
بسم الله الرحمن الرحيم

Phylum Platyhelminthes

Flat worms, a rough classification

Platyhelminthes

Trematoda

Planaria **Aspidobothrea** **Digenea** **Monogenea** **Cestoda**

Phylum Platyhelminthes, Class Monogenea.

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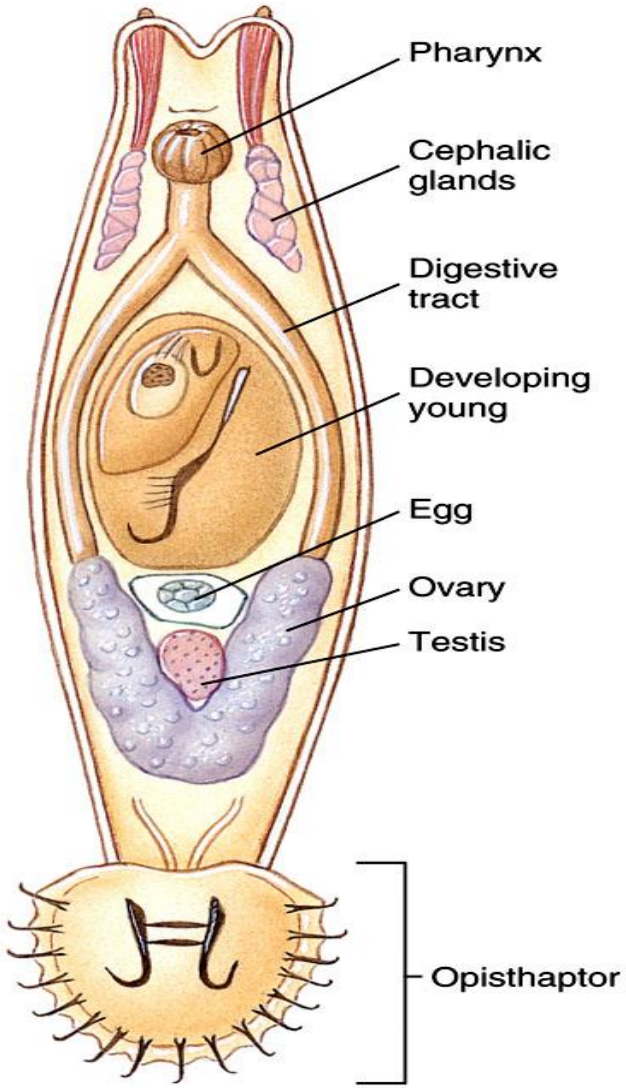


- One host
- Ectoparasites
  - Mainly fish
- Opisthaptor
  - Attachment to host

Monogeneans.

- Totally parasitic - typical platyhelminth features.

1- Dorso-ventrally flattened.
2- Acoelomate.
3- Bilaterally symmetrical.
4- Protonephridial excretory system.
5- No definite anus.
6- No respiratory / circulatory system.
7- Usually hermaphrodite.

Monogeneans.

- Ectoparasites.
- Gills / body surface marine & freshwater fish.
- Amphibians & reptiles.

- One species - mammals, *Oculotrema hippopotami* – hippo eye.فرس النهر

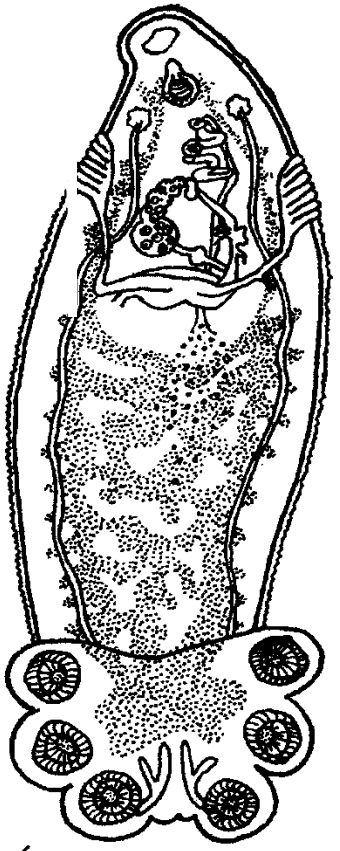
- Mesoparasites? may invade buccal cavity, cloaca & bladder.

Monogeneans.

- Large posterior sucker = haptor.
- Hooks.
- 10 - 14 marginal.
- Pair large median hooks = hamuli.

- Haptor adaptations - sucker-like organs.

- Suckers - sclerites - clamp gill filaments.



Monogeneans – Body plan - Tegument.

- Syncitial surface layer.
- Cell bodies sunken in parenchyma.
  - Cytoplasmic bridges.
- Microvilli.
- Musculature - outer circular, oblique & inner longitudinal muscle fibres.

Monogeneans – Digestive system.

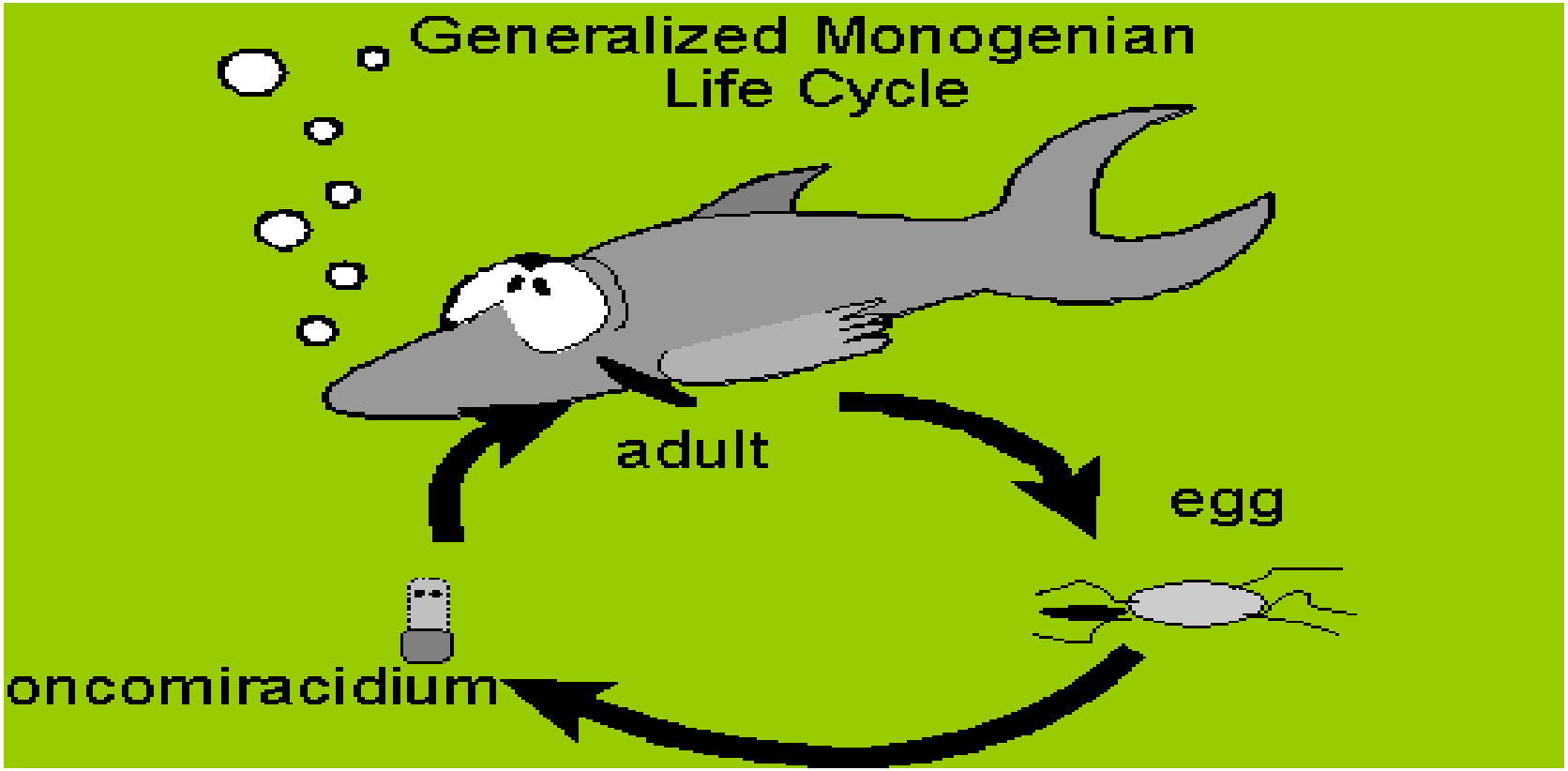
- Mouth, pharynx & bifurcate intestine - no anus.
- Intestine - intercaecal network.
- Nutrients also via tegument - physiological significance?
- Specific microhabitats on host:
  - Little movement.
  - Adults not transferred host-to-host.
- Skin & some gill dwellers - mucus feeders.
- Most gill dwellers - blood feeders (brachial capillaries).

