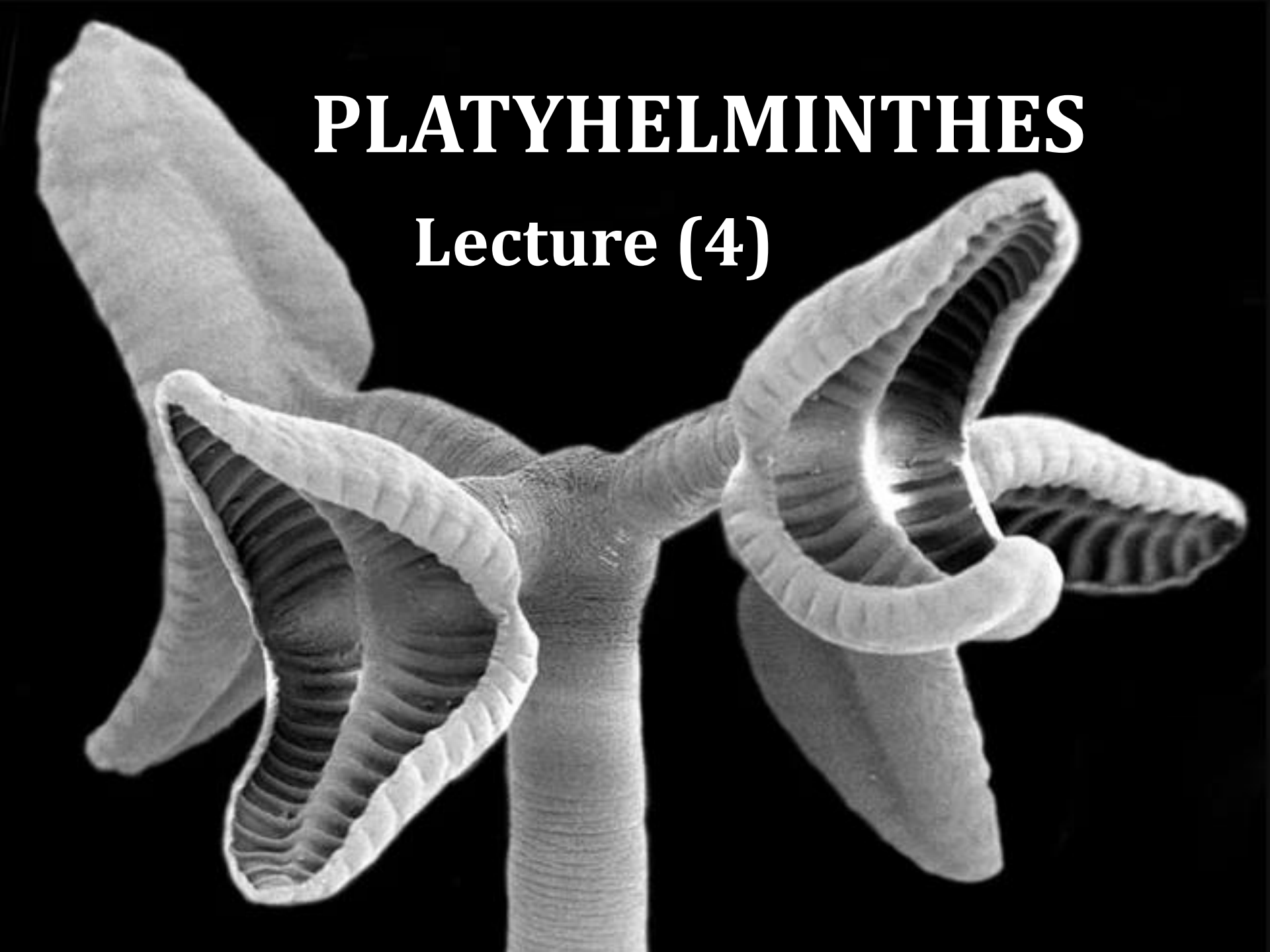
PLATYHELMINTHES

Lecture (4)



Kingdom Metazoa

(Multicellular animals)

Phylum Platyhelminthes (flat worms)

Class: Digenea

eg. *Clonorchis senensis*

eg. *Dicrocoelium dendriticum*

Class: Cestoda

eg. *Taeniarhynchus saginatus*
eg. *Taenia solium*
eg. *Dipylidium caninum*
eg. *Echinococcus granulosus*
eg. Diphyllobothrium sp.

Clonorchis senensis

…The Chinese liver fluke

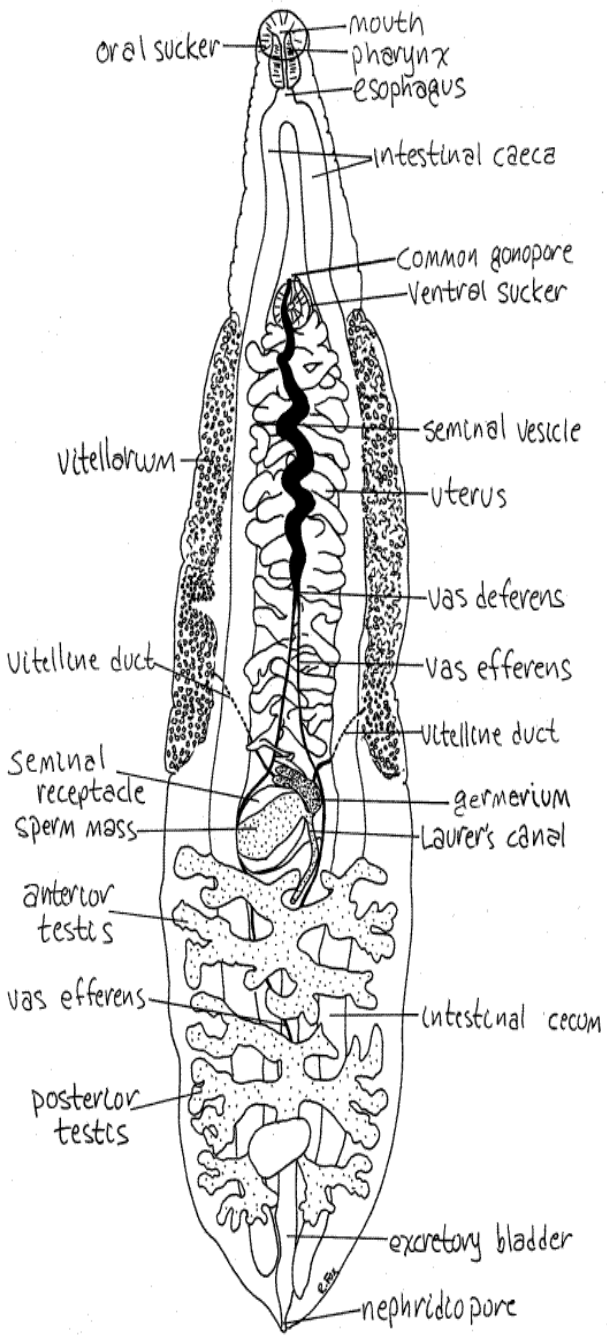
…This parasite lives in the **liver of humans**, and is found mainly in the common bile duct and gall bladder, feeding on bile.

