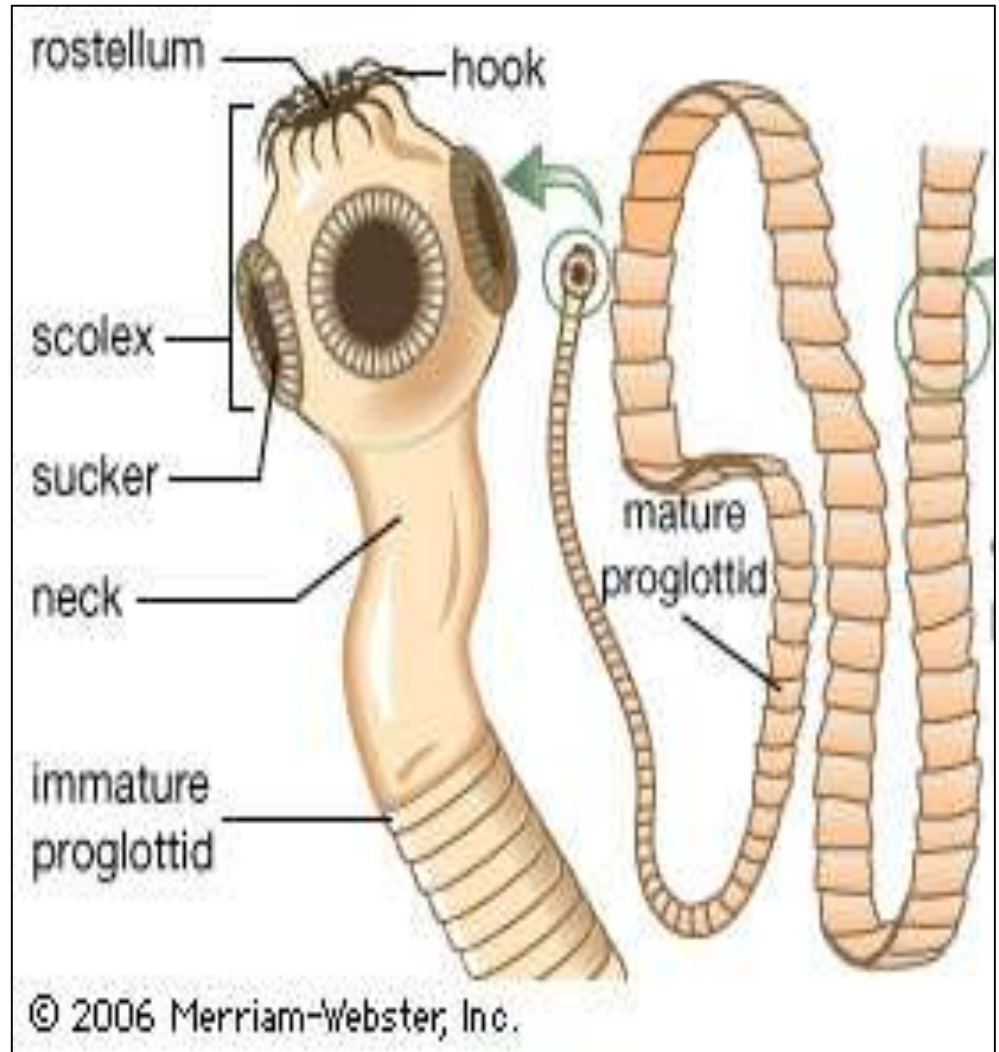
Medical Microbiology and Immunology  
Department

