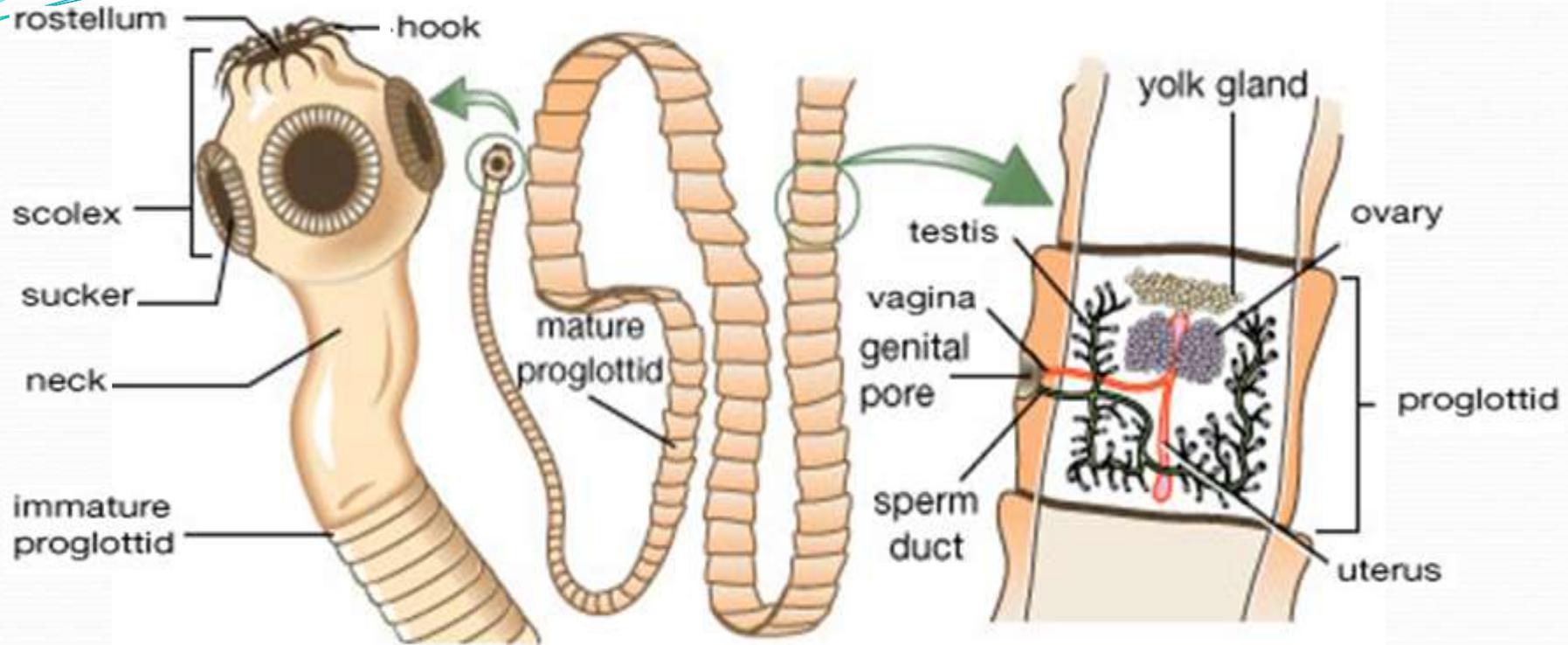


# **Cestoidaea (Tapeworms)**

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# General characters



## Adults:

- Flat, ribbon like and segmented.
- Cestodes have **neither a body cavity nor an alimentary tract.**
- Cestodes are **hermaphrodites.**

➤ The body is formed of :-

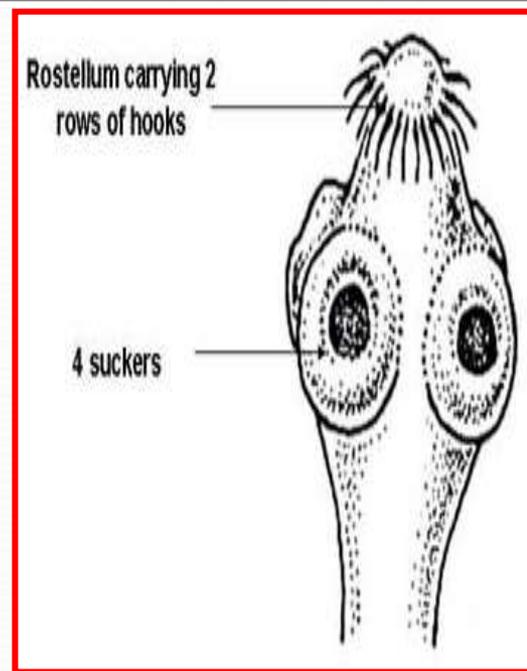
1- **Scolex (head)** with organs of fixation :-