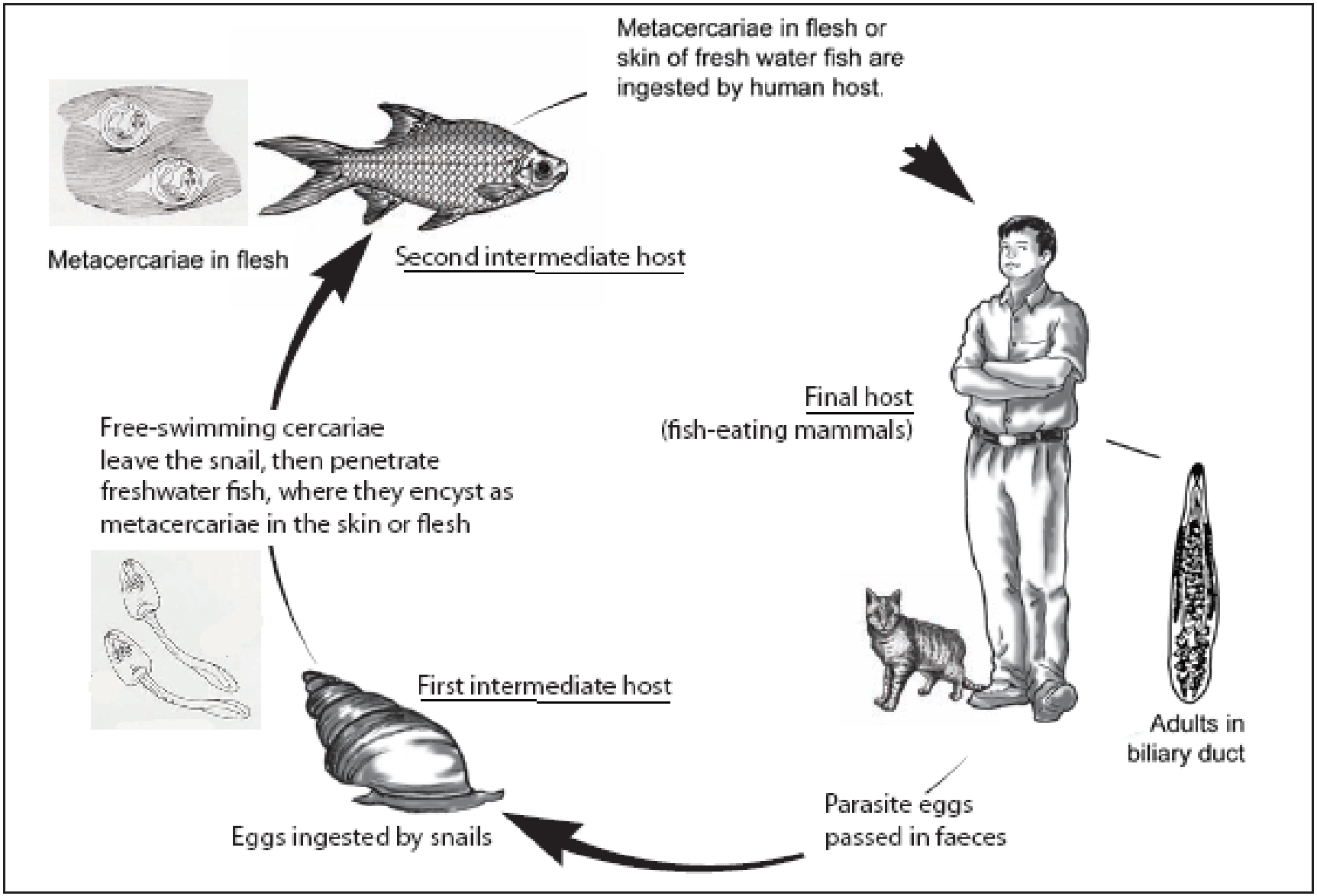
…It causes ***Clonorchiasis***….Due to dwelling of worm in the bile ducts, *Clonorchis* induces an inflammatory reaction, epithelial hyperplasia and sometimes even carcinomas and sometimes obstruction of the bile duct by the parasite.

… Drugs used to treat infestation include praziquantel.

…the final host is fish-eating mammals as human and cats.

…the first intermediate host is the snail while the second intermediate host is freshwater fish.





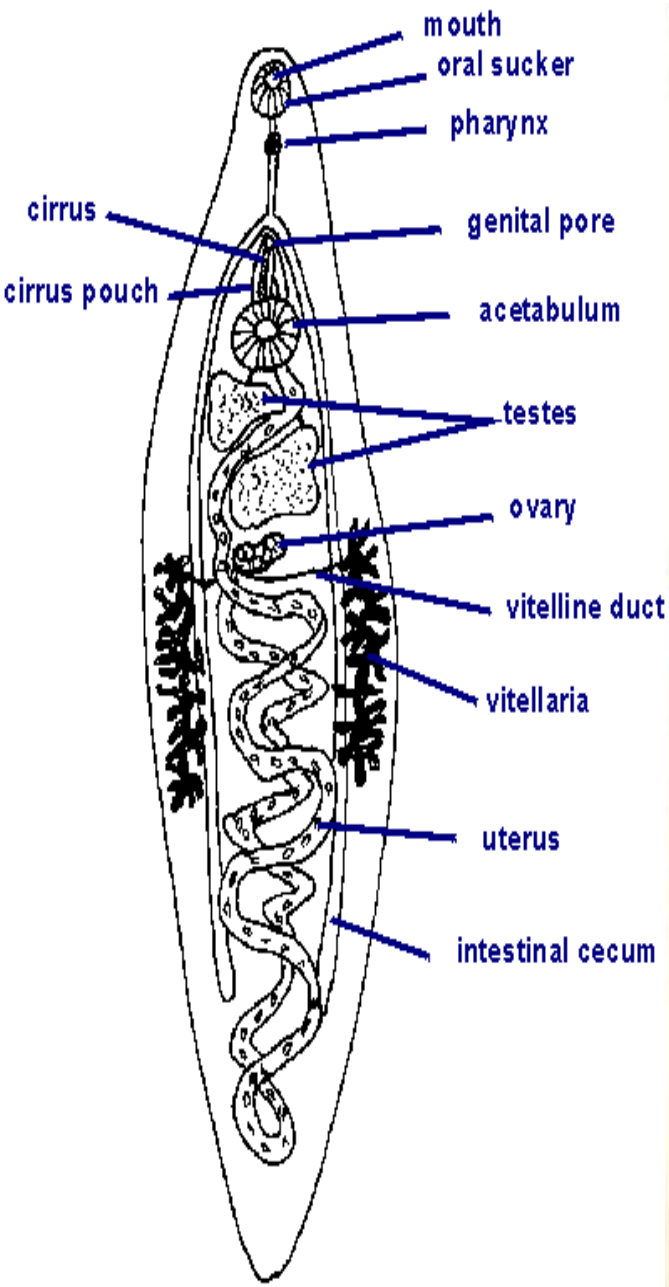
You must know how man can be infected??? By eating poorly cooked fresh water fish contaminated with metacercaria of the parasite.

