

# Cestodes: Tapeworms:

*Taenia saginata* (beef), *Taenia solium* (pork):

## General Cestode Info:

- segmented flatworms/tapeworms
- ALL are parasitic and Obligate parasites of GIT
- Have no digestive tract. Absorb food through surface. Hermaphrodite
- Have nervous system, excretory system, musculature.

## Morphology :

very long (8-10m), flat, segmented

the body consist of :

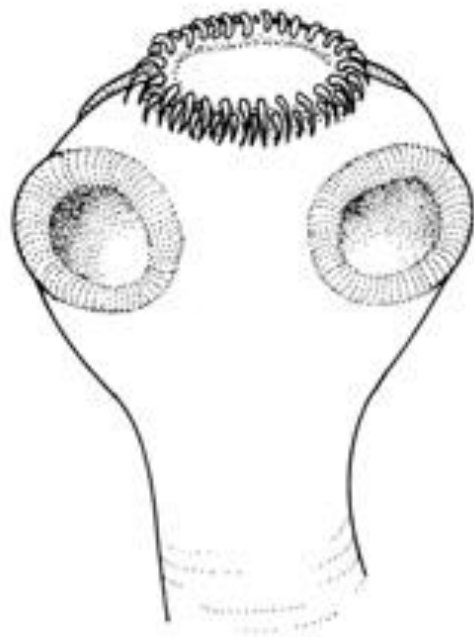
1- Scolex : contain 4 suckers in addition to rostellum with hooks in *T.solium*.

2- Neck

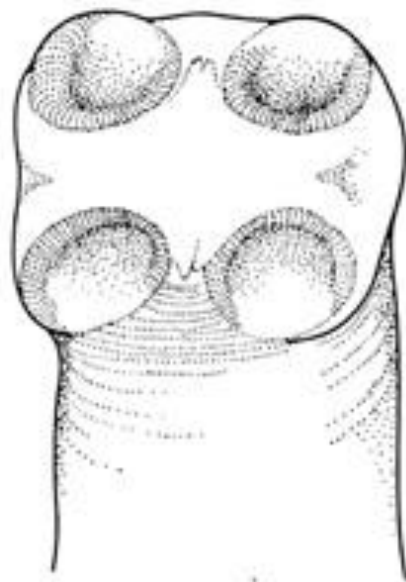
3-Immature proglottids (beginnings of genital organs)

4- Mature proglottids (complete genital organs)

5- Gravid proglottids. (Uterus is main part)

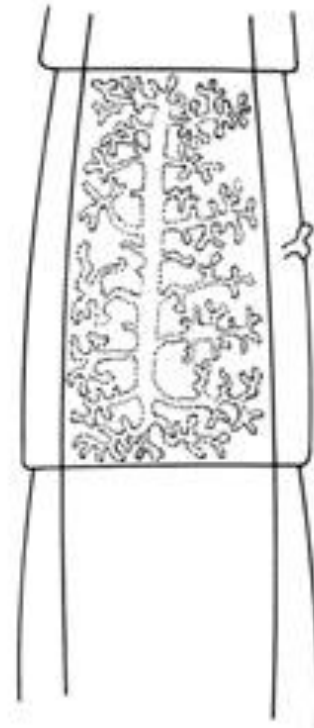


*Taenia solium*



*Taenia saginata*

(a)



*Taenia solium*



*Taenia saginata*

(b)

## Hosts:

Man is the final host for both worms,  
intermediate host are cows in *T.*  
*saginata* and pigs in *T. solium*.

# Life cycle:

Both have typical life cycle except *T. solium* is able to autoinfect humans!

- 1) cysticerci (larvae) (infective stages) in undercooked beef or pork are ingested.
- 2) cyst enters stomach.
- 3) wall of cyst is digested, freeing worm.
- 4) attaches to upper small intestinal wall with 4 suckers on scolex.
- 5) grows into adult (3mos).