A. **Suckers** either :-

- 4 true cup shaped muscular sucker , or
- false suckers as grooves (bothria).

B. **Rostellum** with one or more circles of hooks.

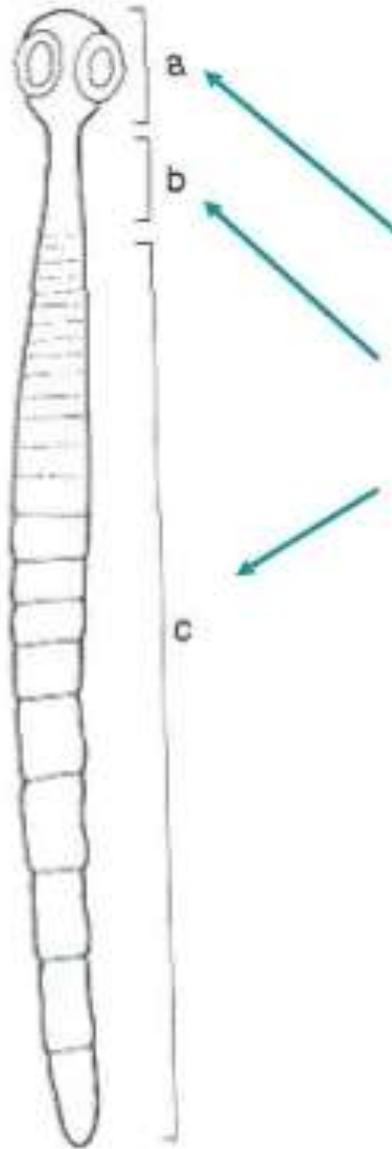
2- **Neck** is the region of growth.



**3- Strobila:** the segmented part of the body of a tapeworm that consists of a long chain of segments.

- **Immature segments:** They lie anterior and contain immature genital organs.
- **Mature segments:** Follow the immature ones and contain fully developed genital organs.
- **Gravid segments:** They lie posterior and contain uteri filled with eggs.