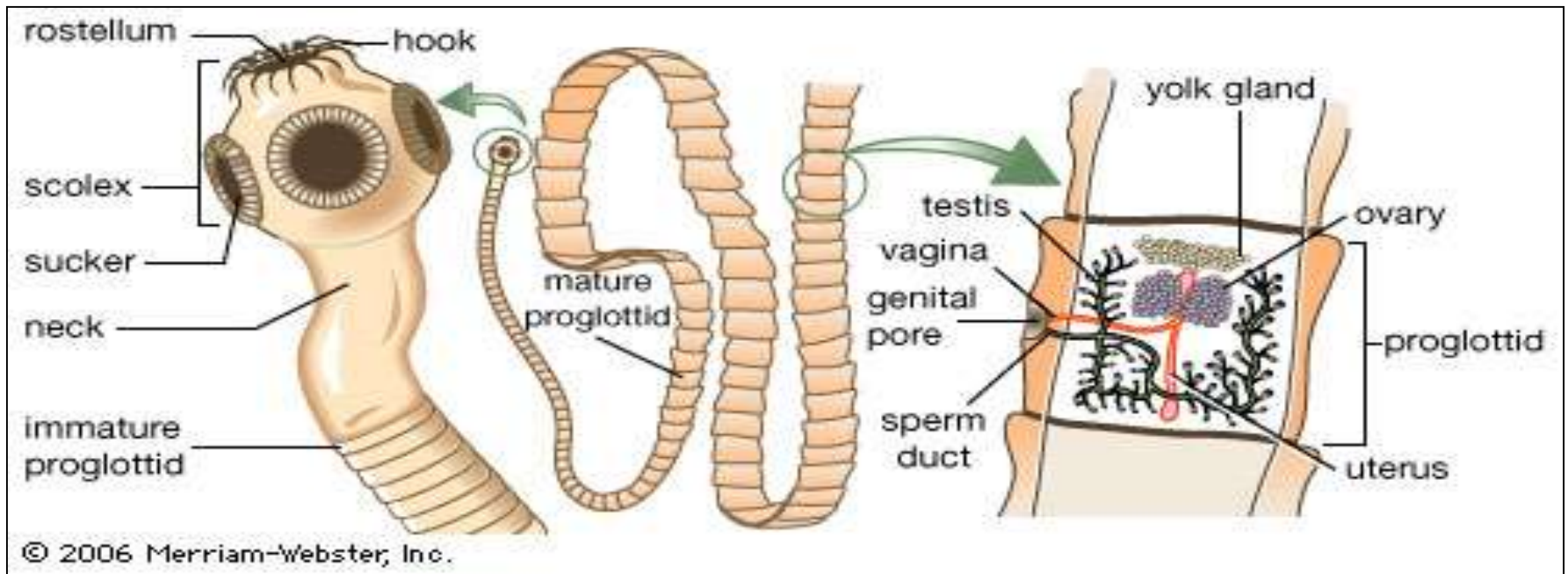
2024-2025

# General characters

## Adults :

- Flat, ribbon-like, and segmented.
- Cestodes have neither a body cavity nor an alimentary tract (absorb nutrients through their tegument).
- Have muscular, nervous, excretor and reproductive systems





### **Scolex (head) :**

- Suckers or bothria (grooves)
- Rostellum
- Hooks

### **Neck :**

- Stem cells

### **Strobila :**

- Immature segments (proglottids)
- Mature segments
- Gravid segments

Subclass Cestoda is divided into two orders

Cyclophyllidea

- *Taenia saginata*
  - *Diphyllobothrium latum*
- *Taenia solium*

Pseudophyllid

ea

Cestodes are classified according to habitat

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

*Taenia saginata*  
(Beef Bald Tape  
Worm)



## ❖ Distribution:

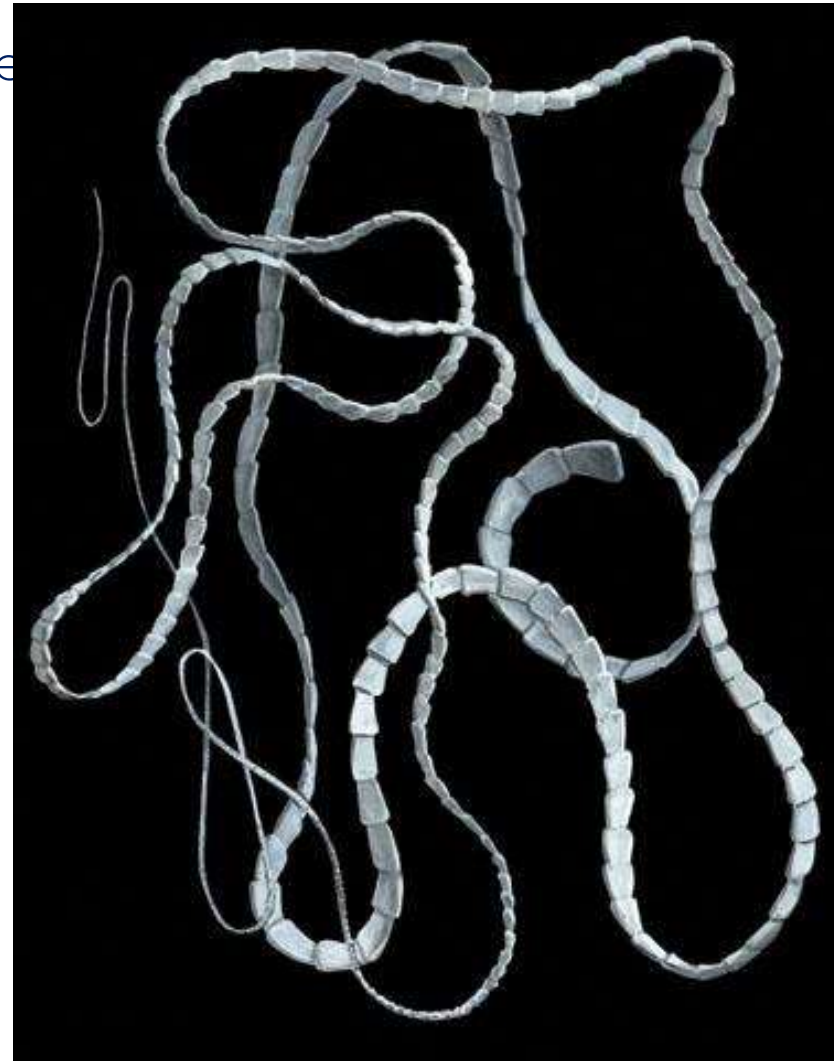
Cosmopolitan where beef is eaten

## ❖ Disease:

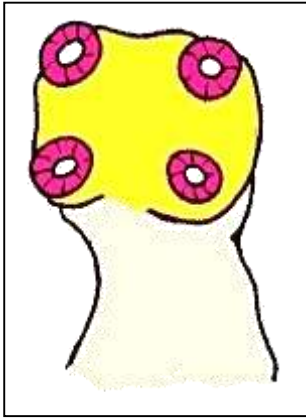
1. *Taeniasis saginata*.