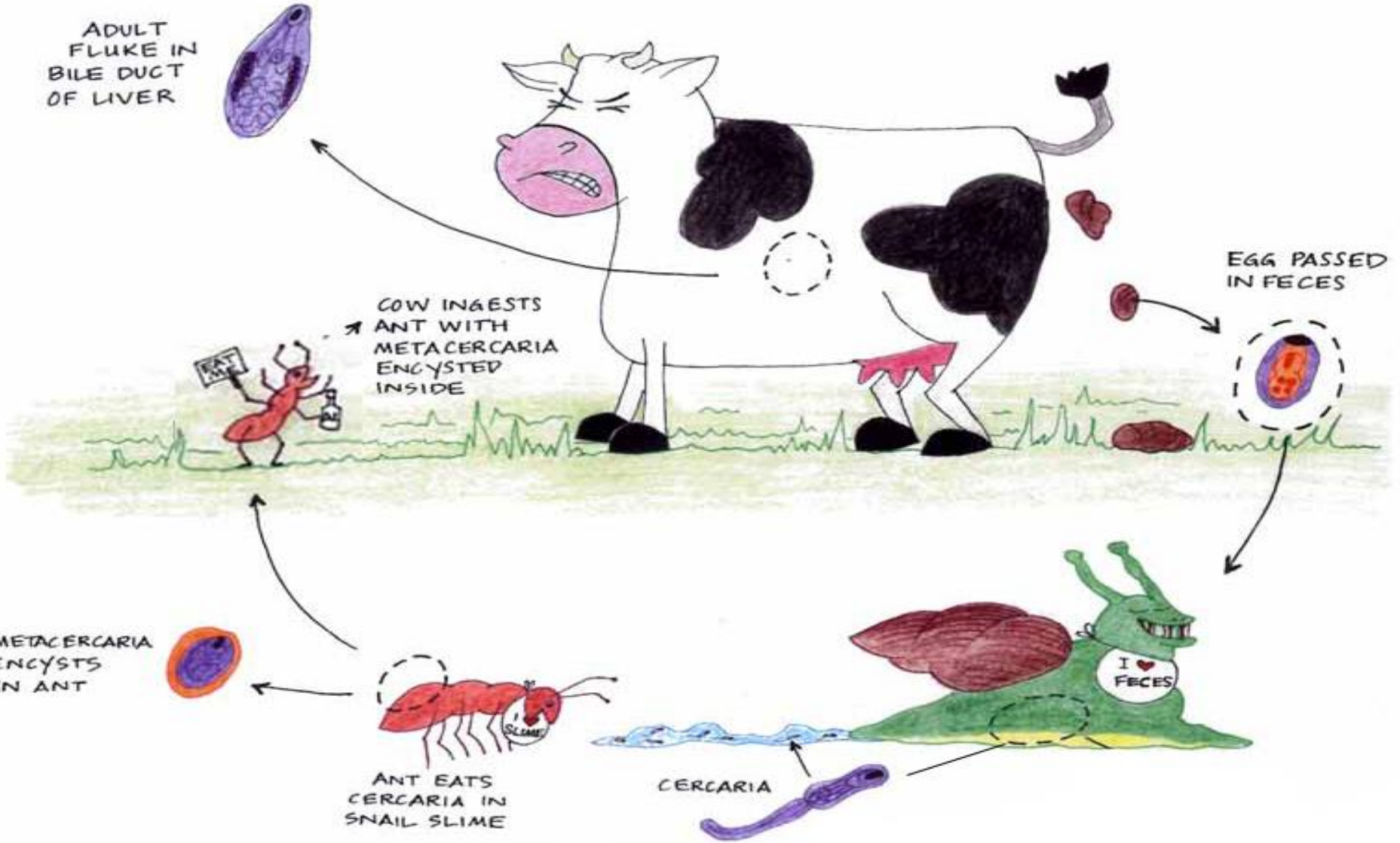
You must know how fish can be infected??? By **direct penetration of cercaria released from snail to** fish skin forming metacercaria in fish flesh.

Dicrocoelium dendriticum

…The lancet liver fluke
…This parasite lives in the liver of humans (rarely) and cows, and is found mainly in the common bile duct and gall bladder, feeding on bile.

…Its symptoms can include biliary colic and general digestive disturbances, including diarrhea. However, in heavier infections, epithelial hyperplasia, enlarged liver (hepatomegaly) or inflammation of the liver (cirrhosis) was observed.





You must know how cow can be infected??? By eating ants contaminated with metacercaria of the parasite.

You must know how ant can be infected??? By **eating cercaria (in slime balls) released from snail.**

Cestoda parasites

- Humans are infected by several species of tapeworms
- ***if they eat underprepared meat such as***
  - Pork (***Taenia solium***)
  - Beef **(*Taenia saginata*)**
  - Fish (***Diphyllobothrium* spp.**)

- ***if they eat food prepared in, conditions of poor hygiene***
  - ***Hymenolepis*** spp.
    - *Hymenolepis nana* (dwarf tapeworm)
    - *Hymenolepis diminuta* (rat tapeworm)
  - ***Echinococcus granulosus*** (dog tapeworm)