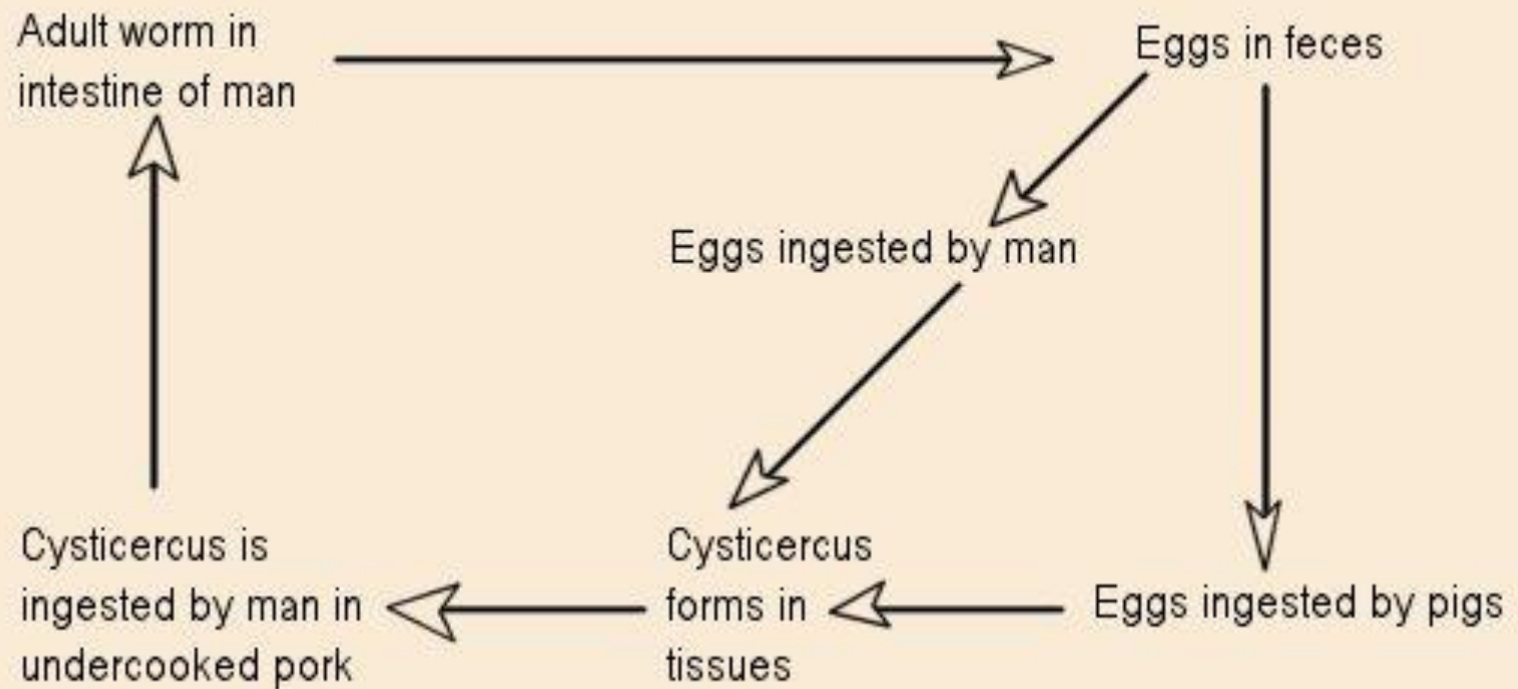
- 6) each segment absorbs pre-digested food
- 7) cross fertilization occurs between segments which all have both male & female organs.
- 8) gravid terminal proglottids detach and migrate out anus with stool.
- 9) segment disintegrates in soil and eggs are released
- 10) cow eats embryonated eggs.

11) eggs hatch in cow's small intestine.

12) hexacanth larvae penetrate intestinal wall .

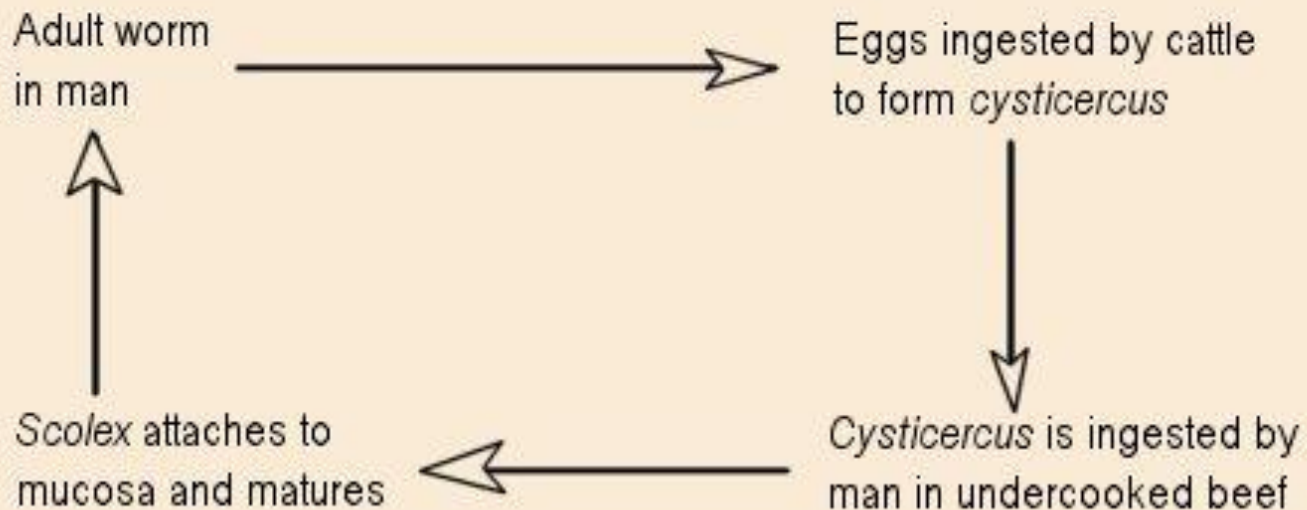
13) enter blood stream & infect tissue, usually skeletal muscle (encyst as cysticercus and become infective within 7-10 weeks).