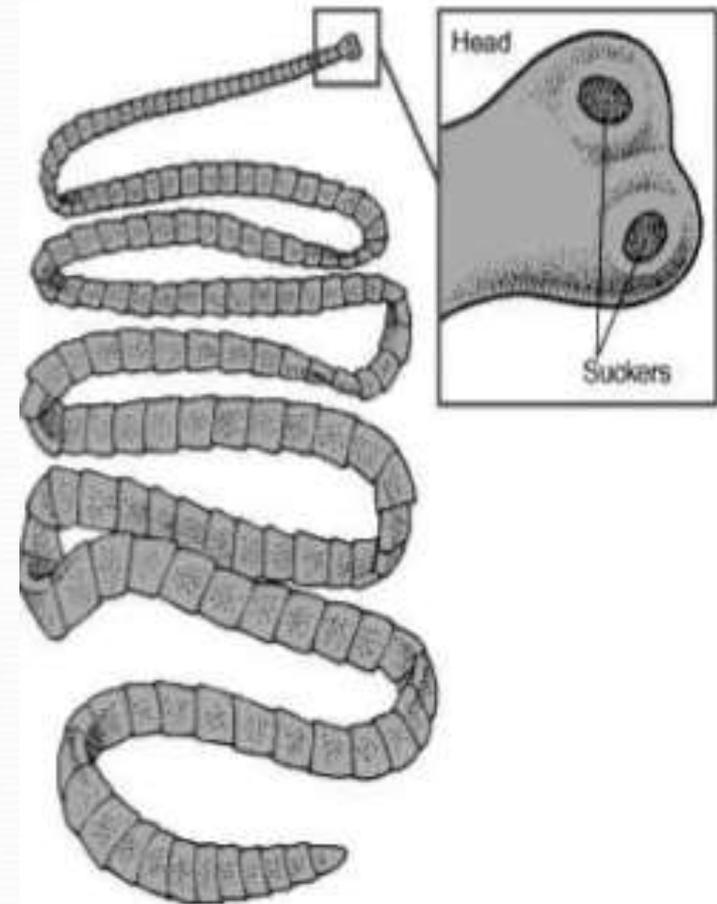
## General Body Shape of a Tapeworm



**a. Scolex**

**b. Neck**

**c. Strobila made up of proglottids**



# Life cycle of cestodes :-

## ➤ Habitat :-

**a- Intestinal:** The adult worm lives in the small intestine of man (D.H).

**b- Extra-intestinal (tissues):** The larval stage founds in the tissues of man (I.H).

➤ They require one or two intermediate host (I.H).

➤ Gravid segments or eggs are passed in faeces of the D.H.

# Cestodes are classified according to habitat into

## Intestinal cestodes

(Adult in the small intestine of man)  
(Man is the D.H)

- 1- *Diphyllobothrium latum*  
(fish tapeworm)
- 2- *Taenia saginata* (Beef tapeworm).
- 3- *Taenia solium* (Pork tapeworm).
- 4- *Hymenolepis nana* (Dwarf tapeworm).

## Tissue cestodes

(Larvae in the tissues of man)  
(Man is the I.H)

- 1- *Cysticercus cellulosa* (larva of *T. solium*) ⇒ **Cysticercosis**
- 2- Hydatid cyst (larva of *Echinococcus granulosus*) ⇒ **Hydatidosis**
- 3- *Cysticercoid nana* (larva of *H. nana*)  
⇒ **Cysticercoid nana**

# ① Intestinal cestodes

## 1) *Diphyllobothrium latum* (broad tapeworm , fish tapeworm)

### ➤ Geographical distribution :-

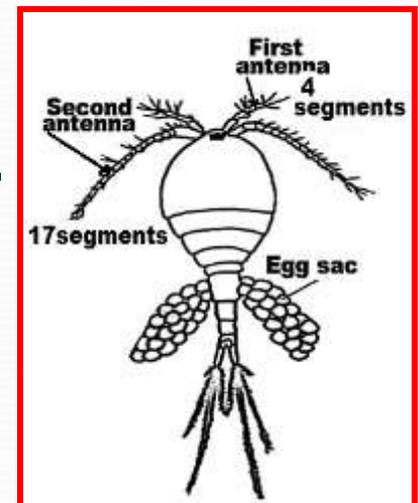
Lake regions in Europe, America, Russia, Japan and Central Africa.

### ➤ Habitat : Small intestine.

### ➤ D.H : Man and fish eating animals e.g. dogs and cats.

### ➤ I.H : • 1<sup>st</sup>: *Cyclops*.

- 2<sup>nd</sup>: Fresh water fish (Salmon).