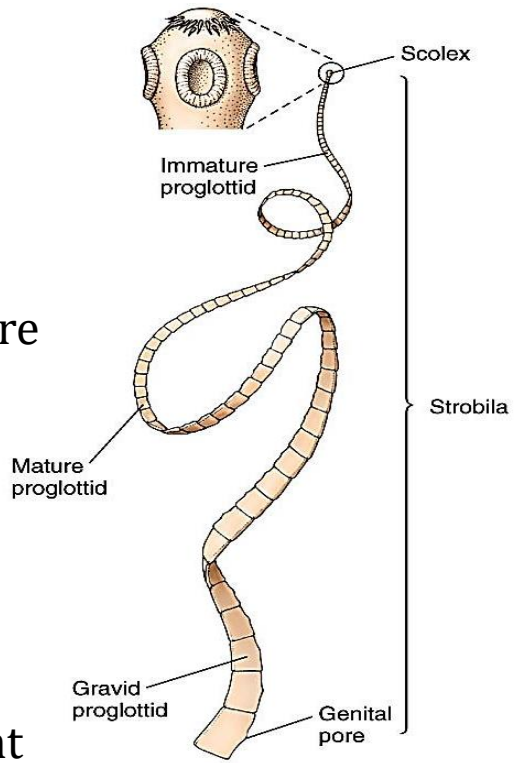
Class Cestoda
(Tape worms or Gutless flatworms)

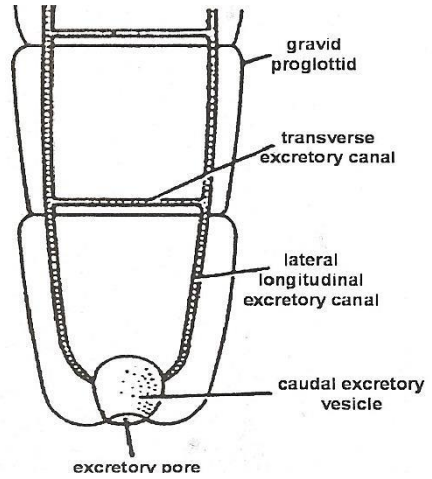
General characters

1- Elongated ribbon like
2- Composed of head/scolex carries sucker, hooks, bothria, rostellum for attachment
3- Neck having activity dividing cells from which proglottid are formed

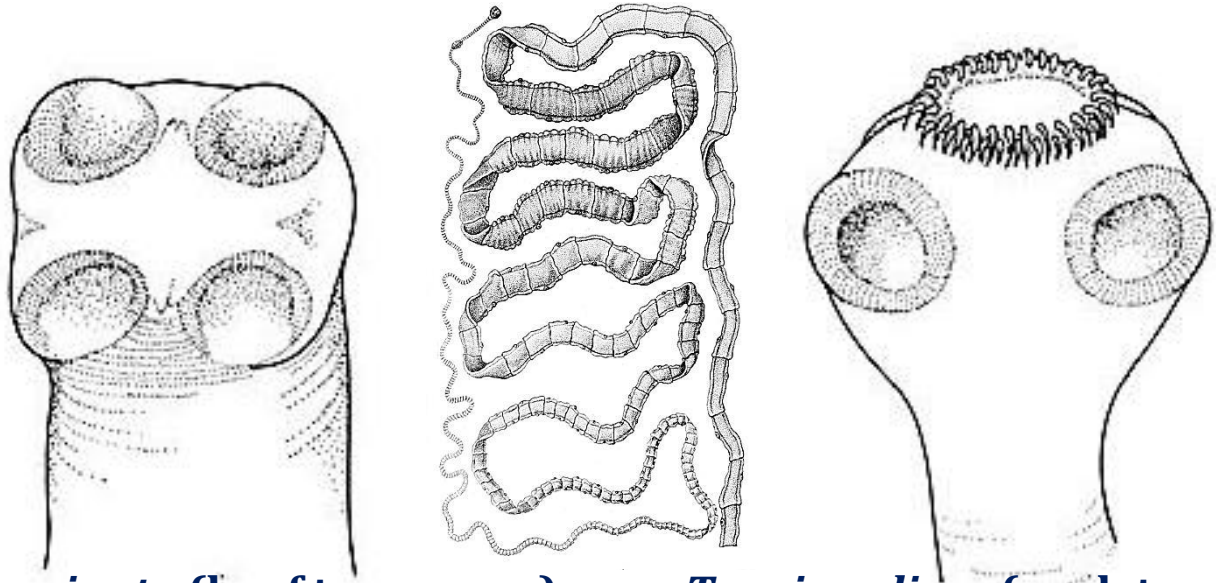
4- Three types of proglottid are found which are:
[a] Immature (immature sexual organs)
[b] Mature (mature sexual organs)
[c] Gravid (uterus filled with eggs)

5- Digestive system absent and they absorb their food by tegument
6- Nervous system composed of nerve bundles and nerve cords
7- Excretory system composed of flame cells. They have special ducts, collecting tubules unite to form main longitudinal excretory canals on each side of proglottid and connected by transverse excretory canal. They open to exterior by single **excretory pore**.
8- Hermaphrodite
9- Reproduction takes place by cross fertilization and self fertilization





EX. *Taeniarhynchus saginatus (Taenia saginata) & T. solium*



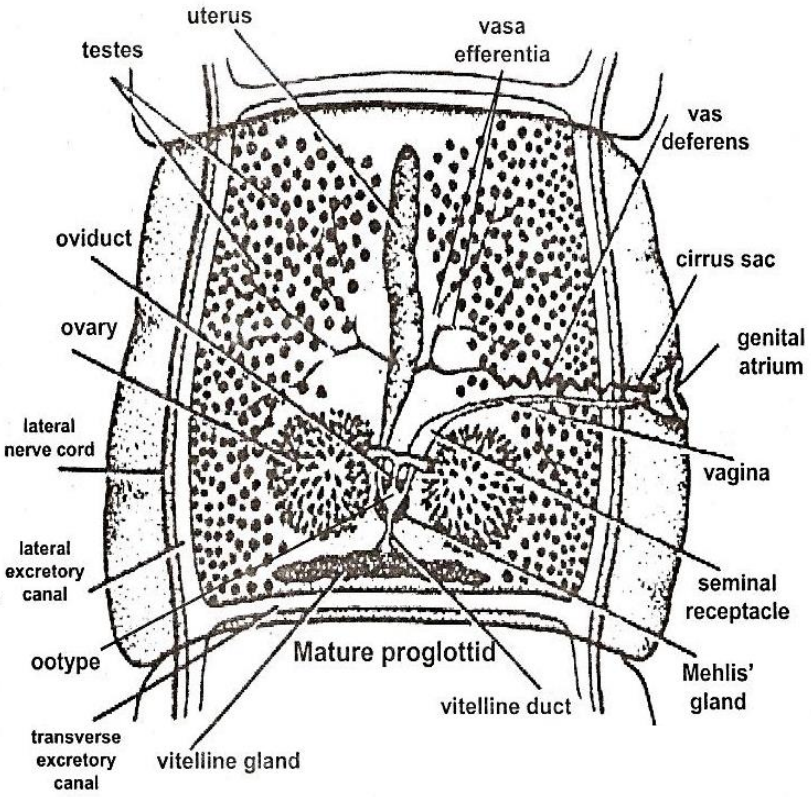
***Taenia saginata* (beef tapeworm)**
Measures 10-12 meters and composed of 1000-2000 proglottid
Intermediate host is Sheep