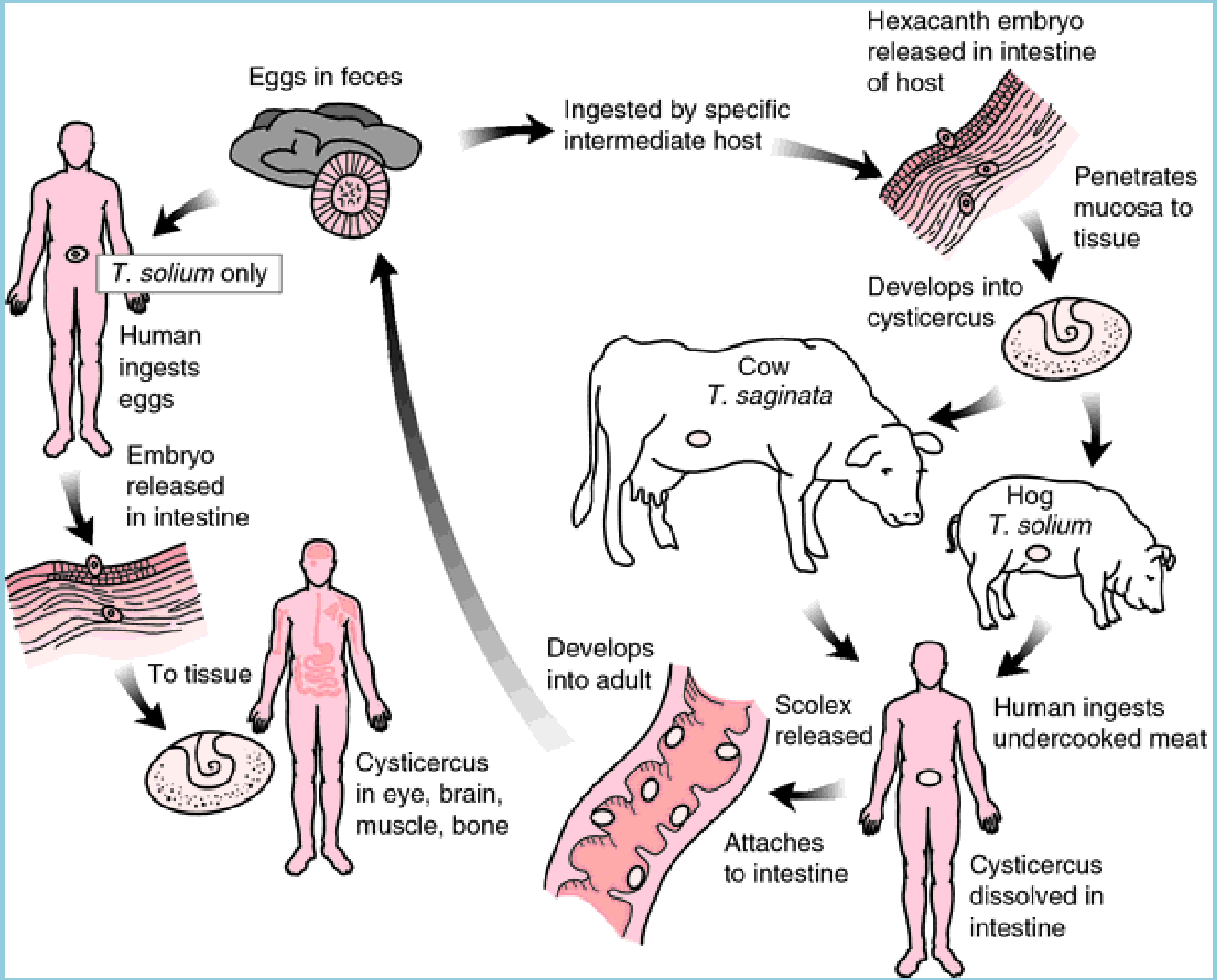
# Taenia solium Life Cycle





# Taenia saginata Life Cycle





## Symptoms:

Symptoms of infection in humans are generally mild and readily treatable.

Symptoms can include:

- digestive disturbances, diarrhea, nausea and weight loss.

-A mass of strobila may cause acute intestinal obstruction.

### Diagnosis:

Based on the recovery of gravid proglottids or the eggs from the feces or perineal region with a swab.

Serological tests (ELISA )

## Treatment:

- 1- Praziquantel: 25 mg/kg single dose.
- 2- Niclosamide: 2 gm(4 tab) for 5-7 days.
- 3- Surgical removal of cysticerci.

## Prevention:

Prophylactic measures include:

- Removal of source of infection by treating infected individuals
- Prevention contamination of soil by human feces
- Inspection of beef for cysticerci.
- Cook beef meet very well at  $70\text{C}^0$  or above.
- cysticerci may be destroyed by freezing at  $-10\text{C}^0$  for 5 days.

## Host parasite relationship:

- 1- Presence of huge cysticerci in intermediate host may cause disease in muscles, heart or lungs.
- 2- Sometimes eggs hatch inside human and many embryos penetrate gastric wall and via circulation to all parts causing many problems.

**Echinococcosis:**

**Zoonotic disease.**

also known as **hydatid disease**

The disease results from infection by  
tapeworm larvae of the genus

*Echinococcus* - notably *E. granulosus*, *E. multilocularis*, and *E. vogeli*.