## ❖ Morphology:

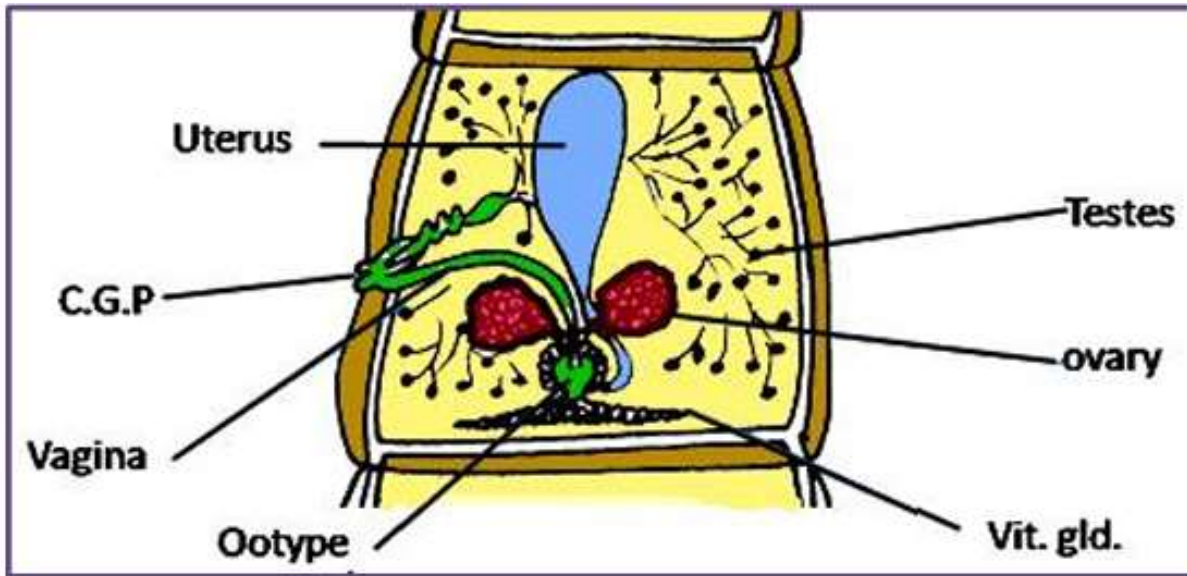
5-10 meters



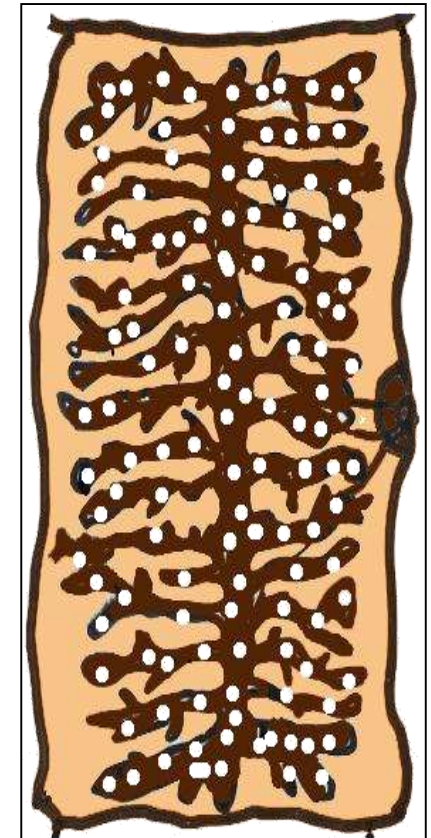
# Taenia saginata



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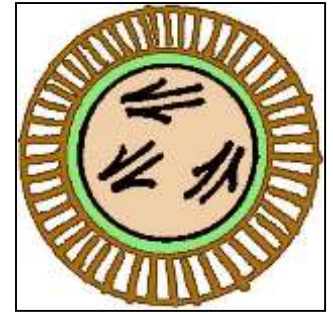


Mature segment



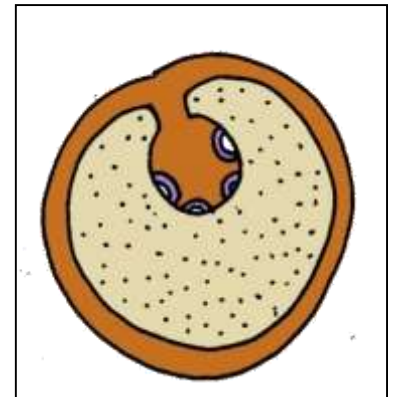
Gravid segment  
15-30 lateral branches

- **Size:** 30-40  $\mu\text{m}$  in diameter
- **Shape:** Spherical, covered with outer thin membrane which is lost during disintegration of segments and has an inner radially striated embryophore
- **Colour:** Yellowish brown (by Ziehl-Neelsen stain, the egg is stained red).
- **Content:** Fully developed hexacanth embryo (oncosphere).



**Egg**

It measures about 1.5-2 cm, bladder shaped with two layers enclosing a cavity containing fluid. The inner germinal layer forms the scolex, which is invaginated and inverted in the fluid.