Monogeneans – Reproductive system.

- Hermaphrodite.
- Vitellaria, ovary, ootype + Mehlis' gland & uterus.
- Single testis, seminal vesicle & muscular penis.
- Monogeneans often have pair vaginas.
- May have genito-intestinal canal.

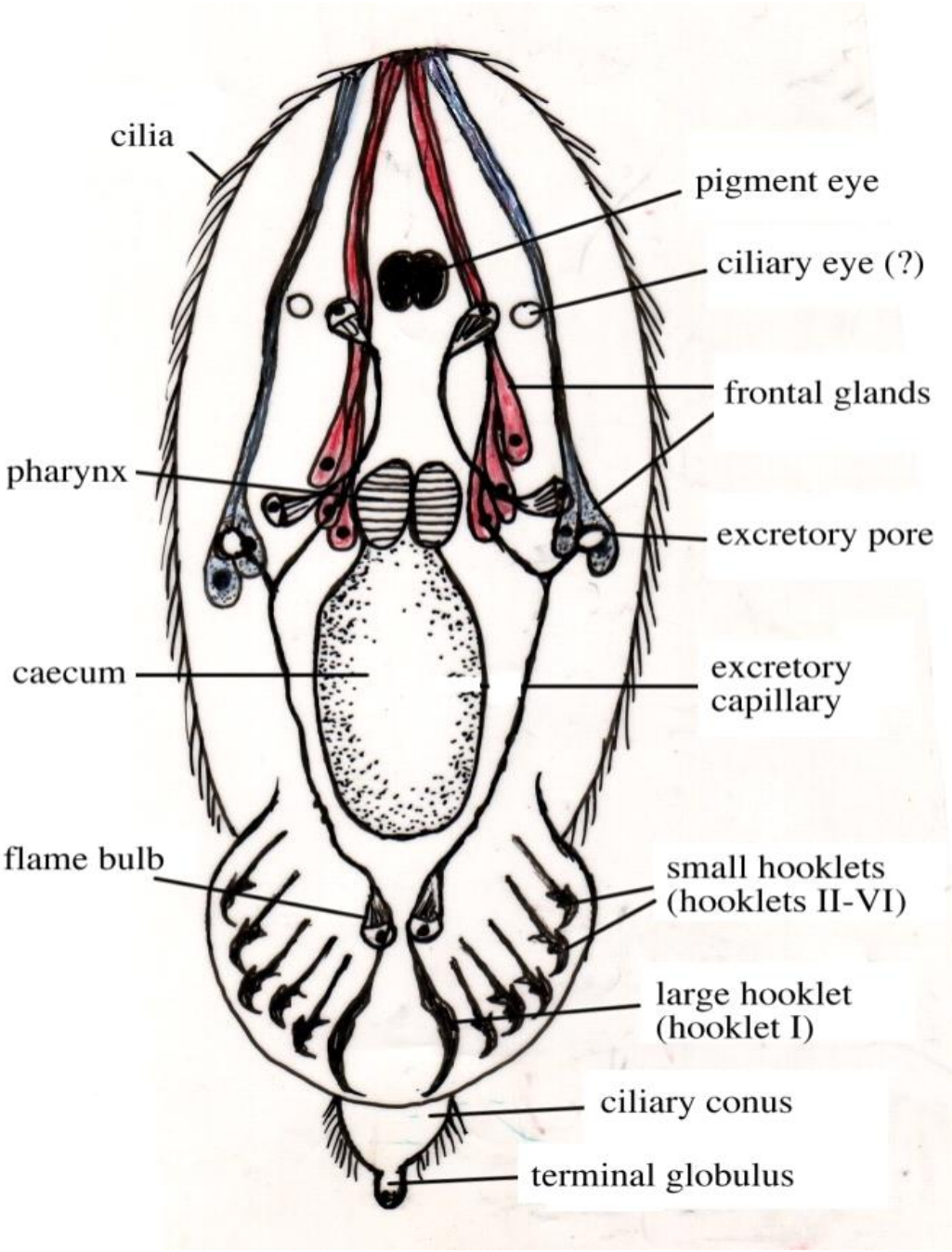
Monogeneans – Life cycle.

- Direct development.
- “Monogenea” = 1 generation. 1 egg = 1 adult



Oncomiracidium

- Note the pharynx and caecum, anterior glands, flame bulbs, capillaries and excretory pores of the excretory system, the opisthaptor with large hooks and hooklets, and the posteriorly located ciliated cone and terminal globule



Monogeneans – Life cycle.

- Eggs - water - hatch.
- Eggs large.
- Long filaments - extensions egg envelope.
- Filaments stick eggs to skin of fish.
- Or eggs form mass - fish respiratory currents.