***Taenia solium* (pork tapeworm)**
Measures 3-5 meters and composed of 800-1000 proglottid
Intermediate host is Pig

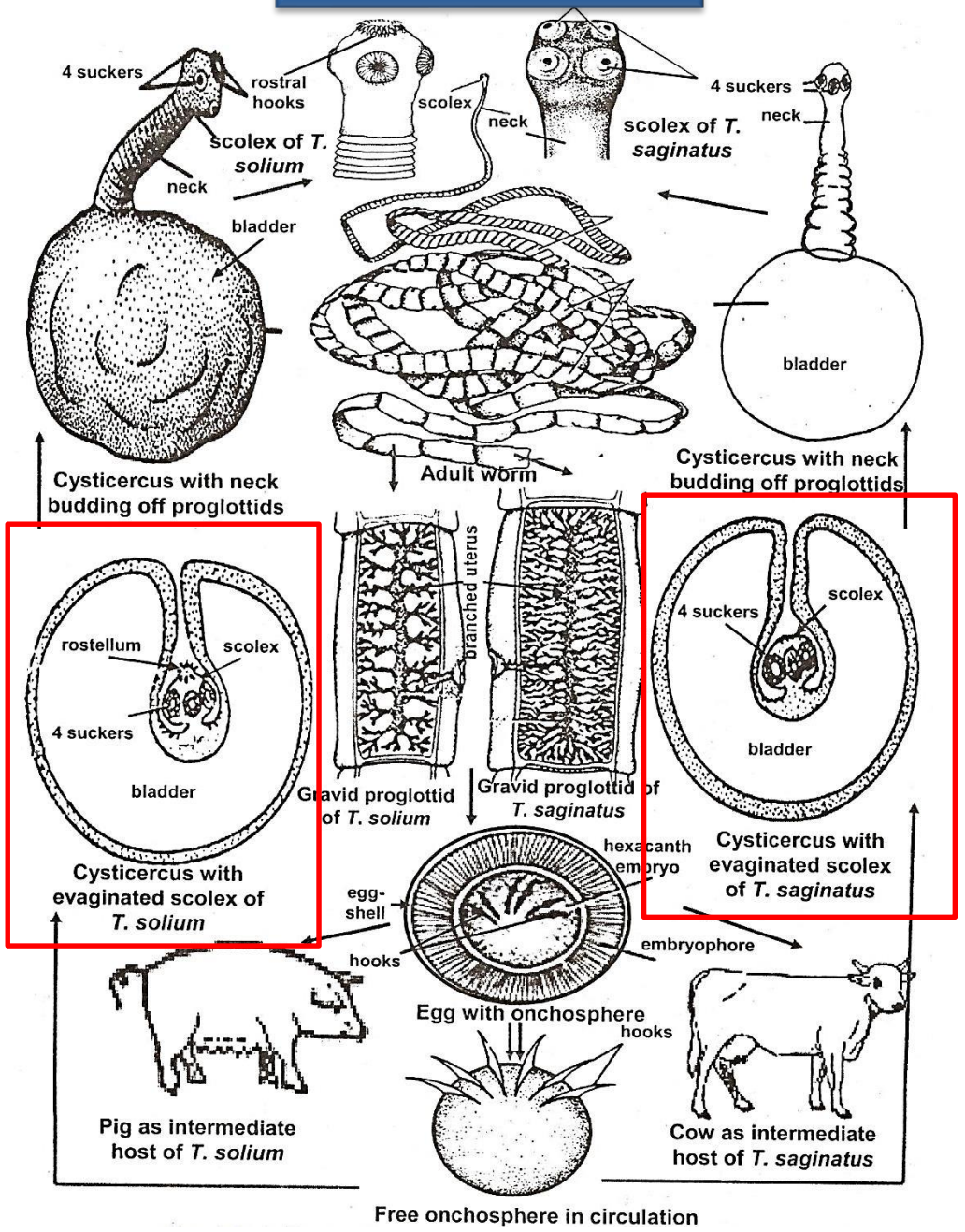
Final host is Man, they are intestinal parasites

Mode of infection: When man eats raw or insufficiently cooked meat of cows or camel in case of *Taenia saginata* or meat of pig in case of *T. solium* which contain the bladder worms (infective stage) in their muscles.

Reproductive system of *Taenia*



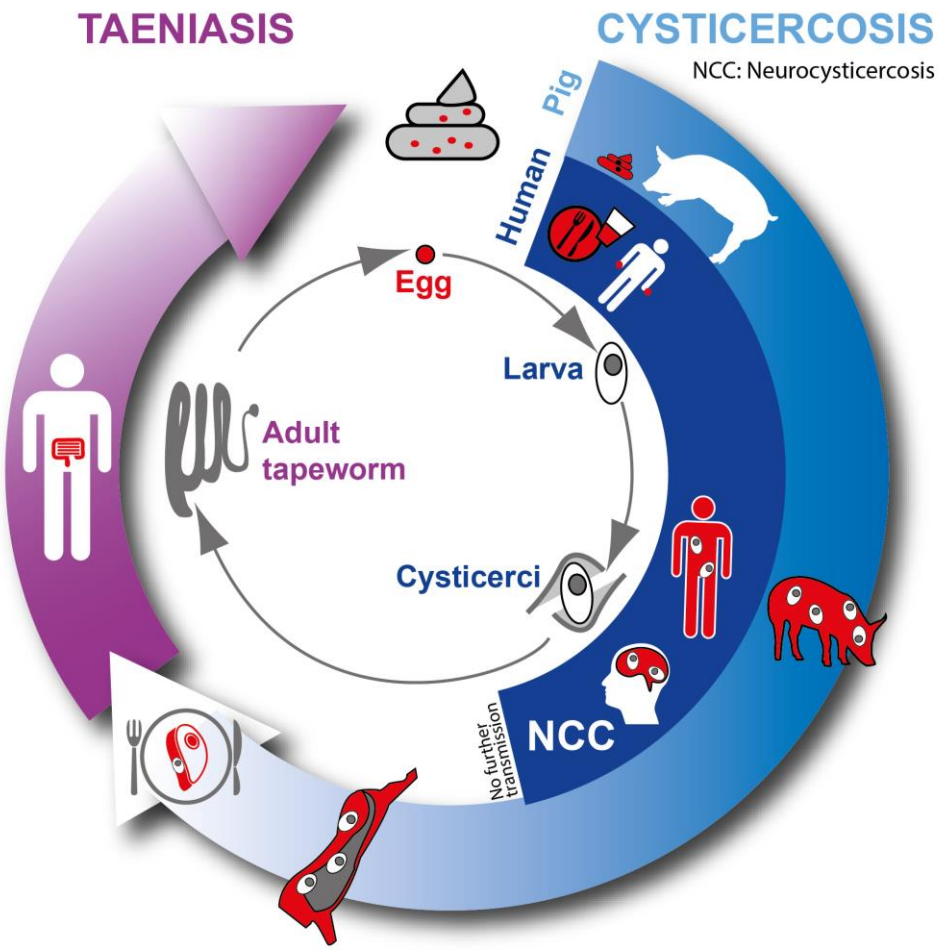
Life cycle of *Taenia*



What is the difference between Taeniasis and cysticercosis?