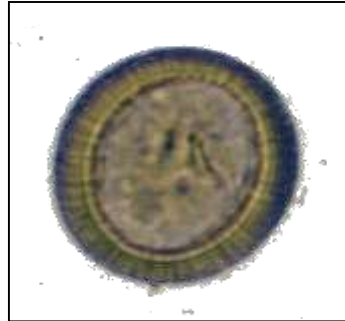
**Cysticercus bovis**



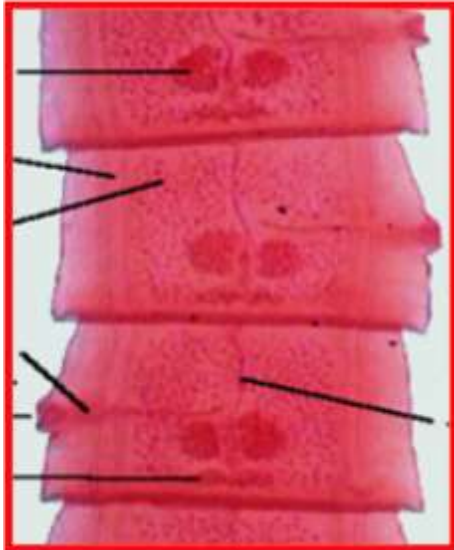
# *Taenia saginata*



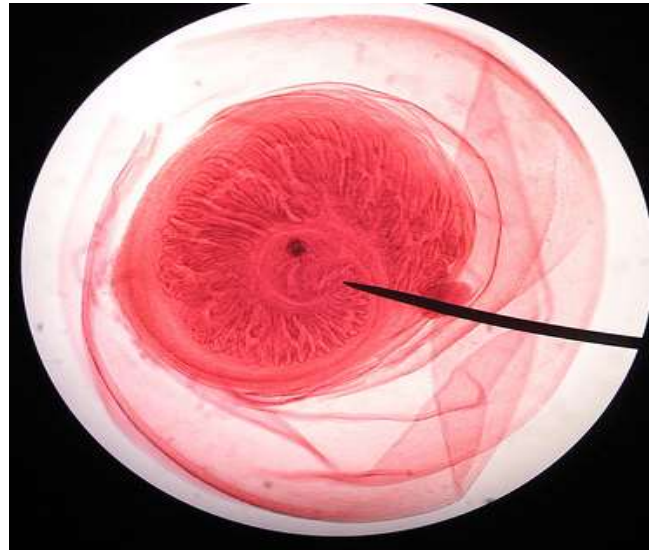
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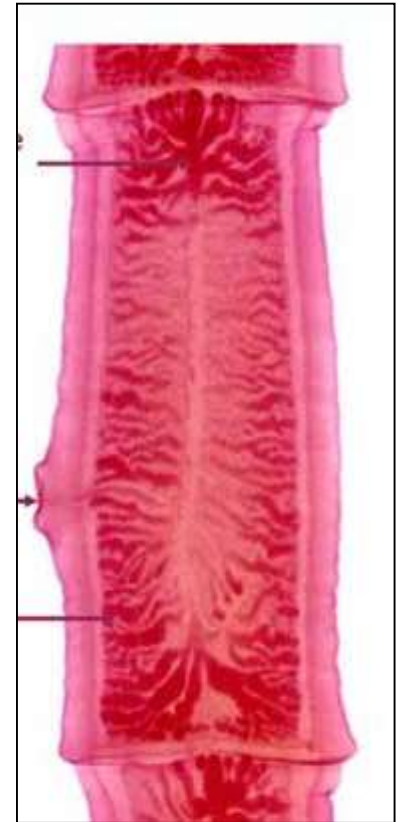
**Egg**