*Cyclop*

# Morphology

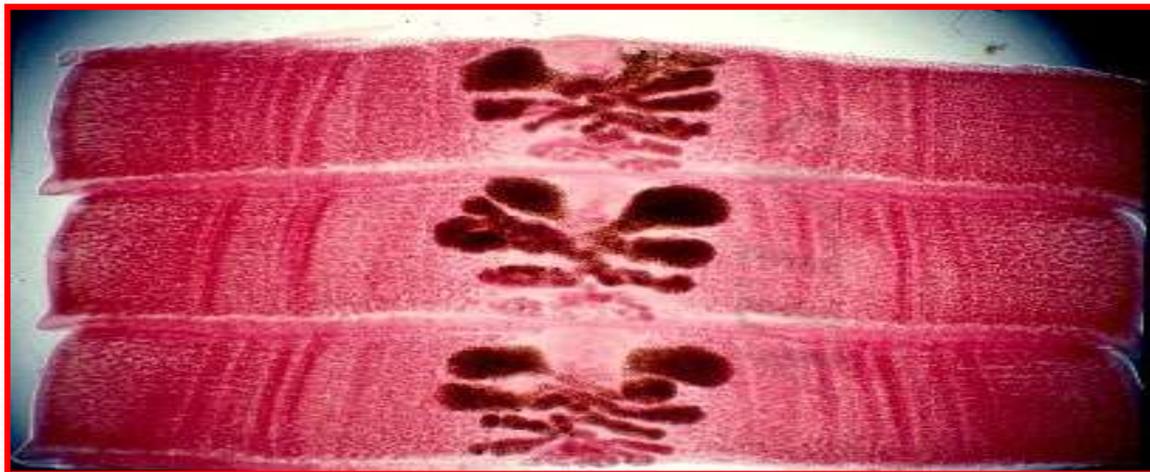
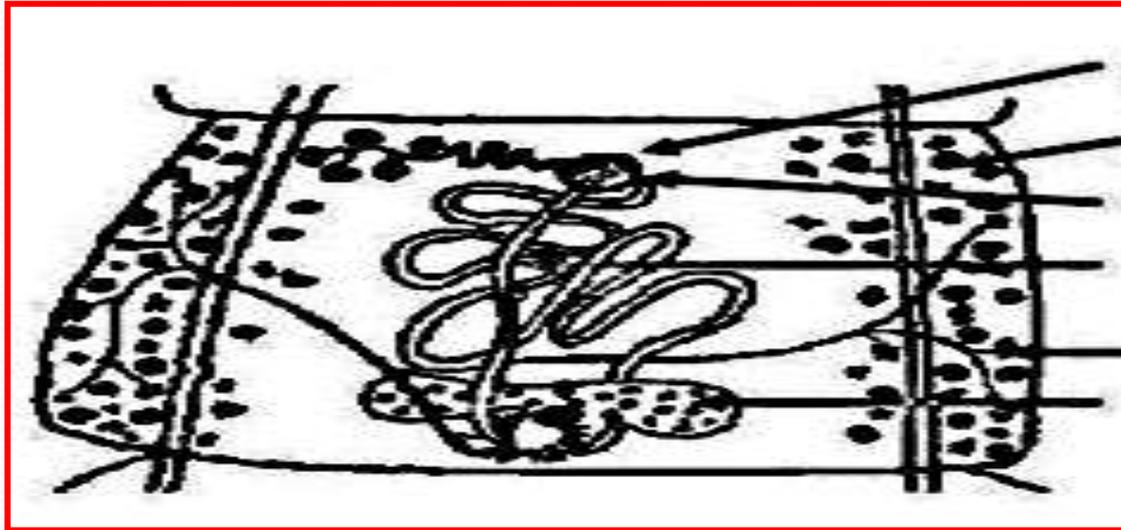
## Adult :-