... ***Taeniasis*** is an intestinal infection with the adult tapeworm, either *Taenia saginata* (from cattle) or *Taenia solium* (from pigs). Infected individuals often have mild or no symptoms.

... ***Cysticercosis*** is a tissue infection with the larval stage (or **cysticercus**) of the pork tapeworm.



Symptoms

Most people that have taeniasis don't have any symptoms. If signs and symptoms are present they may include:

1. pain
2. unexplained weight loss
3. blockage of the intestine
4. digestive problems

Some people with taeniasis may also experience irritation in the perianal area, which is the area around the anus. Worm segments or eggs being expelled in the stool cause this irritation.

Treatment

Taeniasis *can be treated with:*

1. Praziquantel (5–10 mg/kg, single-administration).
2. Niclosamide (500 mg, single-administration).
3. Albendazole, as well as supporting therapy with corticosteroids and/or anti-epileptic drugs.

Control and prevention

The most effective way to prevent taeniasis is to:

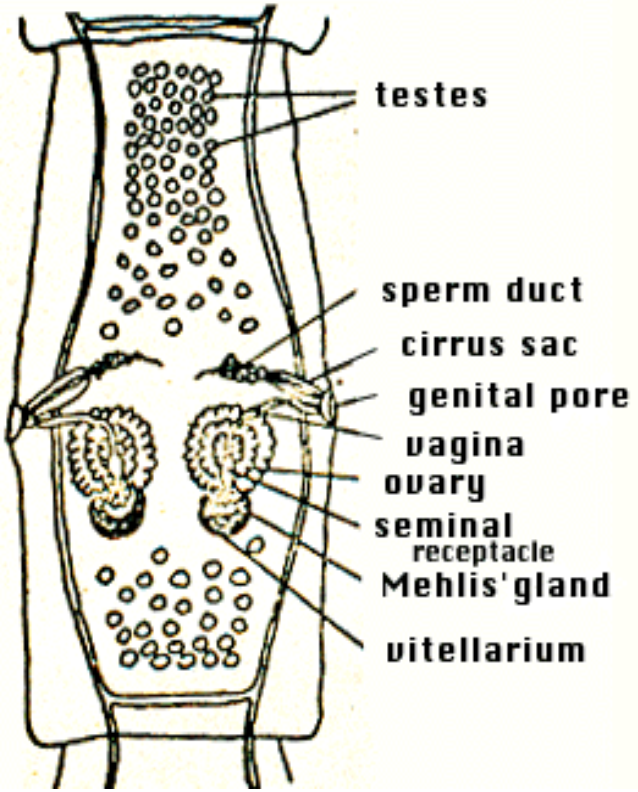
1. Avoid eating raw or undercooked pork
2. Cook food thoroughly. This means cooking meat to a temperature above 140°F for five minutes or more.
3. Wash all raw vegetables and fruits before eating
4. Proper hand hygiene is also important for preventing the spread of this disease.
5. Wash your hands after using the bathroom and teach your children to do the same.
6. Drink bottled water if you live in or travel to an area where water must be treated.

eg. *Dipylidium caninum* (the double-pore tapeworm)

…This parasite mainly infects dogs and cats, but is occasionally found in humans.

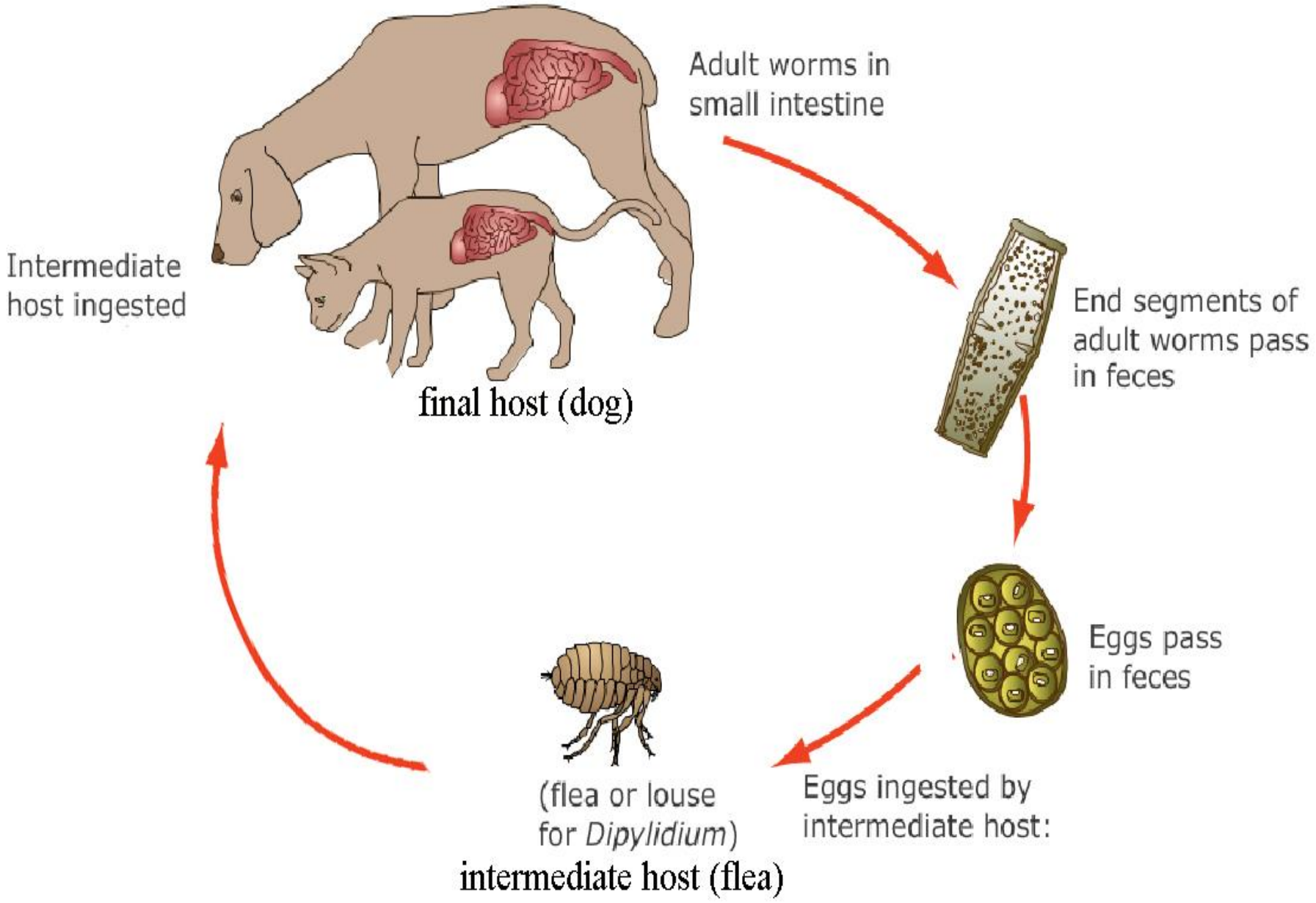
…The final host is dogs and cats while the intermediate host is the flea insects.

