

**Topic  
On  
Genus - Taenia**



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- *Taenia saginata*
- *Taenia solium*
- *Taenia hydatigena*
- *Taenia ovis*
- *Taenia pisiformis*
- *Taenia krabbei*
- *Taenia taeniaeformis*
- *Taenia multiceps*
- *Taenia serialis*



Species	Definitive host	Larval stage	Intermediate host
<i>Taenia solium</i>	Man	<i>Cysticercus cellulosae</i>	Pig & man
<i>Taenia saginata</i>	Man	<i>Cysticercus bovis</i>	Cattle
<i>Taenia hydatigena</i>	Dog	<i>C. tenuicollis</i>	Sheep, goat, cattle & pig
<i>Taenia ovis</i>	Dog	<i>C. ovis</i>	Sheep & goat
<i>Taenia pisiformis</i>	Dog	<i>C. pisiformis</i>	Rabbit



Species	Definitive host	Larval stage	Intermediate host
<i>Taenia krabbei</i>	Dog	<i>Cysticercus tarandi</i>	Rein deer
<i>Taenia taeniaeformis</i>	Cat	<i>Cysticercus fasciolaris</i>	Rodent
<i>Taenia multiceps</i>	Dog	<i>Coenurus cerebralis</i>	Sheep & goat
<i>Taenia serialis</i>	Dog	<i>Coenurus serialis</i>	Rabbit

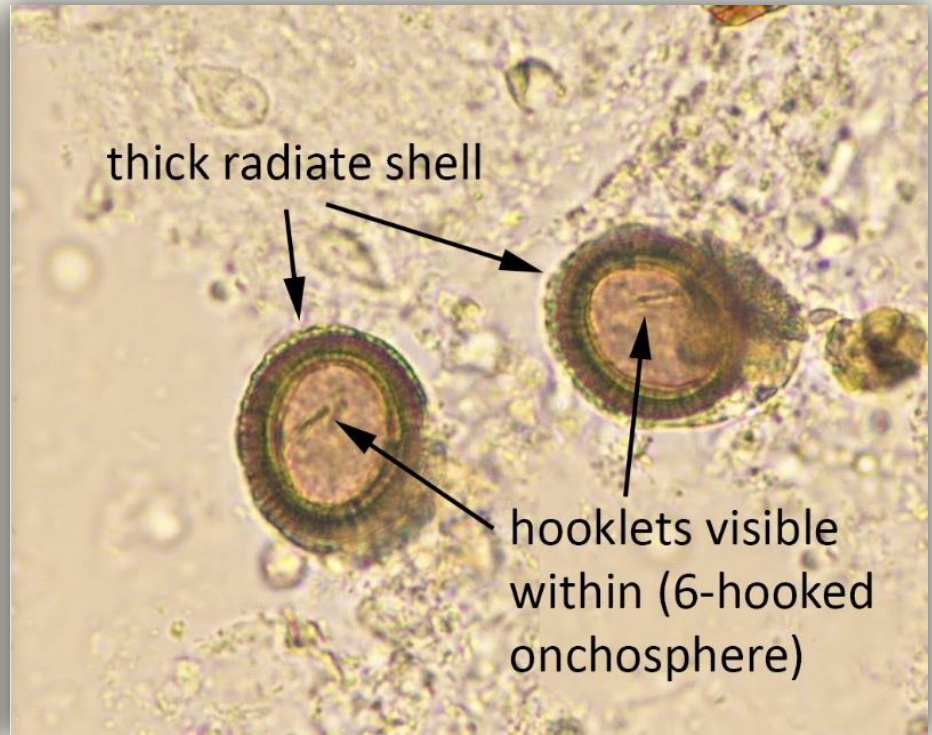
# *Taenia saginata*



<b>Common name</b>	<b>Beef tapeworm</b>
Host	Human
Intermediate host	Cattle
Location	Small intestine
Metacestode	<i>Cysticercus bovis</i>
Transmission of infection	In man- Ingestion of measly beef In cattle- Ingestion of eggs during grazing