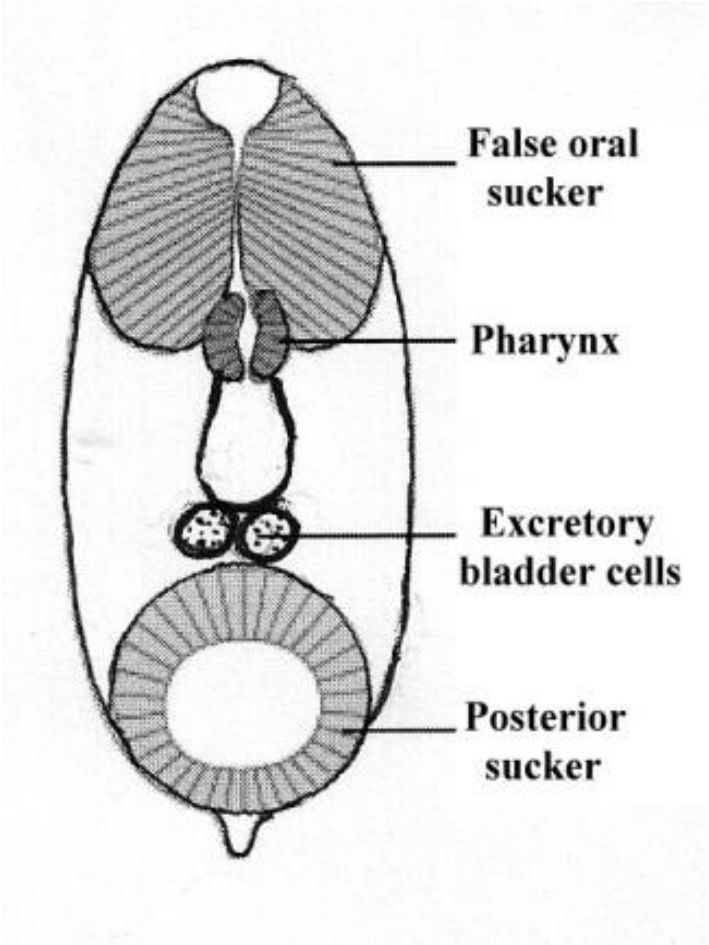
Monogeneans – Life cycle.

- Hatched egg = oncomiracidium.
- Ciliated larva – swims - eyespots & haptor.
- Complex anterior eyes – orientation & host location.
- Rhabdomeric photoreceptors.
- Oncomiracidial digestive tract well differentiated.
  - Excretory pores formed.
- Haptor - attachment.
- Loose ciliated coat.
- Growth to adult stage = more complex haptor.

The Aspidogastrea

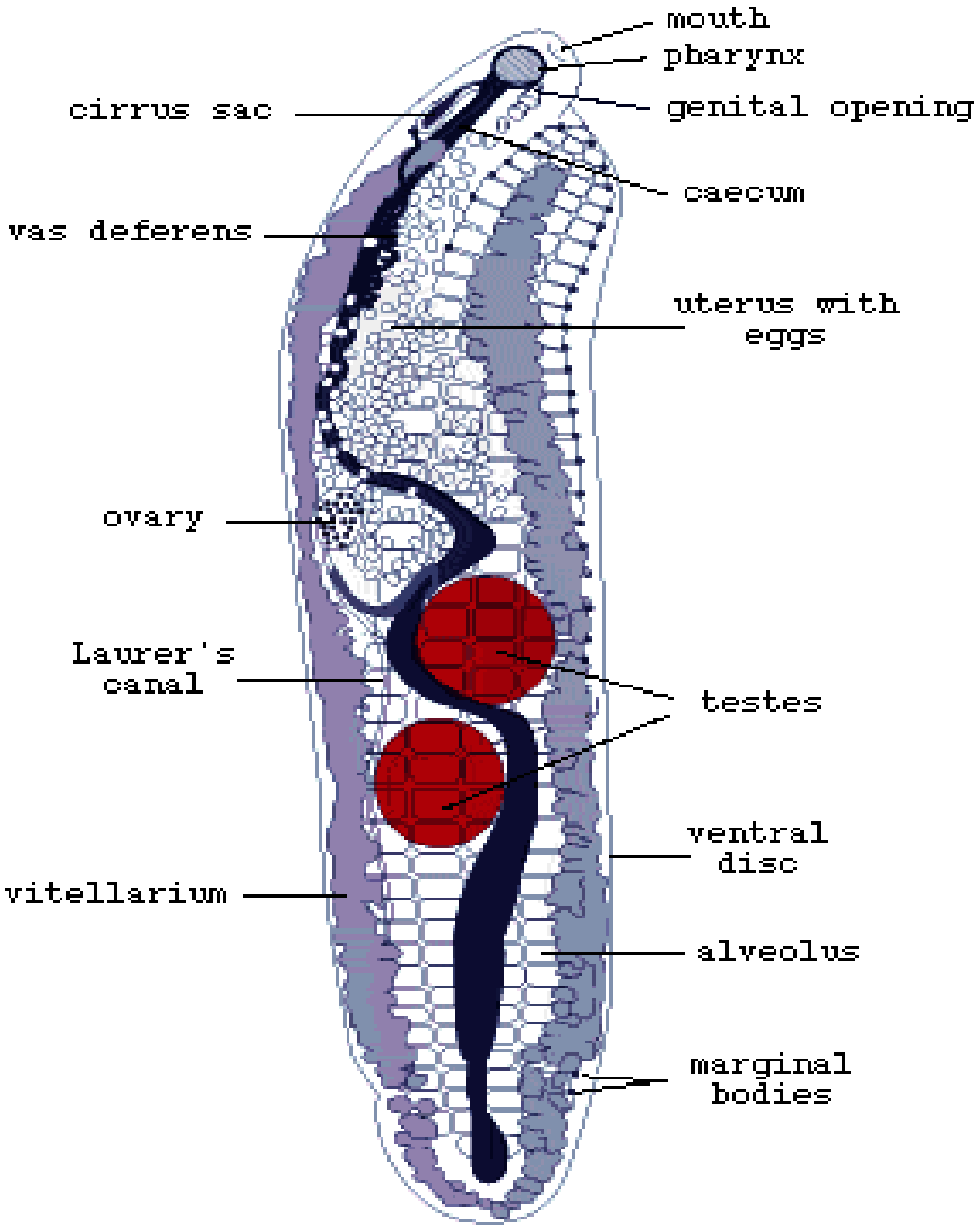
- Aprimitive group of flukes. They belong to the best known groups of helminthes (Parasitic worms).Aspidogastrea is one group of tremstodes which differs markedly from (Digenea) in morphology and life cycles.