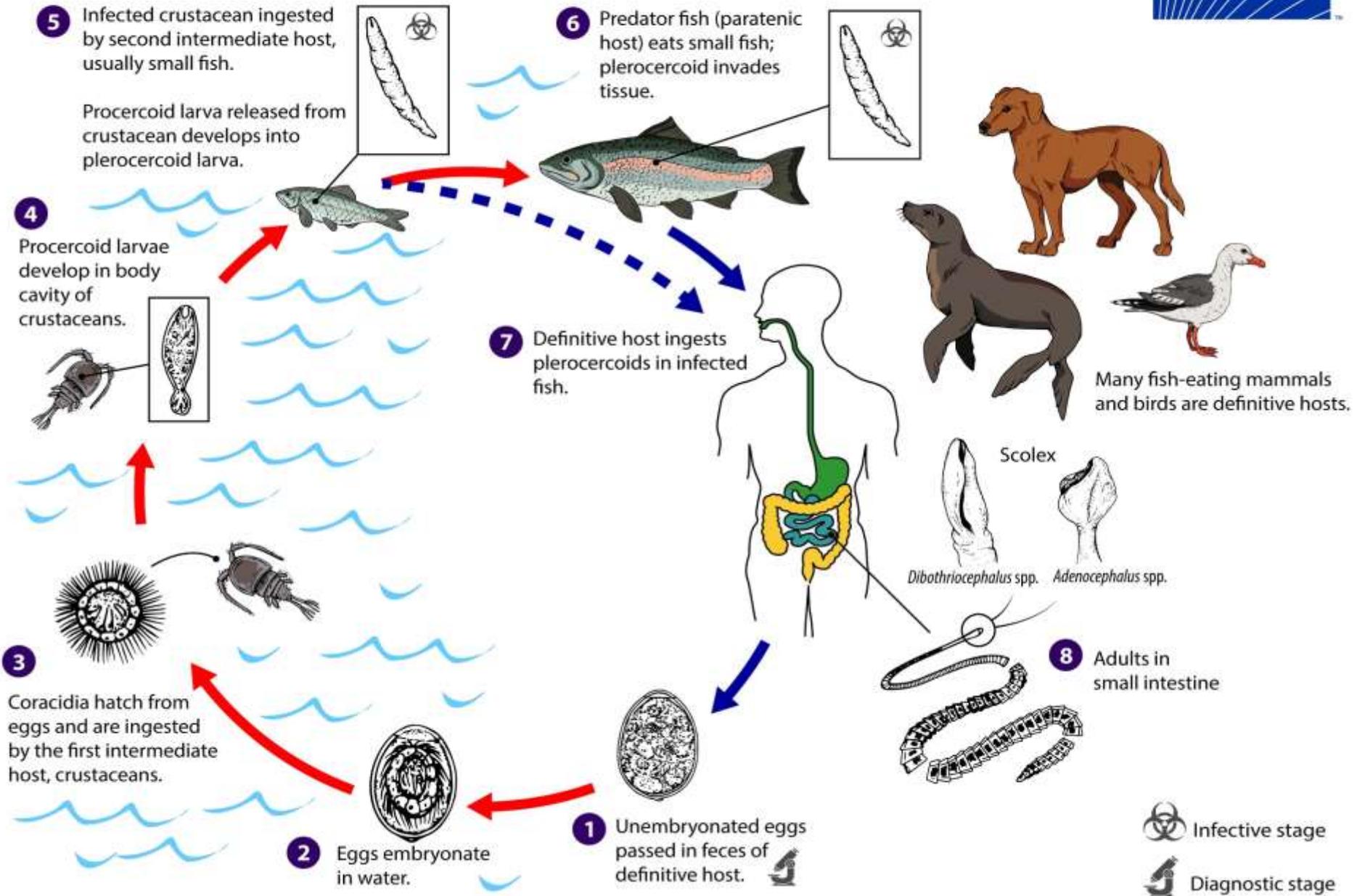
- **Size** : 3 - 10 meters.
- **Scolex** : Elongated, almond like with two grooves (bothria), one dorsal & one ventral.
- **Strobila** : More than 3000 segments:
  - a- Immature segments
  - b- Mature segments
  - c- Gravid segments: Not present.



Scolex

**Mature segment:** contain male and female genital systems.





# Pathogenesis and Symptomatology

**Disease: Diphyllbothriasis.**

- 1. General toxic manifestations and intestinal disturbances** in the form of nausea, vomiting, hunger pain, dyspepsia, diarrhea & loss of weight.
- 2. Manifestations of macrocytic hyperchromic anaemia (pernicious anaemia)** due to consumption of vit.B12 and folic acid by the parasite.
- 3. Intestinal obstruction** by large number of worms.
- 4. Neurological manifestations** are common (headache, insomnia & convulsions).

# Laboratory Diagnosis

## ➤ **Direct:-**

1. **Stool examination for detection of eggs (direct and concentration methods).**
  2. **Finding mature segments in faeces.**
- **Indirect: Blood picture for anaemia.**

# Treatment

1) Niclosamide (Yomesan)

2) Praziquantel (Biltracide).

3) Atebrine.

4) Vitamin B12 & folic acid for **pernicious anaemia.**

***Taenia saginata***

***(Beef tapeworm, Bald tapeworm)***

## ➤ **Geographical Distribution:**

**Cosmopolitan, especially in cattle-raising countries.**

➤ **D.H : Man**

➤ **I.H : Herbivorous animals (cattle, sheep and camels).**

➤ **Habitat: Small intestine.**

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# Morphology

## 1) Adult :-

- **Size** : 4-10 meters.
- **Scolex** : Globular, with 4 cup shaped suckers at at the angles of the head. **No rostellum or hooks.**
- **Strobila**: 1000 - 2000 segments.
  - **Immature segments.**
  - **Mature segments.**
  - **Gravid segments.**