# Morphology





**Egg**

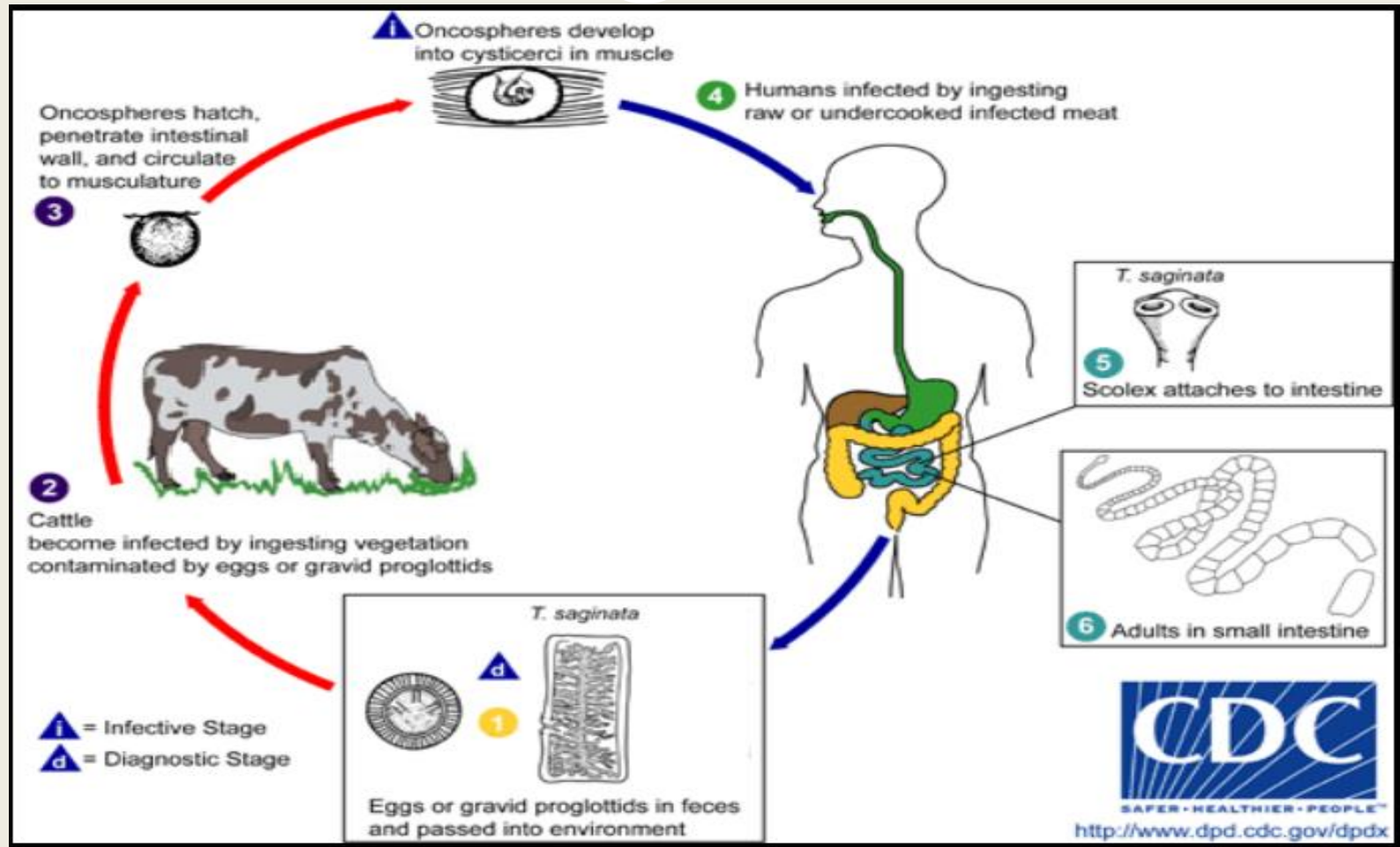
# Morphology



- Adult worm is white, ribbon shaped, flattened and segmented.
- Adult are 4-8 meters in length and may rarely attain 25 meters.
- It consists of 1000-2000 segments or proglottids.
- The scolex has 4 suckers without rostellum and hooks.
- Ovaries are 2 in number.
- The vagina possesses a sphincter muscle.
- The gravid proglottids are 16-20 mm long and possess 14-32 lateral uterine branches.
- Each gravid proglottid contain about 80,000 eggs.
- The eggs are oval, 46-50 by 39-41  $\mu\text{m}$  in diameter.



# Life cycle





- Gravid segments are passed in the stools and these gravid segments migrate and contaminate the soil or grazing area of livestock.
- During migration eggs are released which are ingested by the I/H (cattle) and in the small intestine of cattle they hatch where upon the oncosphere penetrates the intestinal wall and reach different parts of body via general circulation and develops into Cysticercus in heart, masseter muscles, tongue, diaphragm etc.



- However, high density occurs in the heart and masseter muscle.
- The cysticercus attains maturity in 10 weeks time and remain viable for 9 months.
- The larval stage is *Cysticercus bovis* and the beef infected with *Cysticercus bovis* is called as “measley beef”.
- Humans acquire infection by ingestion of uncooked or improperly cooked infected beef.