…Final host can be infected by eating the flea contaminated with parasite.



Scolex of *Dipylidium caninum*

Isolated mature segment of *Dipylidium caninum*



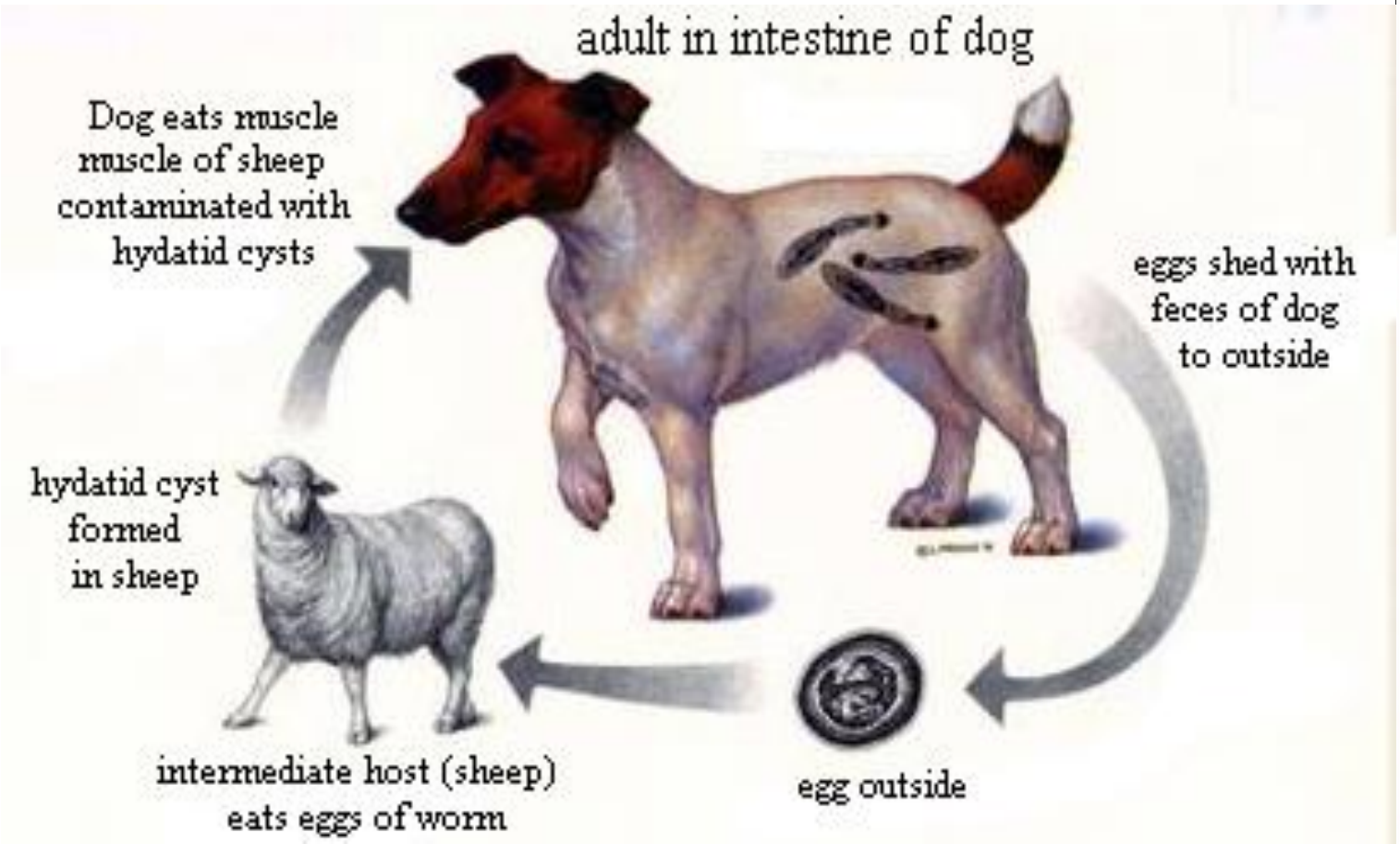
You must know how dog can be infected??? By eating flea contaminated with parasite.

You must know how flea can be infected??? By **eating eggs** released from dog**.**

eg. *Echinococcus granulosus* (the smallest worm, Hydatid worm)

…Adult worm parasitizes the small intestine of canids (dogs) as a final host, and an important intermediate hosts such as livestock and humans, where it causes **hydatid disease.**

…With a body consists of only three segments, immature, mature and gravid segments.

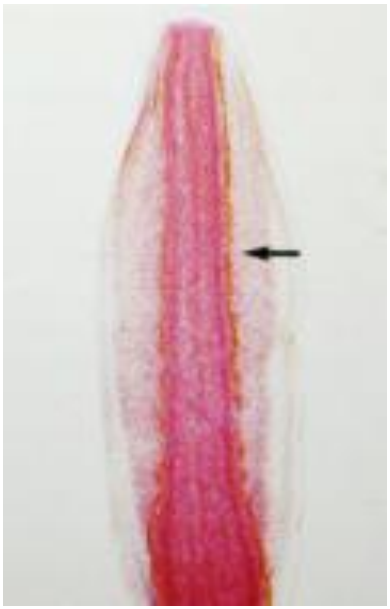


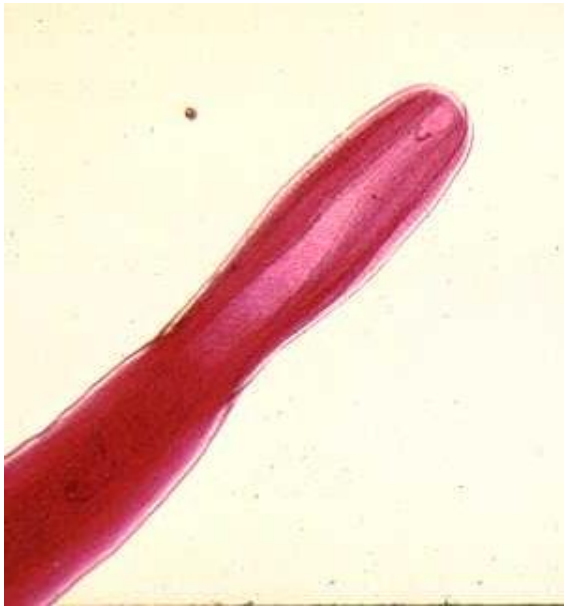
eg. *Diphyllobothrium sp.*

It known as broad fish tapeworm. It can cause Diphyllobothriasis in humans through consumption of raw or undercooked fish.