The aspidogastrea morphology

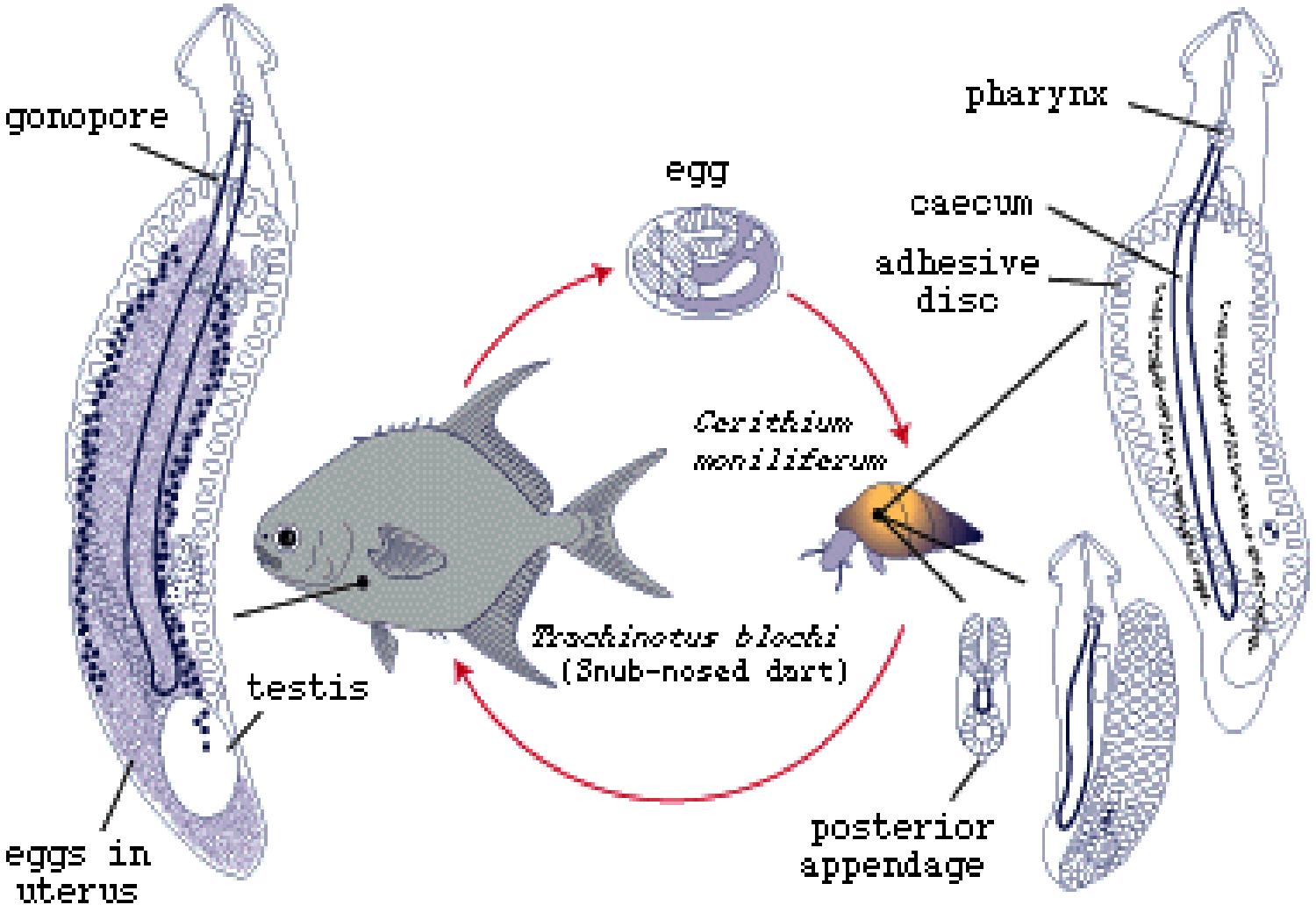


- (Aspidogastre Larva). Note the false anterior sucker, the parynx, the blind ending caecum, and the two excretory bladder cells. The posterior end is drawn out into a short appendage of unknown function.

- Adult do not have a posterior or ventral sucker but an adhesive (ventral disk consisting of transverse grooves (rugae) , a single raw of well separated small sukers (sukerlets)or three to four rows of alveoli on a ventral disk

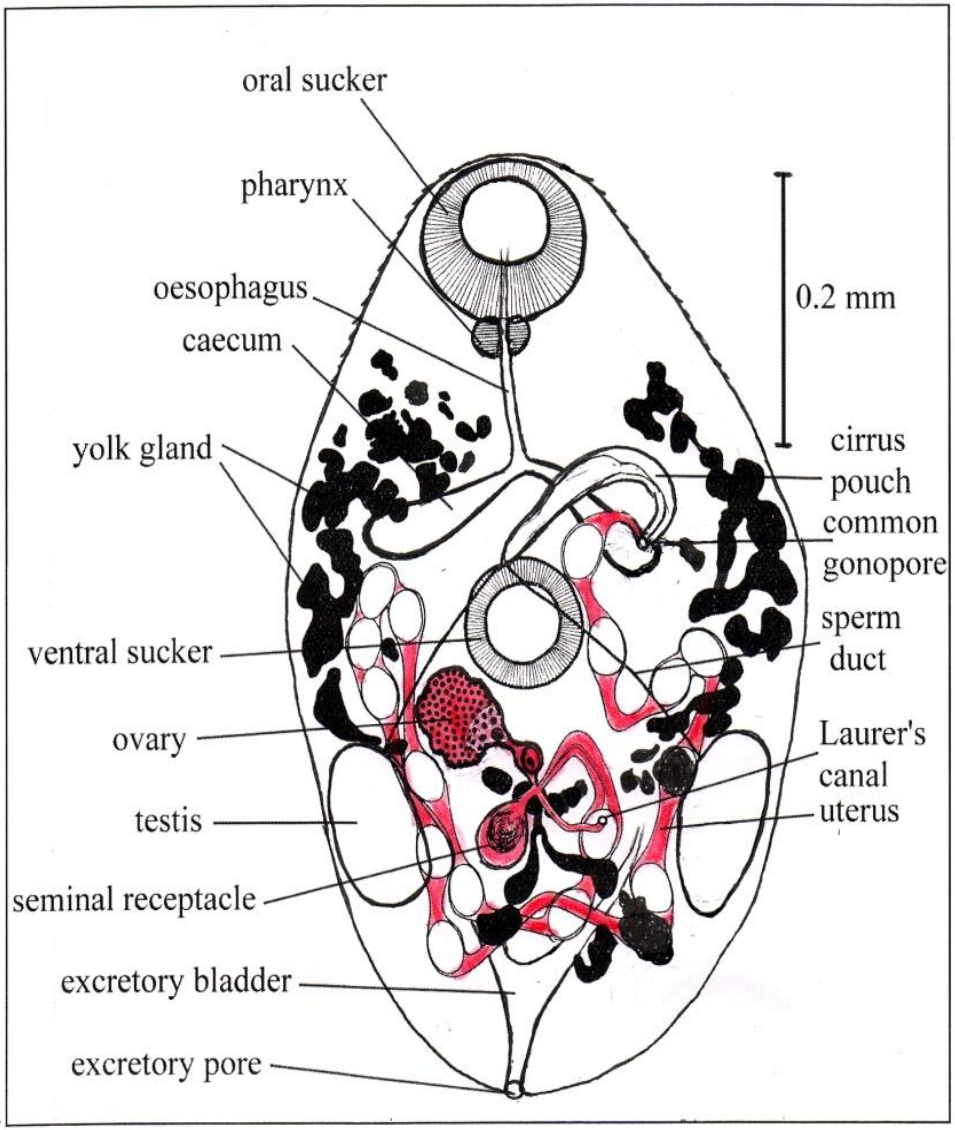

mouth
pharynx
genital opening
cirrus sac
caecum
vas deferens
uterus with eggs
ovary
Laurer's canal
testes
ventral disc
vitellarium
alveolus
marginal bodies