# Pathogenesis



- **In man:** Abdominal pain, diarrhoea and constipation may occur.
- **In cattle:** Usually asymptomatic but heavy infection causes myositis, myocarditis and stiffness of muscle may be seen.

# Diagnosis



- Cattle: *Cysticercus* is diagnosed during meat inspection of carcasses.
- Perianal swab for the presence of egg in man.
- The adult cestode in man is without rostellum and the presence of sphincter muscle in vagina confirm the diagnosis.

# Treatment



- Niclosamide – 2 g/ person.
- Praziquantel – 10 mg/Kg b wt.
- Paromomycin – 5 mg/Kg b wt.
- Quinacrine 7 – 10 mg/Kg b wt. (It should not be given for *T. solium* infection because it induces vomiting).

# Control



- Personal hygiene.
- Proper disposal of night soil.
- Public education.
- Avoid eating of raw or under cooked beef.

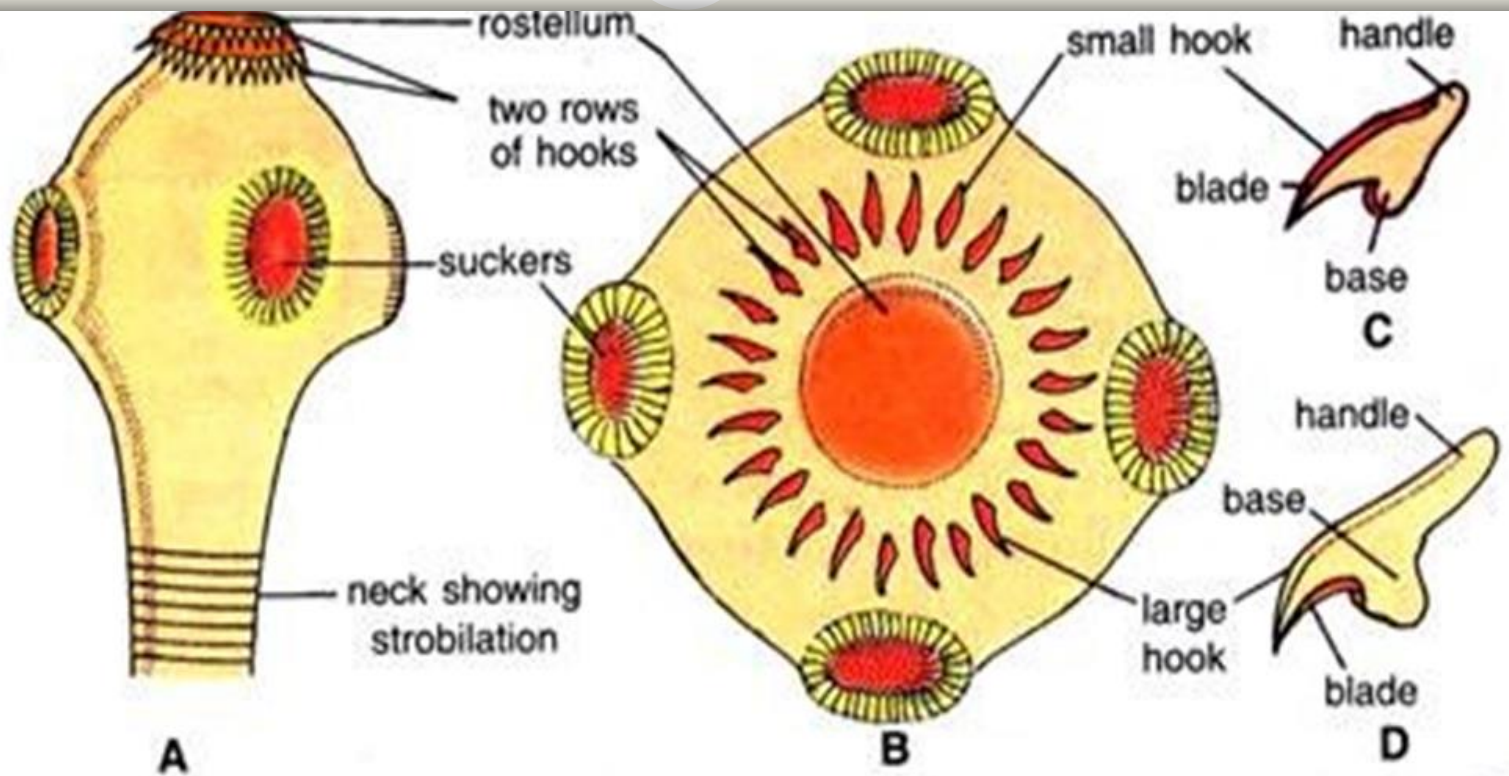
# *Taenia solium*



Host	Man
Location	Small intestine
I/H	Pig (Man also acts as I/H)
Metacestode/Bladder worm /Larval tapeworms	<p><i>Cysticercus cellulosae</i></p> <p>The condition caused by this larval stage is <b>Porcine cysticercosis</b> or <b>Measely pork</b></p>