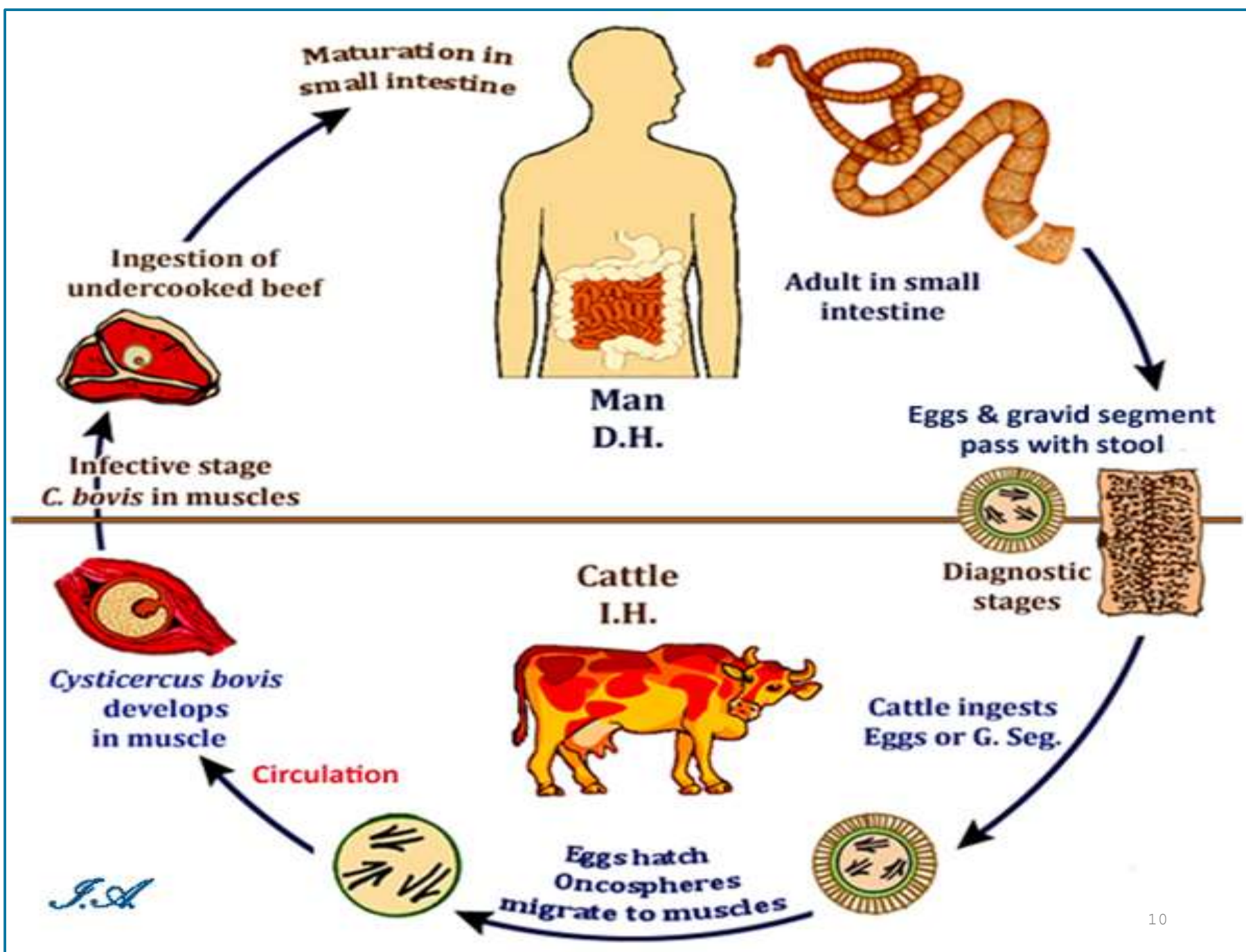
**Mature segment**



***Cysticercus bovis***



**Gravid segment**



## Mode of Infection

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

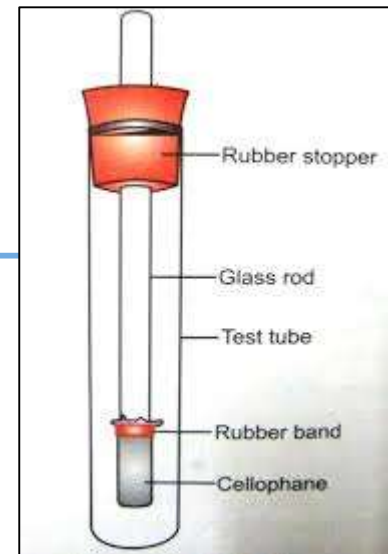
<b>Habitat:</b>	Small intestine
<b>Hosts:</b>	<b>D.H.:</b> Man <b>I.H.:</b> Cattle
<b>Diagnostic stages:</b>	Egg and gravid segment
<b>Infective stage:</b>	<i>Cysticercus bovis</i>
<b>Mode of infection:</b>	Ingestion of undercooked beef containing <i>Cysticercus bovis</i>

# Clinical aspects of taeniasis:

- The infection may be asymptomatic.
- 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

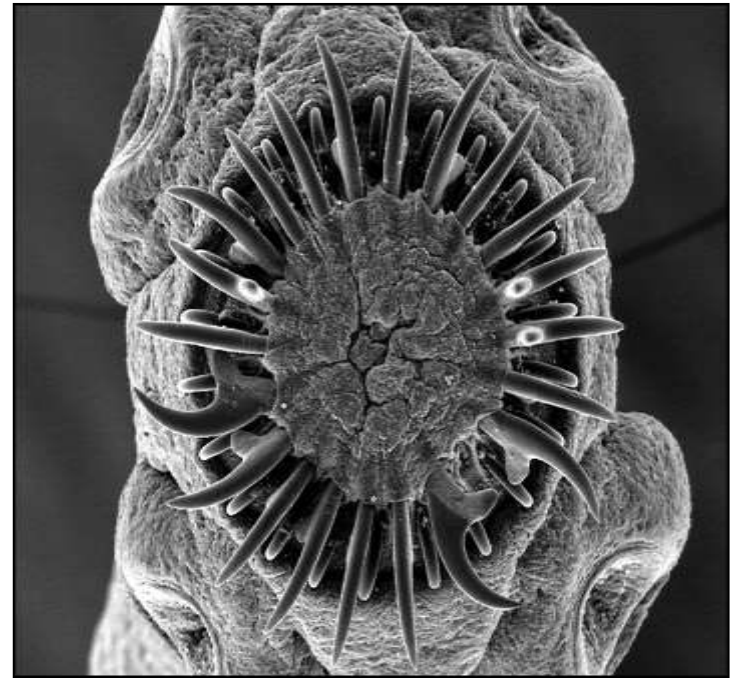
- 1- Detection of **acid-fast** eggs by stool examination (direct and concentration methods or peri-anal scotch adhesive tape swab and NIH swab).
- 2- Detection of gravid segments in the stool.
- 3- Detection of copro-antigen in stool.



# Treatment

- 1) Praziquantel (Biltricide) drug of choice.

*Taenia solium*  
(Pork tape worm)



## ❖ Distribution:

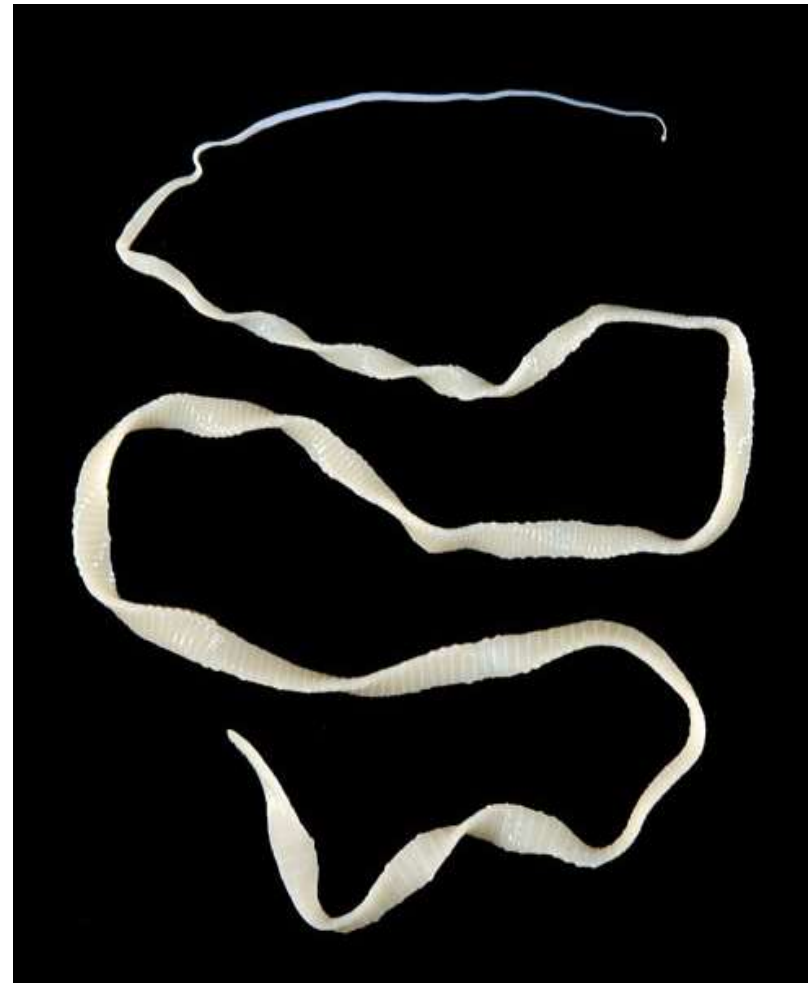
Cosmopolitan where pork is eaten.