Life Cycles of Aspidogastrea



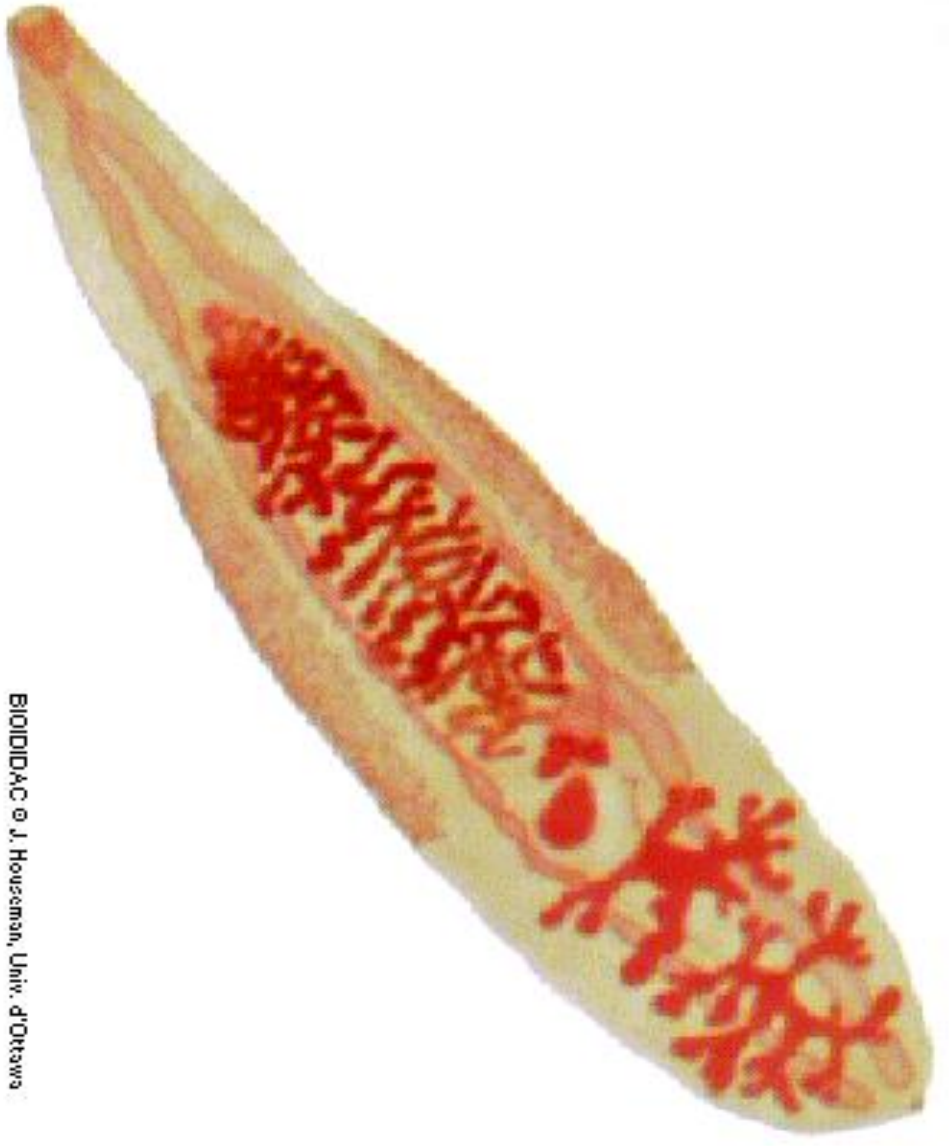
Structure and life cycles of digenea

- Most digenea are hermaphroditic i.e., they possess male and female reproductive systems except schistosomes which the only separated sexes.



Structure and life cycles of digenea

- Flukes
- Parasites
- Holdfast devices
  - Most
- Complex life cycle
- Intermediate host
  - Animal with juvenile stage
- Definitive host
  - Animal with adult stage



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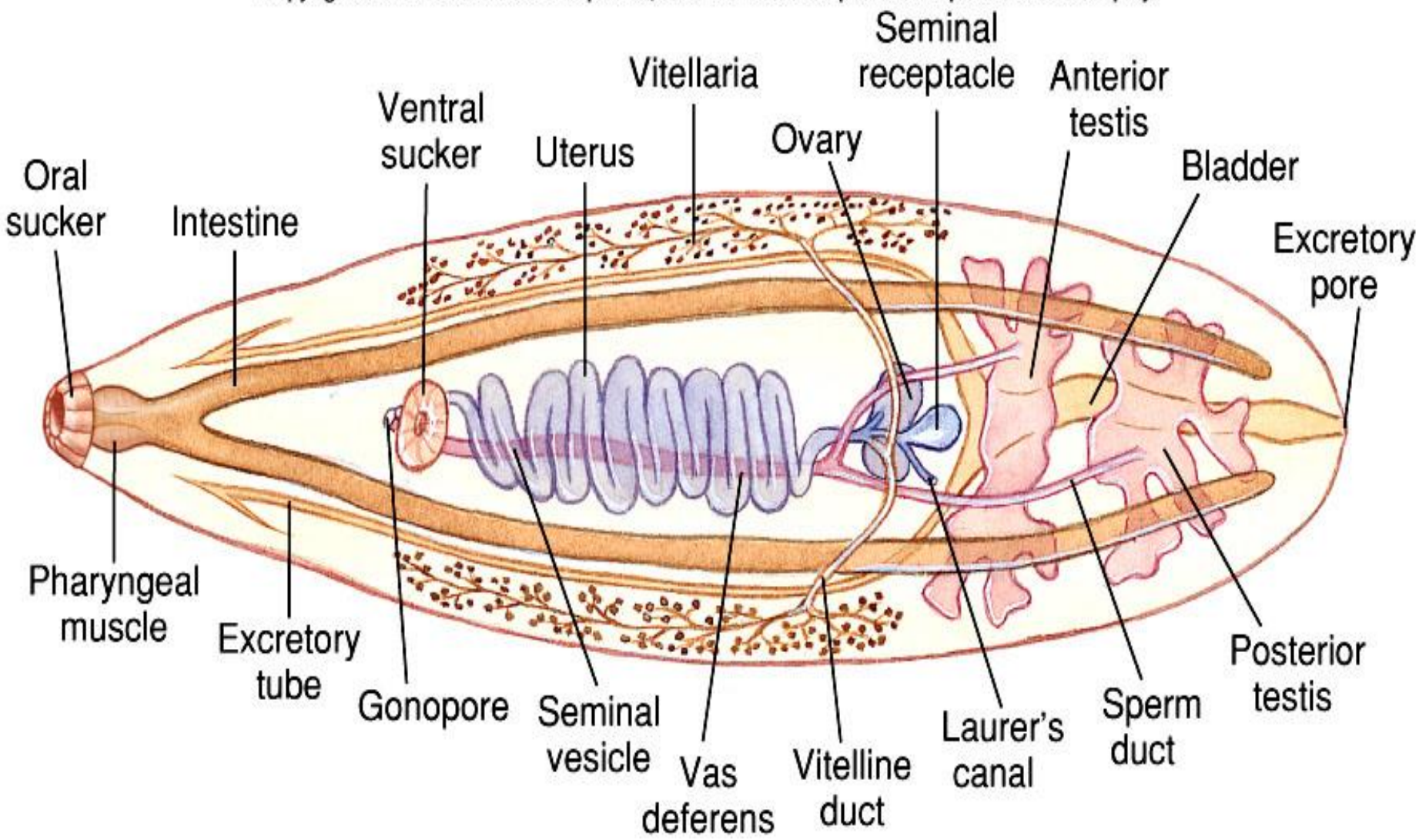
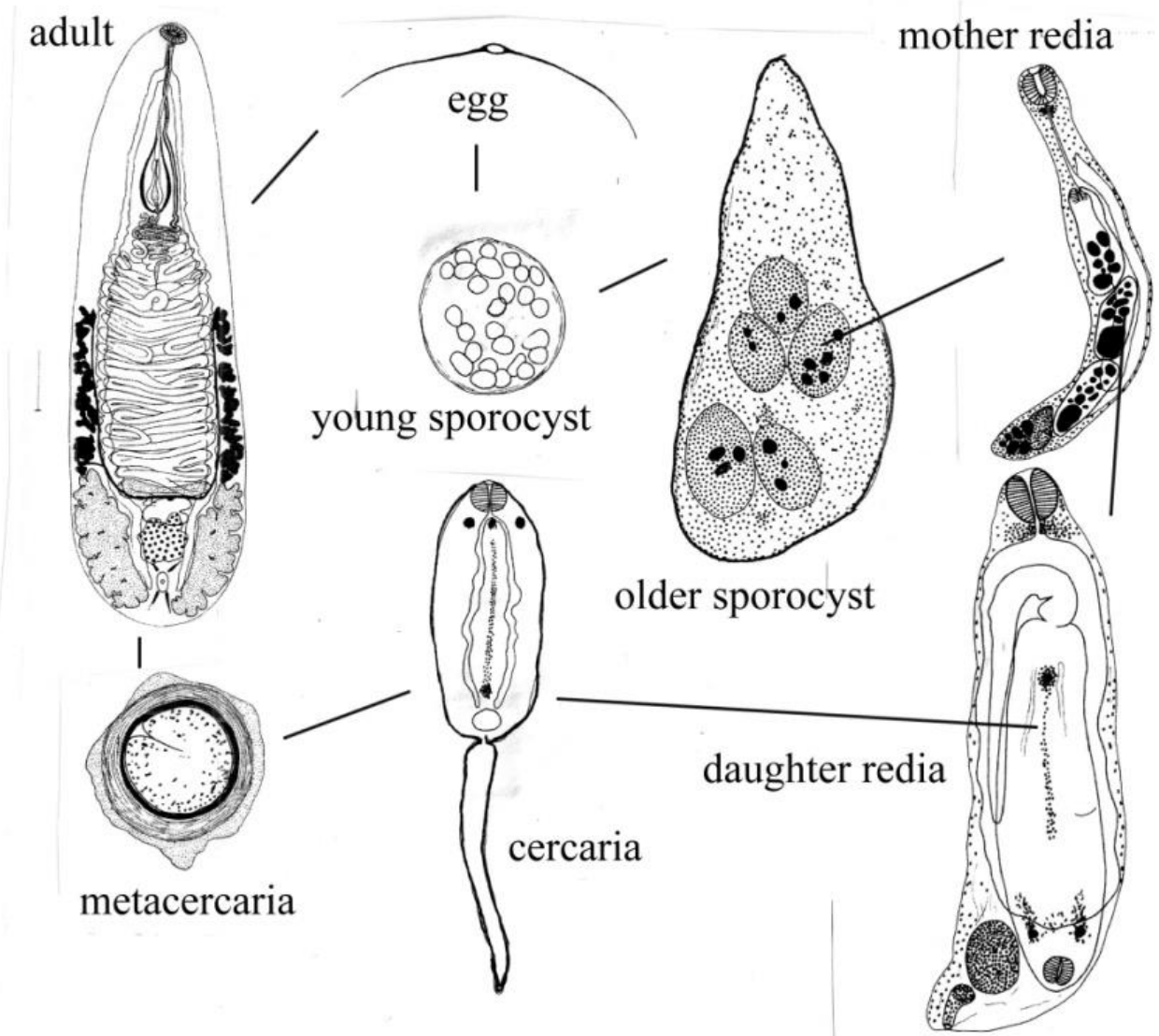