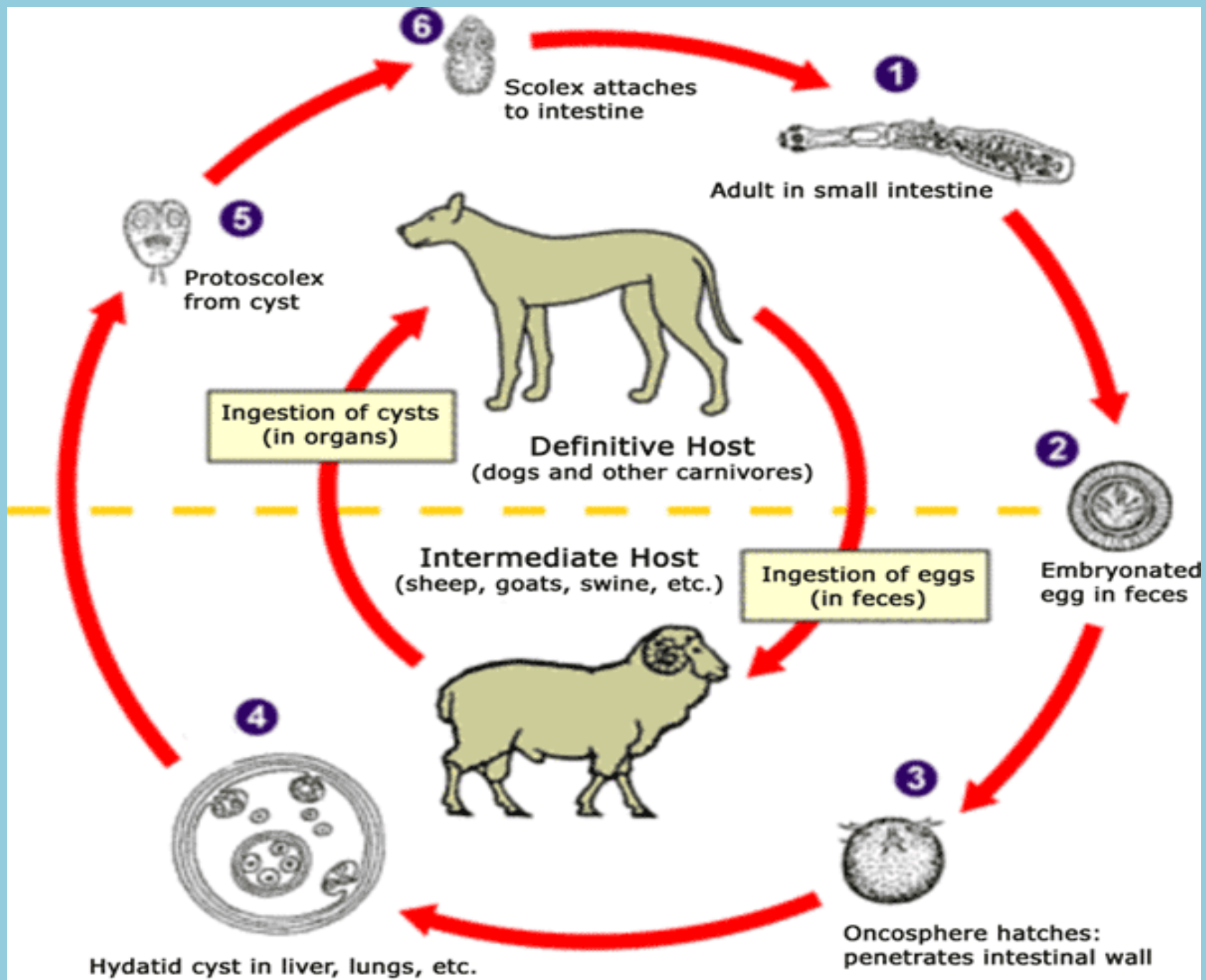


Life cycle:

The worm has a life cycle that requires definitive hosts and intermediate hosts.

Definitive hosts are normally carnivores such as dogs, while intermediate hosts are usually herbivores such as sheep and cattle. Humans also function as intermediate hosts, although they are usually a 'dead end' for the parasitic infection cycle.

The disease cycle begins with an adult tapeworm infecting the intestinal tract of the definitive host. The adult tapeworm then produces eggs which are expelled in the host's feces. **Intermediate hosts** become infected by ingesting the eggs of the parasite. The eggs are very similar to those of the genus *Taenia*.



Humans are usually exposed to these eggs in one of two ways:

- By directly ingesting food items or drinking water that is contaminated with stool from an infected animal.

- By having contact with cats and dogs that are infected. These pets may shed the eggs in their stool, and their fur may be contaminated.

Inside the intermediate host, the eggs hatch and release tiny hooked embryos which travel in the bloodstream, eventually lodging in an organ such as the liver, lungs and/or kidneys. There, they develop into hydatid cysts. Inside these cysts grow thousands of larvae.

When the intermediate host is predated or scavenged by the definitive host, the larvae are eaten and develop into adult tapeworms, and the infection cycle restarts

# Morphology

Hydatids cysts: are large, roughly spherical, fluid filled hollow bladders, containing numerous protoscolices (forming the so-called hydatid sand).

The protoscolices are formed within capsules, which may rupture to give the free protoscolices in the hydatid fluid