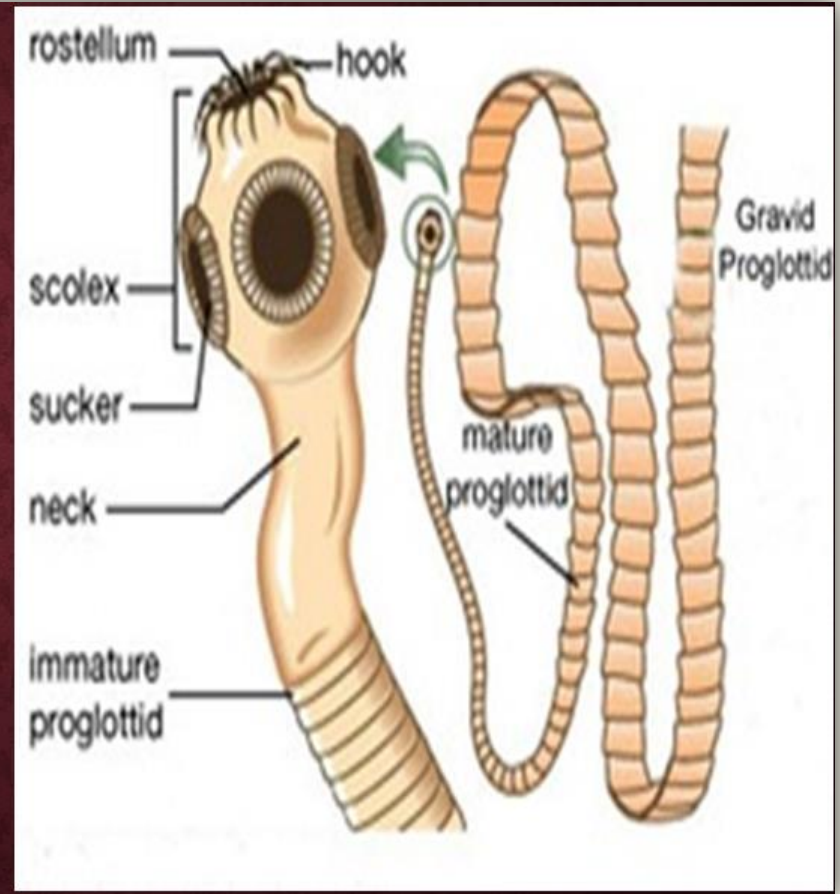
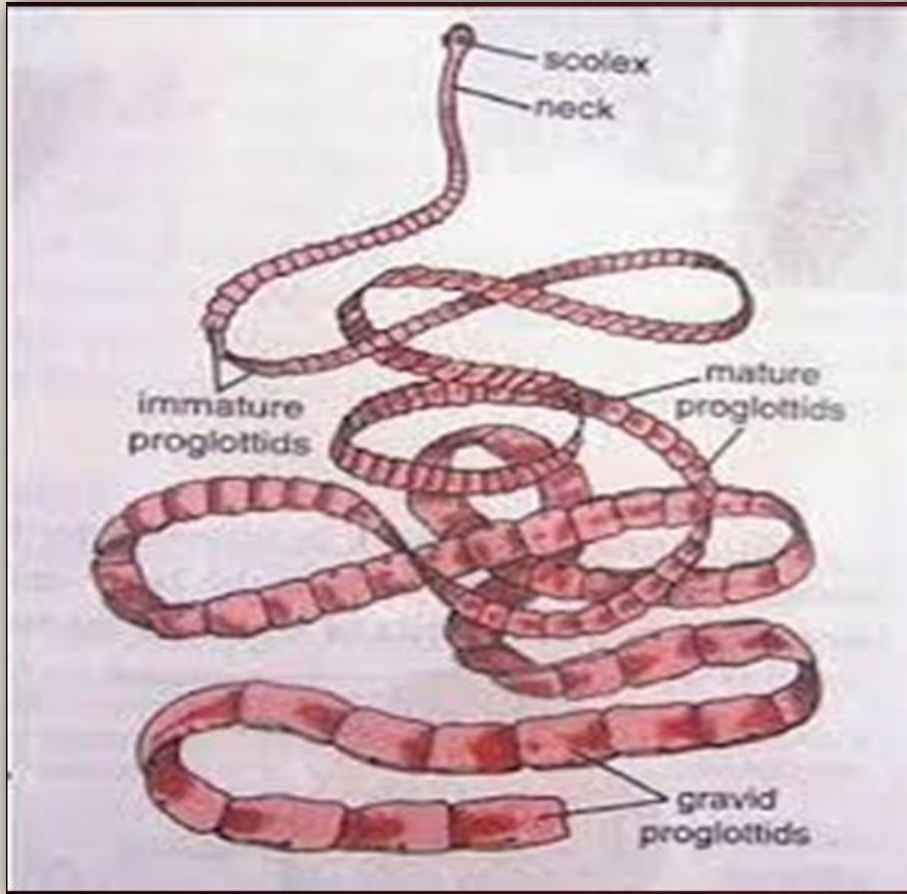