## ❖ Disease:

1. Taeniasis *solium*.
2. Cysticercosis.

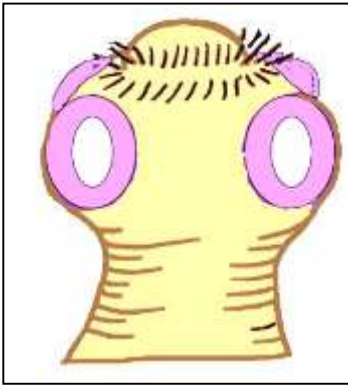
## ❖ Morphology:

2-4 meters

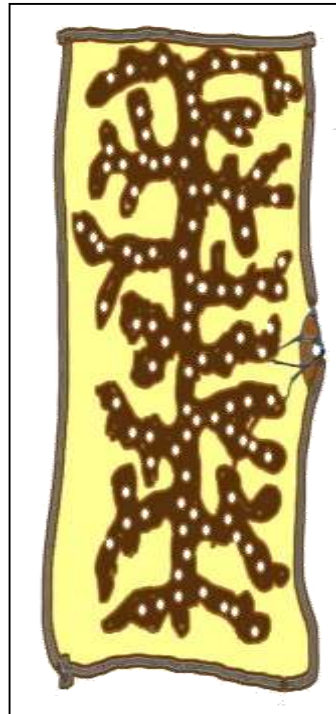




# Taenia solium

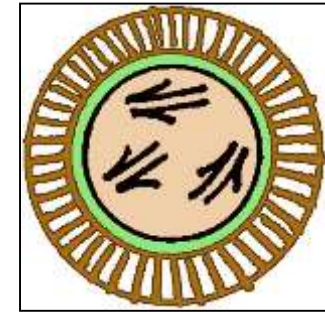


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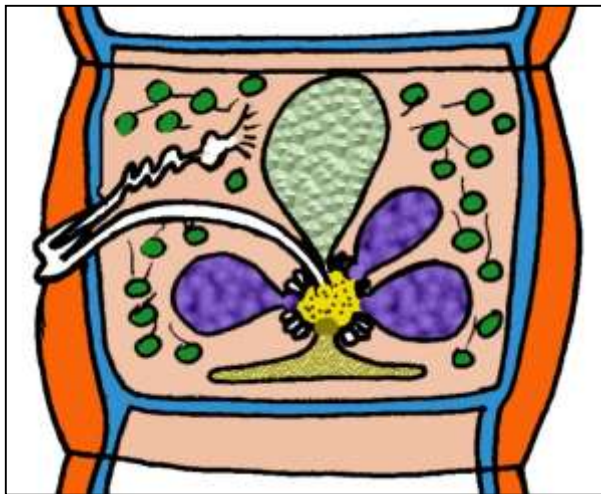


Gravid segment

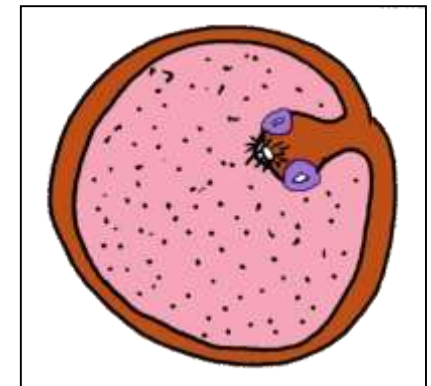
7-13 main lateral branches



Egg

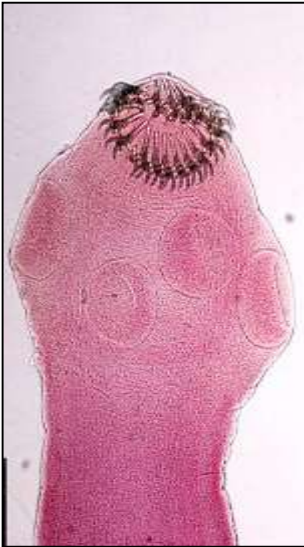


Mature segment

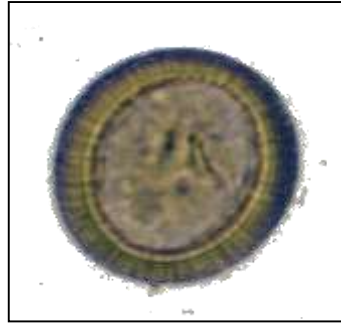


*Cysticercus cellulosae*

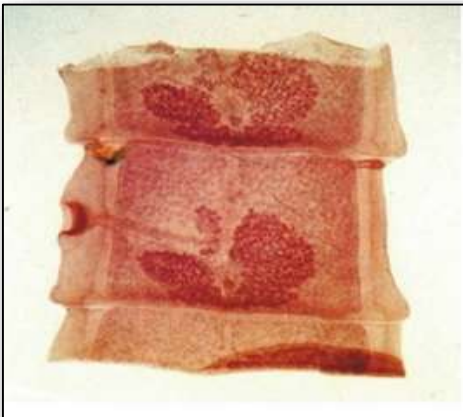
# *Taenia solium*



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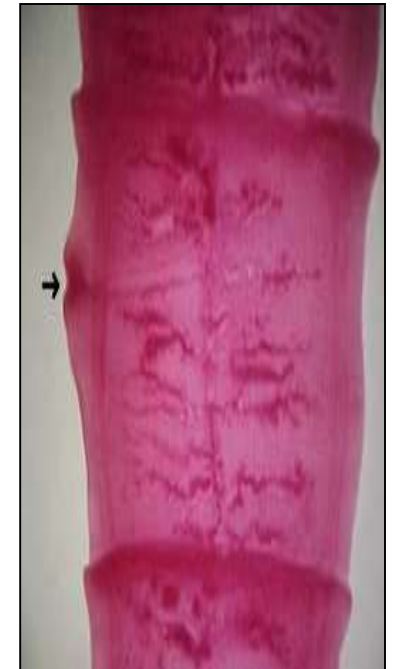
**Egg**