**Adults** - The adult parasites in the dog represent one of the smallest of the tapeworms. They measure between 3 and 9mm in length, and usually consist of only 3 proglottids, an immature, a mature, and a gravid proglottid. The scolex has a prominent rostellum, armed with a double row of between 30 and 36 hooks.





Disease symptoms:

Arise as the cysts grow bigger and start putting pressure on blood vessels and organs. Large cysts can also cause problems if they happen to rupture.

There is also risk of intrapleural or intraperitoneal dissemination of the disease and of secondary infection that causes a lung or hepatic abscess.

Infection with *E. multilocularis* results in the formation of parasitic tumors in the liver, lungs, brain and other organs. and it needs removal by surgical means.

Unlike intermediate hosts, definitive hosts are usually not hurt very much by the infection. Sometimes, a lack of certain vitamins and minerals can be caused in the host by the very high demand of the parasite. Because the cysts are usually slow-growing, infection may not produce symptoms for years. Symptoms usually reflect the size and location of the cysts.

Therapy with albendazole or praziquantel should be given and prolonged 28 days if dissemination of hydatid cyst is to be avoided.

## Prevention:

- Do not feed **cattle and sheep** viscera to dogs.
- Do not allow dogs to have access to **cattle and sheep** carcasses.
- basic hygiene practices such as thoroughly cooking food and vigorous hand washing before meals can prevent the eggs entering the human digestive tract.

Regular “deworming” of farm dogs with the drug praziquantel also helps kill the tapeworm

- After handling pets, **always** wash your hands with soap and warm water.
- Do not eat fruits or vegetables without careful washing or cooking