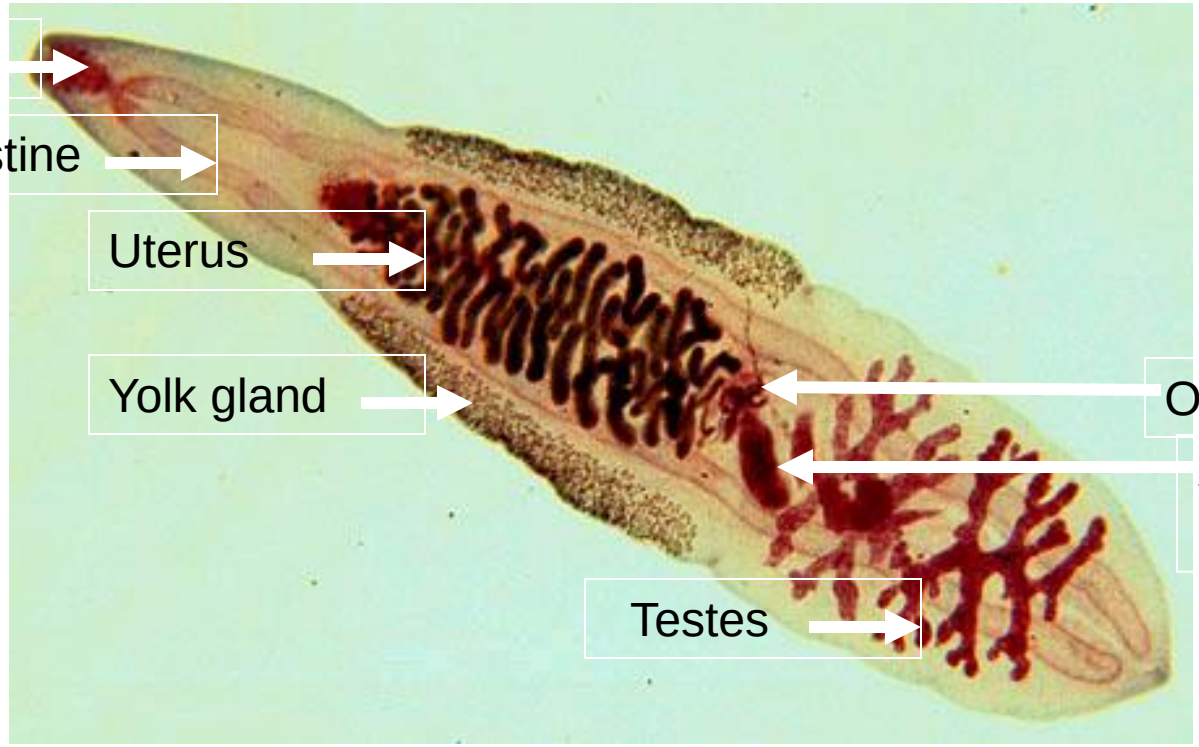
life cycles


adult
egg
young sporocyst
mother redia
older sporocyst
daughter redia
cercaria
metacercaria