1 Oncospheres develop into cysticerci in muscle

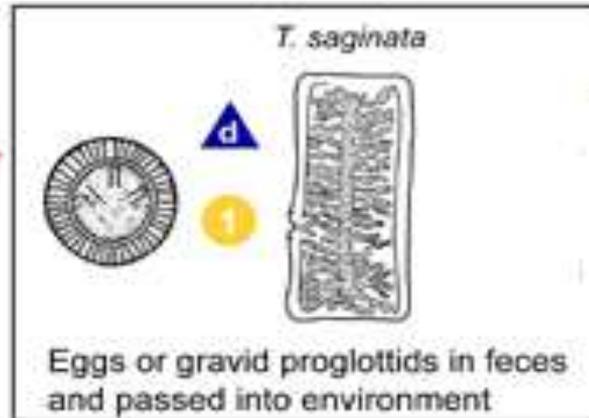
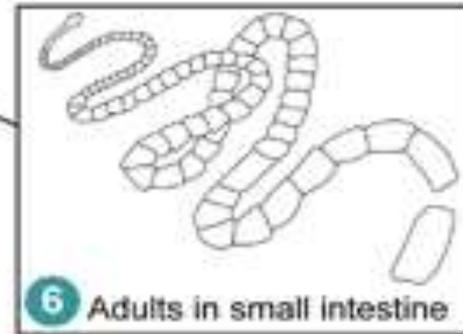
4 Humans infected by ingesting raw or undercooked infected meat

Oncospheres hatch, penetrate intestinal wall, and circulate to musculature

3

# Taenia saginata

2 Cattle become infected by ingesting vegetation contaminated by eggs or gravid proglottids



i = Infective Stage  
d = Diagnostic Stage



# Mode of Infection

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

# Pathogenesis and Symptomatology

➤ **Disease** : *Taeniasis saginata*

- 1) **Intestinal disturbance** e.g. nausea, vomiting, hunger pains, colic, diarrhea or constipation.
- 2) **Toxic manifestations**: Due to worm products e.g. dizziness, headache, insomnia & delirium.
- 3) **Intestinal obstruction.**
- 4) **Loss of weight.**
- 5) **Anxiety and nervousness** due to continued migration of G. segments out of the anus ➔ irritation & itching.

# Diagnosis

- 1- Detection of eggs by stool examination (direct and concentration methods).
- 2- Detection of gravid segments in the stool to differentiate between *Taenia* species.

# Treatment

- 1) Niclosamide (Yomesan).
- 2) Praziquantel (Biltricide).
- 3) Atebrine.