*Taenia solium*. Scolex. A—Scolex magnified; B—Frontal view of scolex; C—Small hook; D—Large hook.

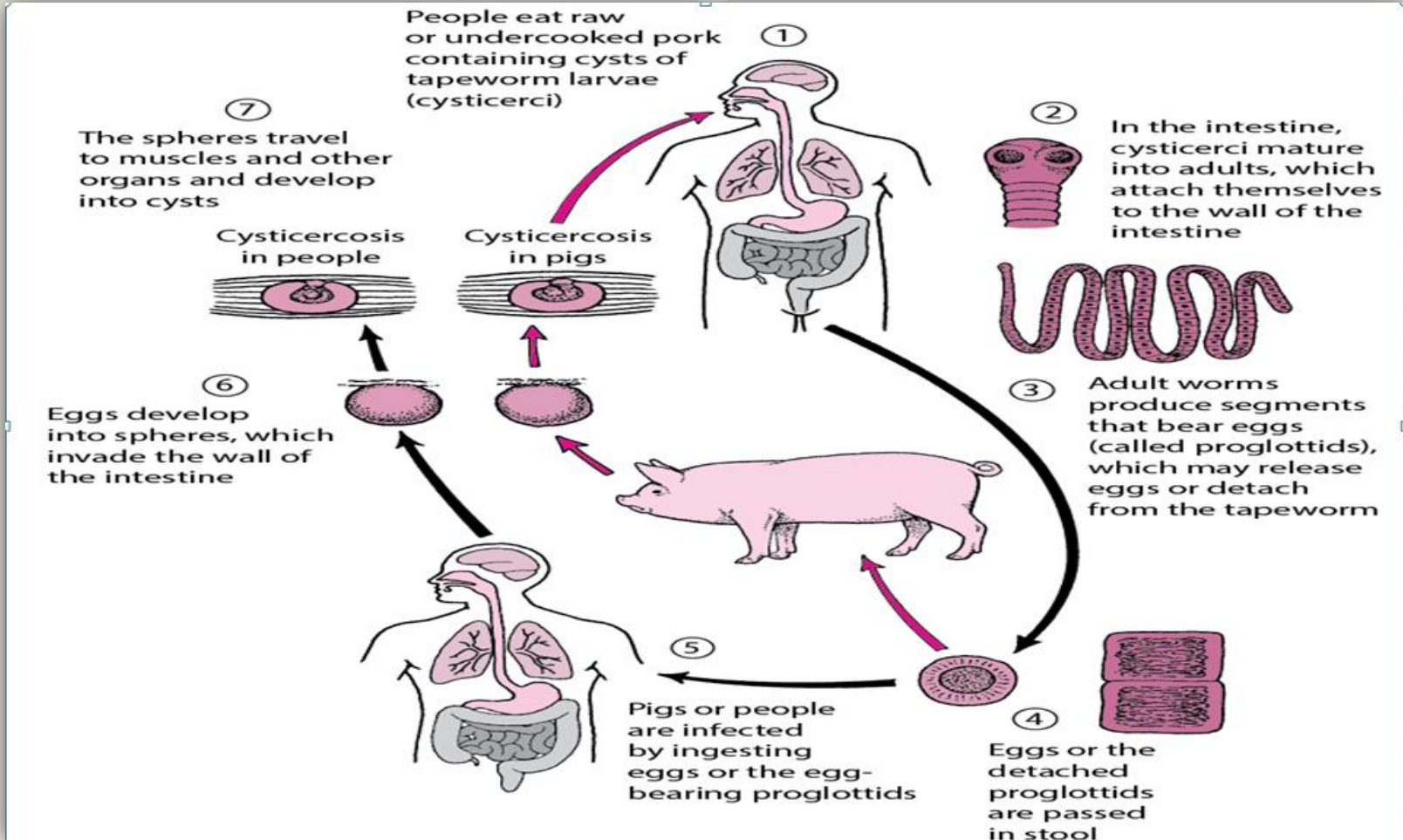
# Morphology





- The adult is usually 3.5 m or rarely up to 8 m long, having 800-1000 proglottids.
- The scolex is armed with 22-32 rostellar hooks in 2 rows.
- The ovary has 3 lobes.
- Vaginal sphincter muscle absent.
- The gravid proglottids are 10-12 mm long and possess 7-16 lateral uterine branches.
- Each gravid proglottid contain about 40,000 eggs.
- The eggs are spherical and 26-34  $\mu\text{m}$  in diameter.

# Life cycle



# Pathogenesis



- In pigs: Myositis, myocarditis, and muscular stiffness may occur.
- In man: The adult worms may cause abdominal pain, diarrhoea and constipation.
- The pathogenesis is severe in man due to the larval stage of the *Taenia solium*.
- The cysticercus mainly occurs in the ventricle of brain and cause pain and neurological signs such as epileptic seizure. This condition is called as “**neurocysticercosis**”.

# Diagnosis



- Stool examination for gravid segments in humans to diagnose taeniosis and MRI, CT-SCAN to detect neurocysticercosis.
- In pigs, post mortem and serodiagnosis may help to diagnose the presence of larval tapeworms.

# Treatment

- Same as *T. saginata* except quinacrine should not be used.

# *Taenia hydatigena*



Host	Dog and wild carnivores
Location	Small intestine
I/H	Domestic and wild ruminants (sheep, goat, sometimes pigs also act as I/H)
Metacestode stage	<i>Cysticercus tenuicollis</i>

# Morphology



- Adults are upto 75 – 500 cm in length.