Medical and economic importance of trematodes

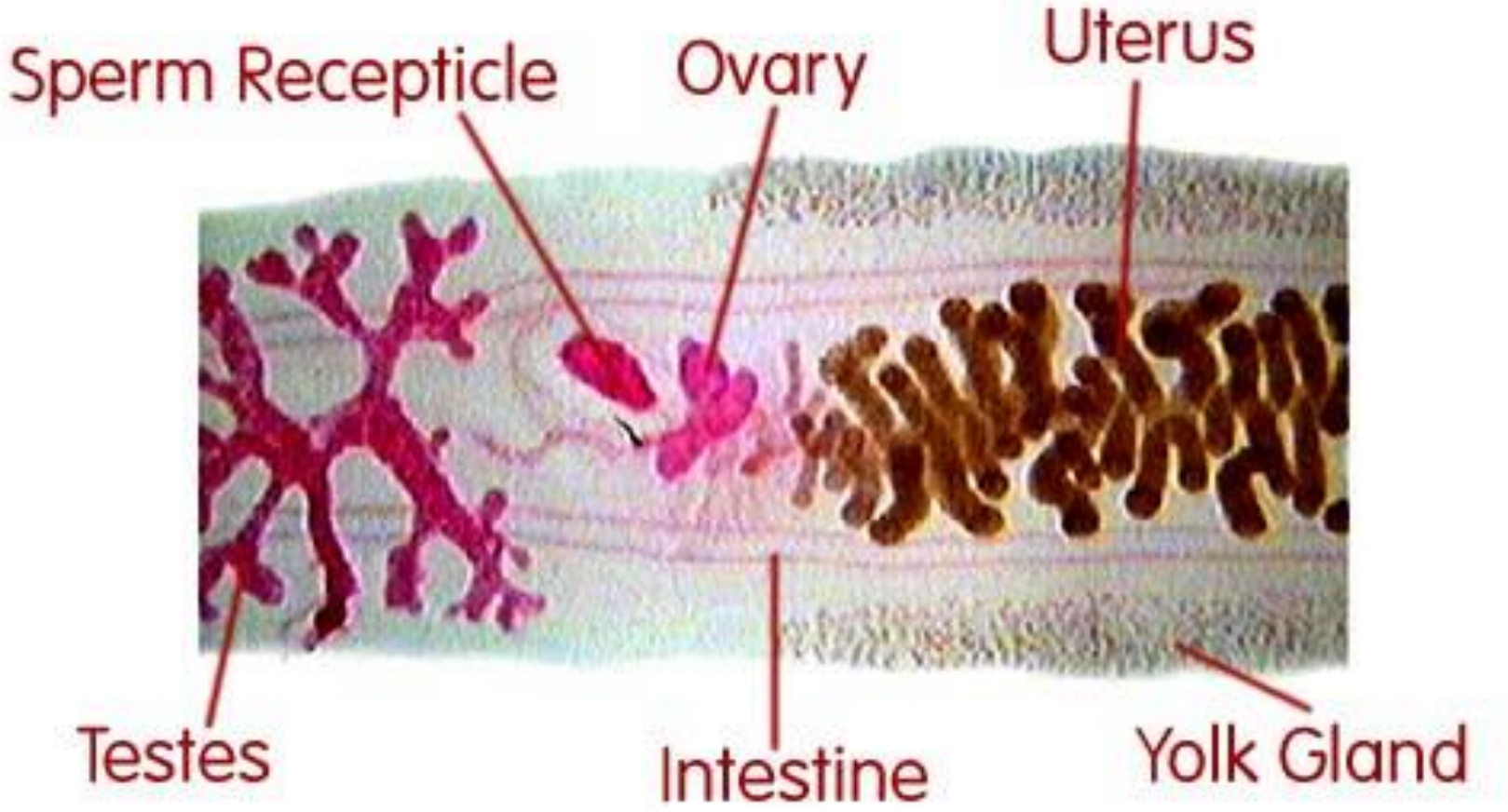
- Some of the most important diseases of man in the tropics, are caused by digenean trematodes.Foremost among them are liver flukes (Clonorchis sinensis) and blood flukes(Schistosoma)