**Mature segment**



***Cysticercus cellulosae***



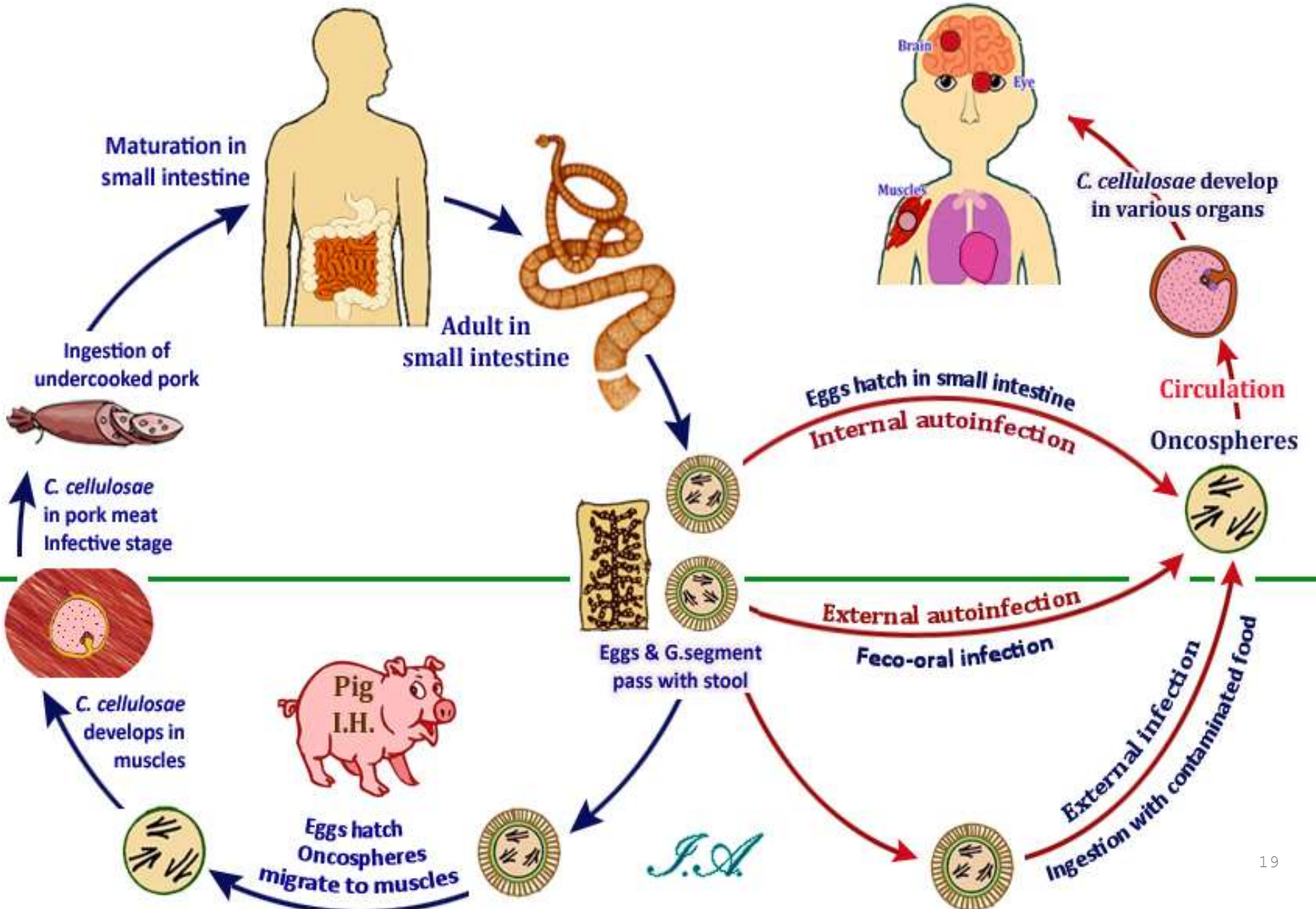
**Gravid segment**

# Taeniasis solium

Man D.H.

# Cysticercosis

Man I.H.



# Pathogenesis and Symptomatology

**Taeniasis solium:** Due to ingestion of undercooked pork containing cysticercus cellulosa (the same clinical pictures as taeniasis saginata).