- Rostellum armed with 2 rows of pen knife shaped hooks [1st row – 26 and 2nd row – 46].
- Gravid segments are longer than wide. In gravid segment, uterus has 6 to 10 lateral branches.
- **Egg**
  - ✓ Contain hexacanth embryo.
  - ✓ Eggs are oval in shape and  $36-39\ \mu\text{m} \times 31-35\ \mu\text{m}$  in size.



# Life cycle



- Sheep and other domestic and wild ruminants serve as intermediate hosts.
- The eggs after ingestion hatch in the small intestine and the liberated oncospheres reach the liver via blood.
- In the liver, they break out of the portal vessels and migrate through parenchyma for up to 30 days causing various haemorrhagic tracts.
- They then migrate into the peritoneal cavity to mature in between 34 and 53 days after infection and remain attached to the mesentery, greater omentum and serosal surface of organs.



- *Cysticercus tenuicollis* - 6 cm in length, consists of single invaginated scolex, attached to a fluid containing bladder by a long neck.
- Final host acquires infection by ingestion of *Cysticercus tenuicollis* infected meat or offals.
- Prepatent period is 51 days.

# Pathogenesis



- The prevalence of infection is high in sheep but level of infection is low.
- The migration of *Cysticercus* in the liver cause haemorrhagic and fibrotic tract.
- Heavy infection in lambs with *C. tenuicollis* causes the condition traumatic hepatitis which is called as “**hepatitis cysticercosa**”.
- This must be differentiated from acute fasciolosis. *Cysticercus* in the peritoneal cavity do not cause any harmful effect.