*Taenia Solium*

*(Pork Tapeworm)*

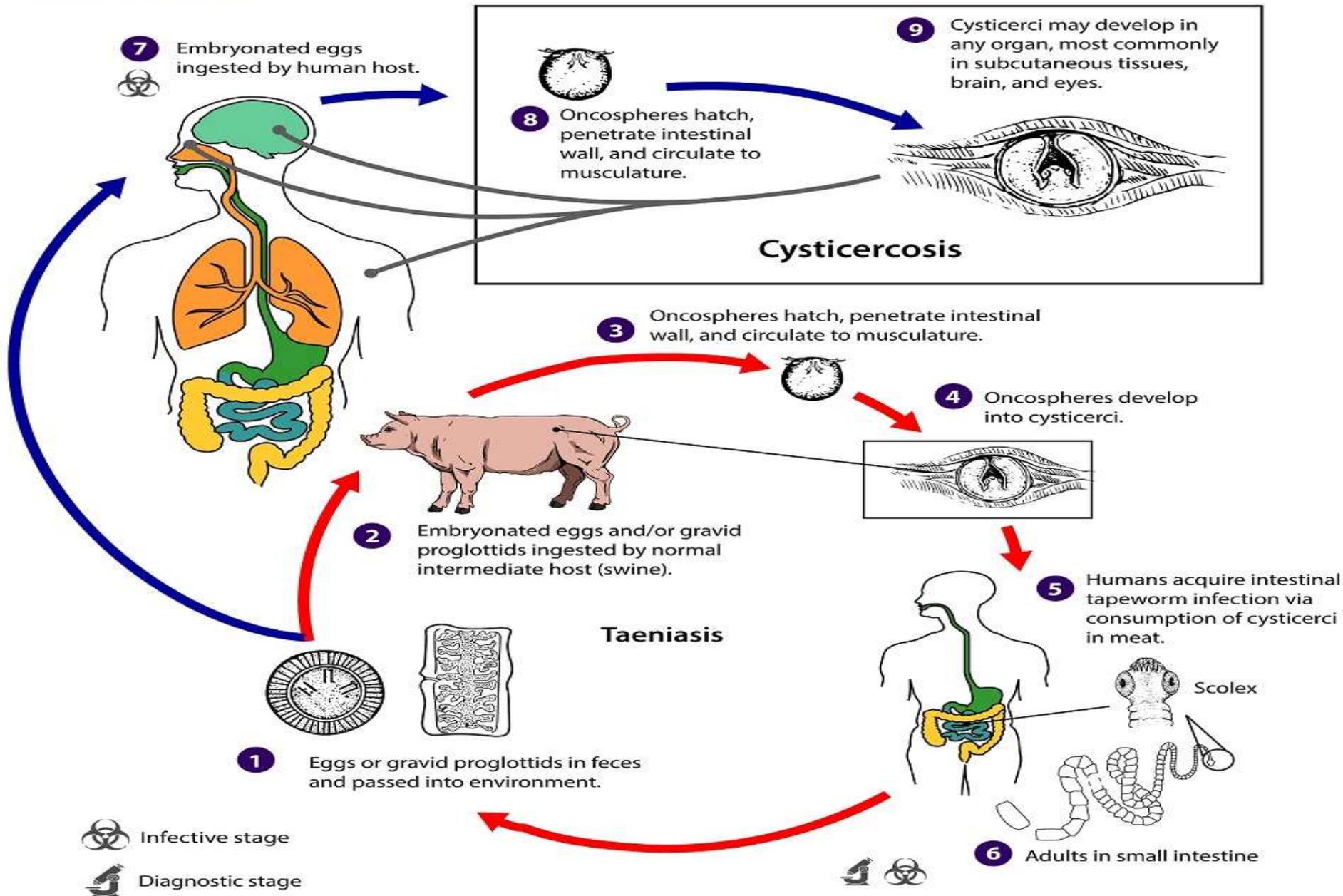
## ➤ **Geographical distribution :-**

**-Pork-eating countries e.g. America, Europe.**

➤ **D.H: Man.**

➤ **I.H: Pigs and occasionally man.**

➤ **Habitat: Small intestine.**



Infective stage  
 Diagnostic stage

# 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, cutaneous tissues).

# 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 convulsions 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 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

- 1) **Brain cyst:** Anticonvulsant and antiparasitic drugs as praziquantel in combination with corticosteroids to reduce inflammatory reaction.
- 2) **Eye cyst:**
  - Cyst within the eye → surgical removal.
  - Cyst outside eye globe → antiparasitic drugs with corticosteroids.
- 3) **Subcutaneous cyst:** Surgical excision.
- 4) Vitamin D and calcium to help calcification.

# Treatment of *Taeniasis solium*

Anti-cestodal drugs for adult as taeniasis *saginata* but:

1) **Niclosamide** is contraindicated because it disintegrates the worms, releasing large number of eggs in the intestine which increase the possibility of cysticercosis (internal autoinfection).

2) **Atebrine** causes nausea and vomiting. Anti-emetic must be given one hour before administration of Atebrine to avoid antiperistalsis and internal autoinfection.

**\*Difference s between *T. saginata* and *T. solium*:**

Item	<i>T.saginata</i>	<i>T.solium</i>	
<b>Life cycle</b>	<b>D.H</b>	Man in both	
	<b>Egg</b>	Morphologically similar	
		Infect cattle only	Infect pigs & man
	<b>I.H</b>	Cattle, sheep & camel only	Pigs & occasionally man
<b>Larva</b>	<i>Cysticercus bovis</i>	<i>Cysticercus cellulosa</i>	
<b>I.S to man</b>	<ul style="list-style-type: none"> <li>• <i>Cysticercus bovis</i> in undercooked beef</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Cyeticercus cetllulosa</i> in undercooked pork</li> <li>• Eggs → cysticercosis.</li> </ul>	

**Hydatid cyst**  
**(larva of *Echinococcus***  
***granulosus*)**

**Hydatidosis**

# Cystic Echinococcosis

*Echinococcus granulosus sensu lato*