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

## Autoinfection:

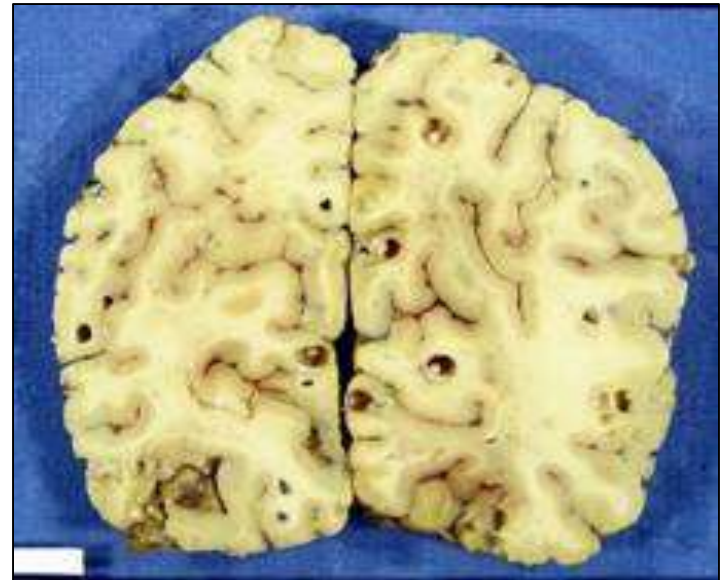
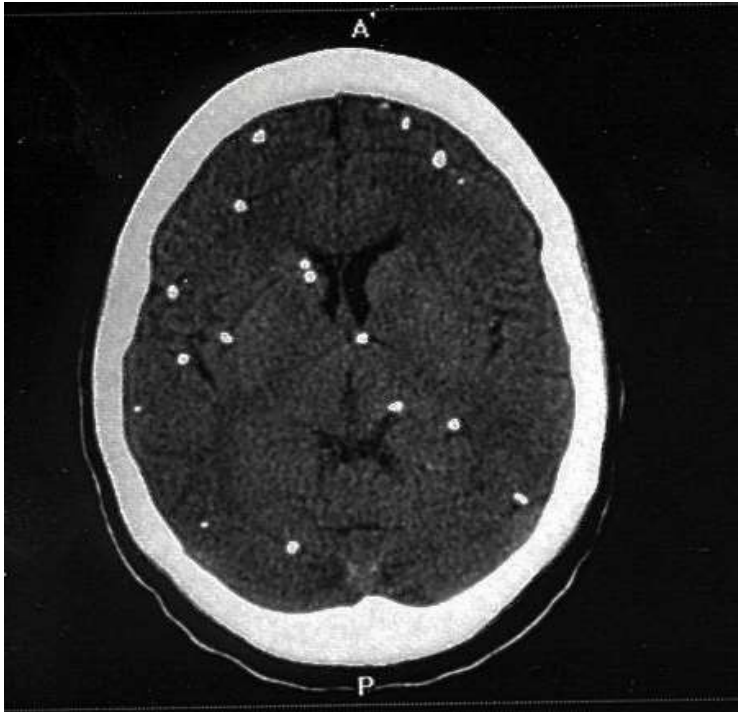
- a. **External:** Faeco-oral from the patient's own stool.
- b. **Internal:** In the presence of anti-peristaltic movements of the intestine (in case of vomiting or taking emetic drugs), the gravid segments and ova may regurgitate to the stomach. The gravid segments become broken up and liberate the eggs. On returning to the intestine, the eggs hatch.

# Symptomatology 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.



# 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.

# 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:

- Serological tests.
- Eosinophilia.



# 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.

	<i>Taenia saginata</i>	<i>Taenia solium</i>
<b>Disease:</b>	Taeniasis saginata	Taeniasis solium
<b>Distribution:</b>	Cosmopolitan where beef is eaten	Cosmopolitan where pork is eaten
<b>Adult : *Size</b>  <b>*Scolex</b>	<ul style="list-style-type: none"> <li>• 5–10 meters (average 6 meters)</li> <li>• Quadrate, about 1–2 mm in diameter with no rostellum or hooks</li> </ul>	<ul style="list-style-type: none"> <li>• 2–4 meters (average 3 meters)</li> <li>• Globular, about 1 mm in diameter, has a rostellum with 2 rows of hooks</li> </ul>
<b>Gravid segment:</b>	<ul style="list-style-type: none"> <li>• Longer than broad.</li> <li>• Uterus with 15–30 (18) lateral branches.</li> <li>• Motile, detach singly and may creep out without defecation.</li> </ul>	<ul style="list-style-type: none"> <li>• Longer than broad.</li> <li>• Uterus with 7–13 (9) lateral branches.</li> <li>• Non-motile, detach in groups of about five segments, pass passively with stool.</li> </ul>

	<i>Taenia saginata</i>	<i>Taenia solium</i>
<b>Egg:</b> *Morphology *Zeil Neelsen stain *Infectivity	<ul style="list-style-type: none"> <li>• Spheroid + oncosphere</li> <li>• Acid fast (red)</li> <li>• Not infective to man</li> </ul>	<ul style="list-style-type: none"> <li>• Similar</li> <li>• Non-acid fast ( not stained )</li> <li>• Infective to man → cysticercosis</li> </ul>
<b>Larval stage:</b>	<ul style="list-style-type: none"> <li>• <i>Cysticercus bovis</i> (scolex without hooks)</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Cysticercus cellulosae</i> (scolex with hooks)</li> </ul>
<b>Hosts:</b> *D. H. *I. H.	<ul style="list-style-type: none"> <li>• Man</li> <li>• Cattle</li> </ul>	<ul style="list-style-type: none"> <li>• Man</li> <li>• Pigs and man</li> </ul>
<b>D.H. Stages:</b>	<ul style="list-style-type: none"> <li>• Adult</li> </ul>	<ul style="list-style-type: none"> <li>• Adult , larvae or both</li> </ul>
<b>Mode of infection:</b>	<ul style="list-style-type: none"> <li>• Ingestion of undercooked beef containing <i>Cysticercus bovis</i> (Taeniasis)</li> </ul>	<ul style="list-style-type: none"> <li>• Ingestion of undercooked pork containing <i>Cysticercus cellulosae</i> (Taeniasis)</li> <li>• Egg ingestion (Cysticercosis)</li> </ul>

## ❖ 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.

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# Taenia Saginata in the Small Intestine



Mesut Akarsu  
Dokuz Eylul University  
Izmir, Turkey

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# Post lecture quiz???

## ❖ Put true or false:

➤ Eggs of *Taenia solium* and *saginata* couldn't be morphologically differentiated ( ).

## ❖ Explain why?

➤ Nauseating drugs are contraindicated in cases of infection with *Taenia solium*

## ❖ Differentiate between *Taenia solium* and *saginata*