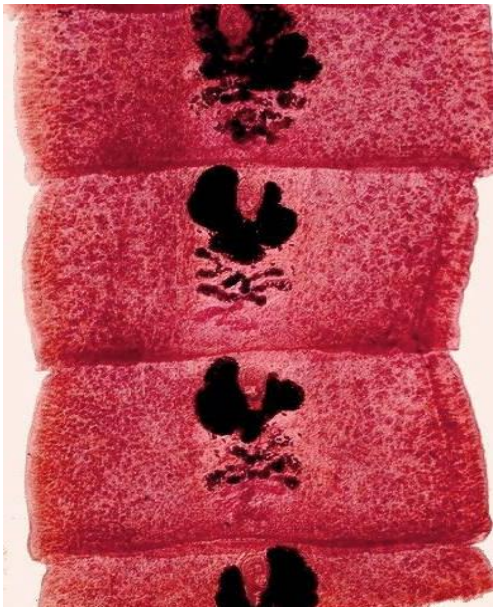
The adult worm is composed of three fairly distinct morphological segments: the scolex (head), the neck, and the lower body.

Each side of the scolex has a slit-like groove, which is a bothrium for attachment to the intestine. The scolex attaches to the neck, or proliferative region. From the neck grow many proglottid segments which contain the reproductive organs of the worm.

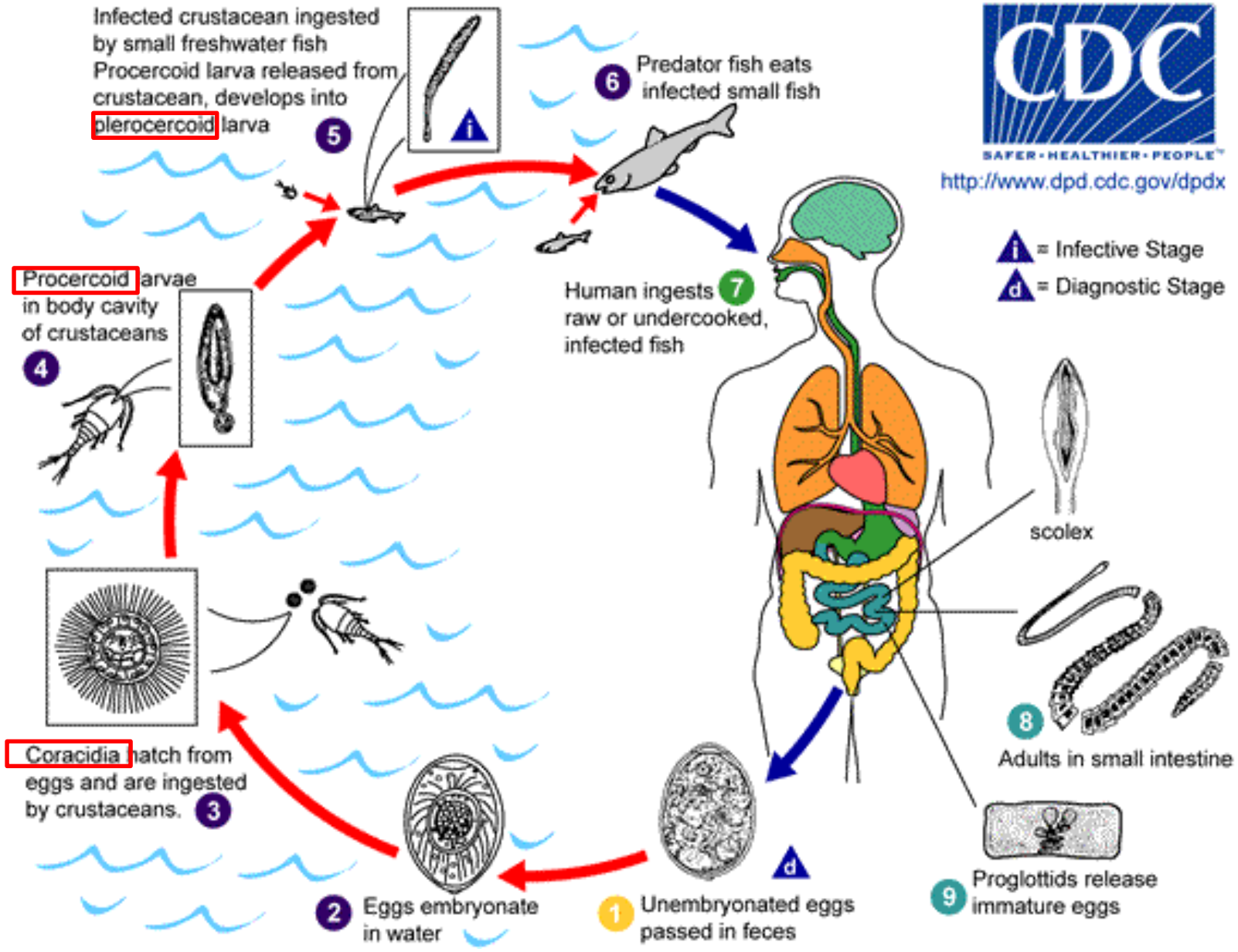




Scolex



Mature segment


Infected crustacean ingested by small freshwater fish
Procercoid larva released from crustacean, develops into plerocercoid larva
5
6 Predator fish eats infected small fish
CDC
SAFER · HEALTHIER · PEOPLE™
http://www.dpd.cdc.gov/dpdx
i = Infective Stage
d = Diagnostic Stage
Procercoid larvae in body cavity of crustaceans
4
Human ingests 7 raw or undercooked, infected fish
scolex
8 Adults in small intestine
Coracidia hatch from eggs and are ingested by crustaceans. 3
9 Proglottids release immature eggs
2 Eggs embryonate in water
1 Unembryonated eggs passed in feces