# *Taenia multiceps* (Syn. *Multiceps multiceps*)



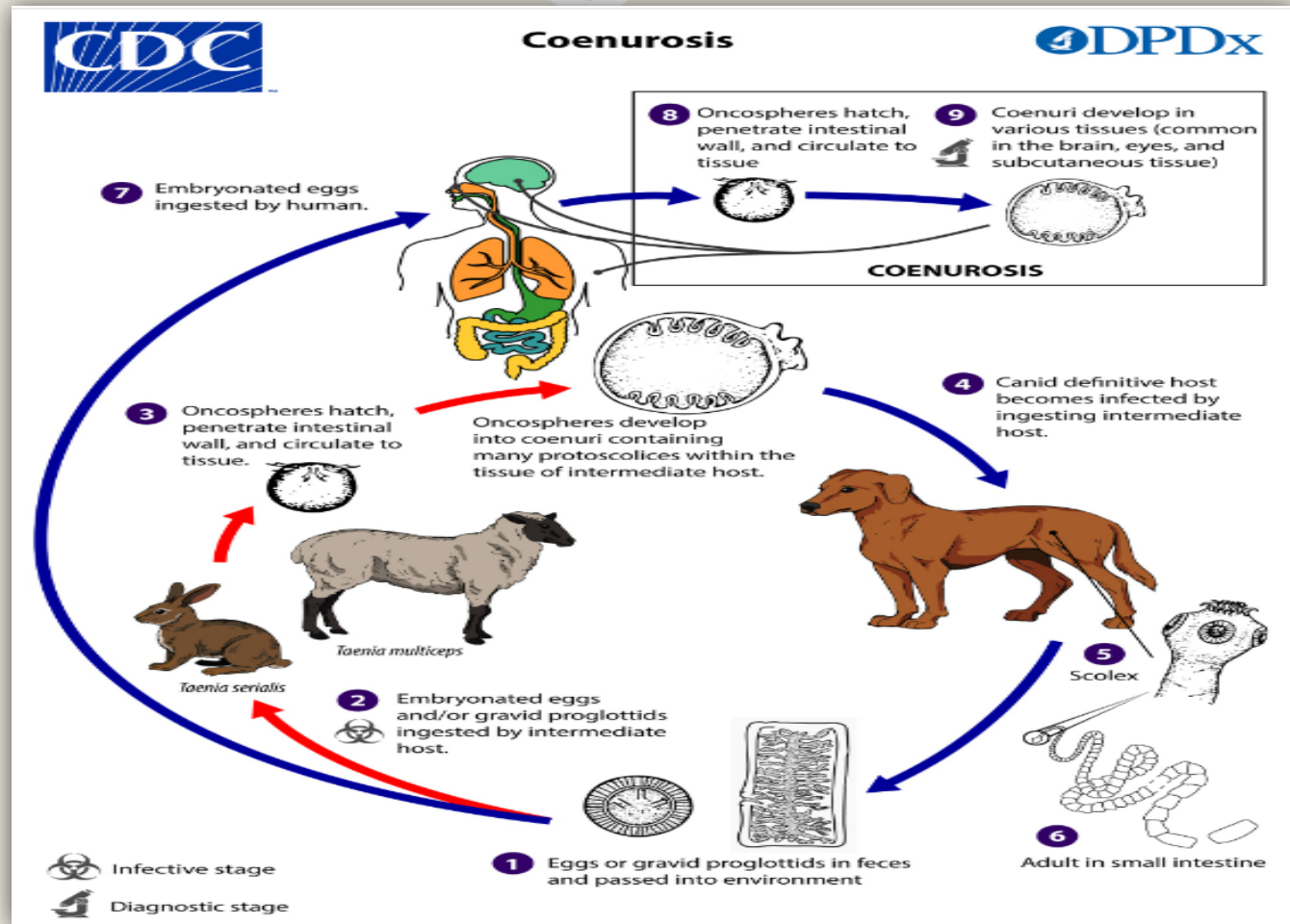
<b>Host</b>	<b>Dog and wild carnivores</b>
<b>Location</b>	<b>Small intestine</b>
<b>I/H</b>	<b>Sheep and Goats</b>
<b>Metacestode stage</b>	<i>Coenurus cerebralis</i>

# Morphology



- Adults are upto 40 to 100 cm in length.
- In the gravid segment, uterus has 14 to 20 lateral branches.
- Metacestode stage occurs in the brain and spinal cord, sometimes in goats, it may occur in s/c tissue.
- The species that occur in goats is considered as a separate spp. *Taenia gaigeri*.
- The rostellum has double row of 22-32 hooks, the larger ones measure 113-157  $\mu\text{m}$ .
- Eggs measure 29- 37  $\mu\text{m}$ .

# Life cycle





- Eggs are ingested by I/H which hatch in the small intestine of the intermediate host.
- The oncosphere penetrates the intestine wall and reach the brain and spinal cord via circulation.
- Developing larval stages migrate in the brain and spinal cord leaving a tortuous yellowish grey to reddish streaks.



- Larval stage matures in 8 months.
- Coenurus is large, fluid containing bladder in which number of invaginated protoscolices are attached to the wall.
- Final host acquires infection by ingestion of infected meat.



# Pathogenesis



- Adult worms are not pathogenic in D/H (Dog) but the larval stages are highly pathogenic in I/H (Sheep). In lambs the migrating larval stage causes, “**acute menigo encephalitis**” which is chronic in nature and associated with one **Coenurus or two Coenuri**.
- The developing Coenurus produces high degree of brain tissue damage causing neurological condition which is referred to as **Gid or Staggers or Sturdy**. The neurological symptom depends upon the location of cyst in the CNS.
- If the cyst is located on the cerebral hemisphere in parietal region, the affected animal moves in a circle towards the affected side.



- If the cyst is situated in the anterior part of the brain, the animal will hold its head against the chest and may walk with high steps or may walk in a straight line until it meets an obstacle and remain motionless.
- If the cyst is present in the ventricle, the movement will be backward.
- If the cyst is present in the cerebellum, the animal will be hyperaesthetic and may have incoordination, jerky or staggering gait or may remain motionless.



- If the cyst is present in the surface of the brain, the skull may be subjected to “pressure atrophy” and so perforation of the skull may occur.
- If the cyst is present in spinal cord, then the hind legs, bladder and rectum become paralysed.

# Diagnosis



- Early diagnosis – ophthalmoscopic examination of eye.
- Larval stage- by clinical signs and by post mortem examination
- Radiological examination

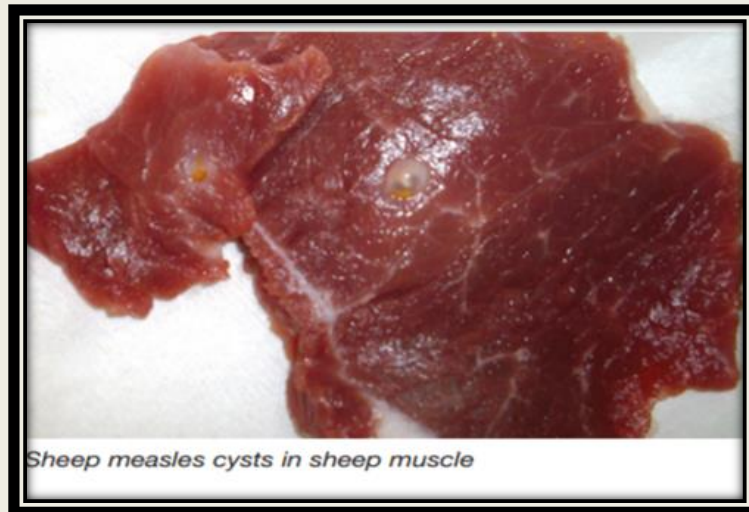
# Treatment

- Cyst can be removed surgically when located on the surface of the brain.

# *Taenia ovis*



- Tapeworm parasite of dogs and other canids.
- *Cysticercus ovis* is the larval stage (cysticercoid metacestode) .
- It may grow to a length of 1 or 2 cm.
- The gravid uterus may have 11- 20 lateral branches.



Sheep measles cysts in sheep muscle

# *Taenia pisiformis*



- *Taenia pisiformis*, commonly called the **rabbit tapeworm**.
- It occurs in the small intestine dog, rarely cat and other wild carnivores.
- It may grow up to 200 cm long.
- The rostellum bears double row of 34-48 hooks, the larger being 225-294  $\mu\text{m}$  long while the smaller ones 132-177  $\mu\text{m}$ .
- The number of testes varies from 400-500.
- The lateral branches of uterus vary from 8-12 on each side.

# *Taenia krabbei*



- It occurs in wild carnivores in northern countries.
- The **metacestode** is called *cysticercus tarandi* which develops in the muscles of reindeer, gazelle and other wild animals.
- The scolex bears 26-34 hooks.
- Uterine branches vary from 9-10 on either side.

# *Taenia serialis*




- It occurs in the intestine of dog and fox.
- The **intermediate hosts** are **lagomorphs** and **metacestode (*Coenurus serialis*)** develops in the subcutaneous and intermuscular connective tissues.
- It is 4 cm or more in diameter and contains many protoscolices in radiating rows.
- The adult tapeworms measures 72 cm in length and bears two rows of 26-32 rostellar hooks.
- There are 20-25 lateral uterine branches on either side.



# *Taenia taeniaeformis*



- It is found in the intestine of cat and other related wild carnivores.
- It may grow to a length of 15-60 cm and a width of 5-6 mm.
- Rastellum bears 26-52 hooks in two rows and the larger hooks may measure 380-429  $\mu\text{m}$ .
- Uterine branches in the gravid proglottids vary from 16-18 on each side.
- Eggs measure 31-36  $\mu\text{m}$  in diameter.

A wooden tag with the words "Thank you!" written in black ink. The tag is placed on a light-colored, textured surface. Three white daisies with yellow centers are scattered around the tag: one in the foreground to the right, and two in the background. A black pen is visible on the left side of the tag.

Thank  
you!