Clonorchis sinensis



Clonorchis

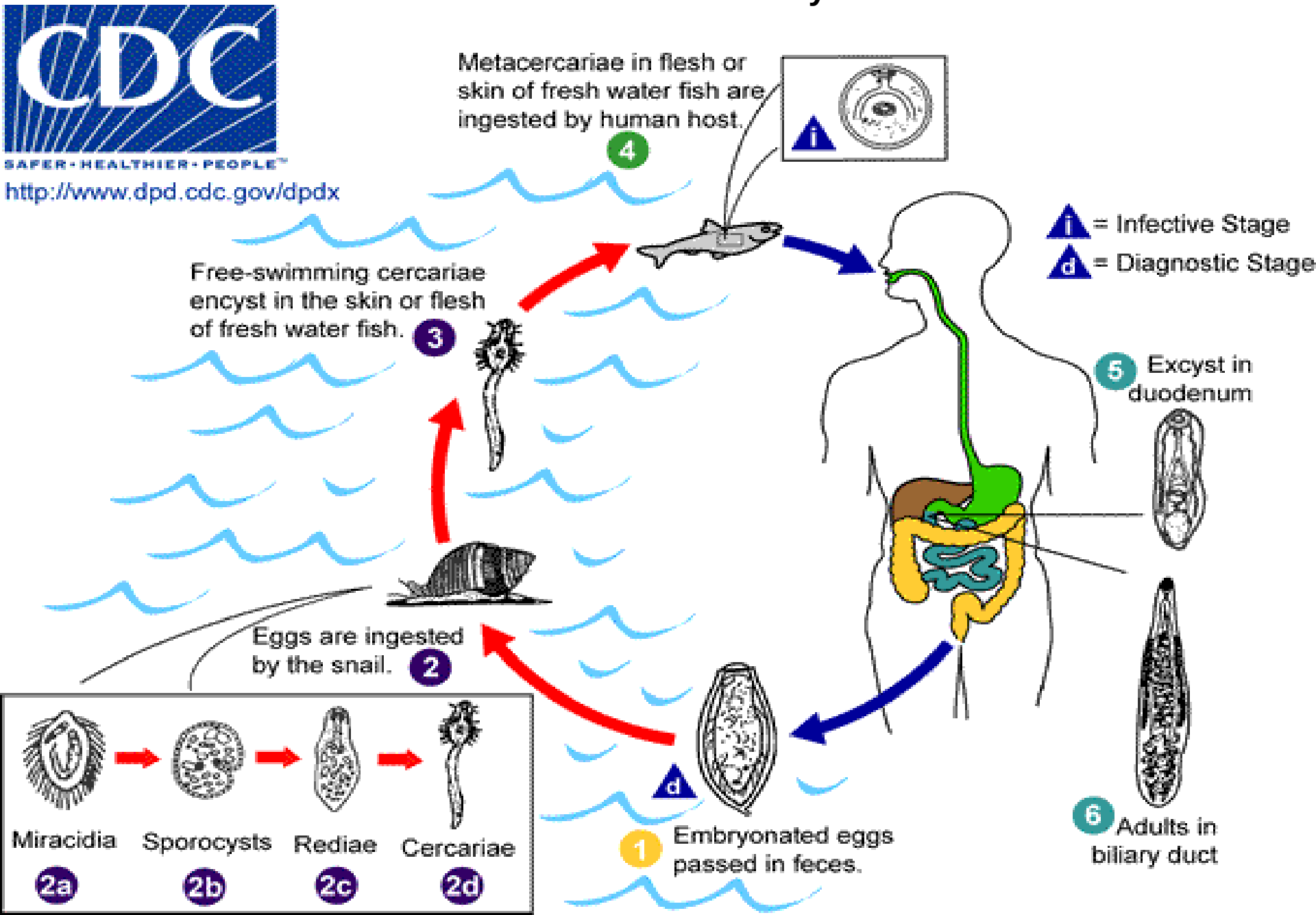
Midsection



Clonorchis sinensis

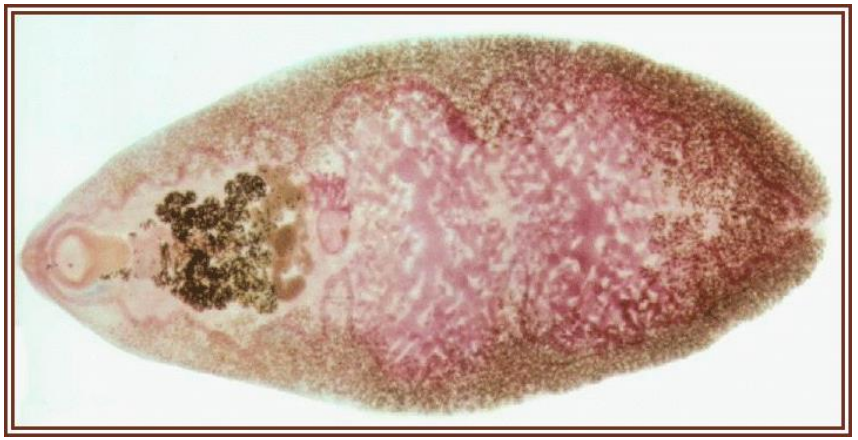
- Chinese liver fluke
- 50 million people
- Cirrhosisتلیف کبدی of liver
- Diarrhea
- Edema
- Pain

. Life cycle of *Clonorchis sinensis*

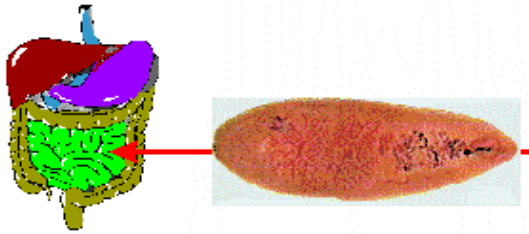


Fasciolopsis buski

- Intestinal fluke
- 10 million people
- Man and pigs
- Hemorrhage and abscesses of small intestine

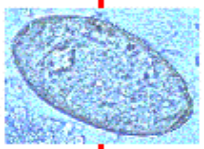


THE LIFE CYCLE OF *FASCIOLOPSIS BUSKI*



The adult, sexually mature parasite resides in the host's small intestine.

Eggs are passed in the host's feces.

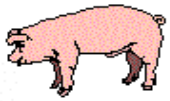


The eggs hatch, producing a free-swimming miracidium.

The miracidium infects the first intermediate host, a snail.

The parasite reproduces asexually in the snail, producing cercariae.

The cercariae leave the snail and encyst on edible vegetation, producing metacercariae.

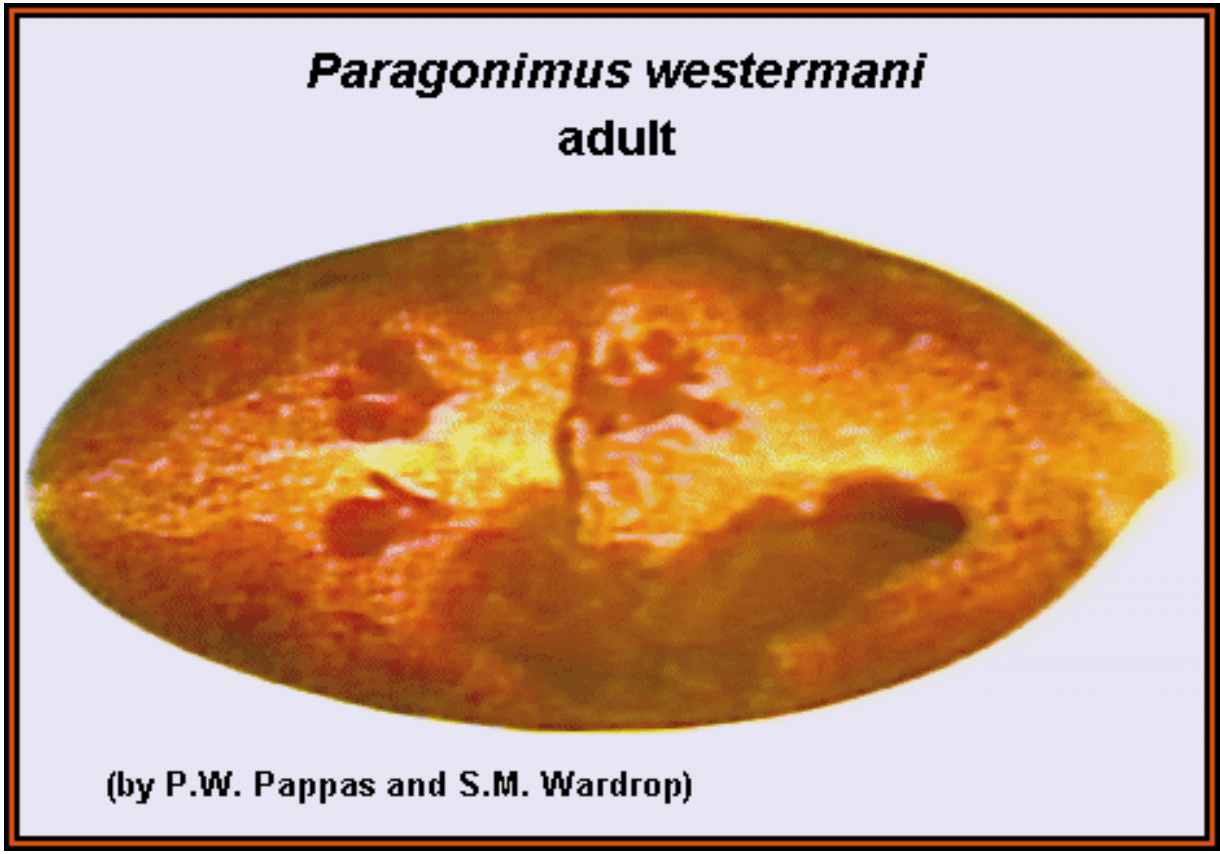


The metacercaria is ingested by the definitive host and "excysts" in the small intestine.

(Parasites and Parasitological Resources)

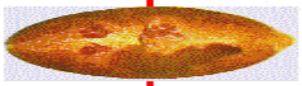
Paragonimus westermani

- Lung fluke
- Carnivores, pigs, rodents and man
- May be fatal

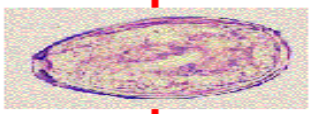


THE LIFE CYCLE OF *PARAGONIMUS WESTERMANI* (THE HUMAN LUNG FLUKE)

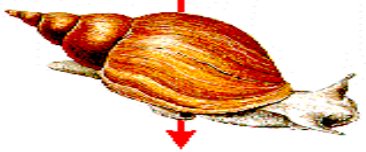
The adult parasites reside in the lungs.



The parasites produce eggs which are "coughed up" and spit out or swallowed and passed in the feces.



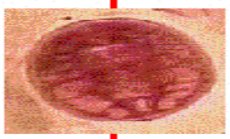
The eggs hatch releasing a miracidium, and the miracidium infects the first intermediate host.



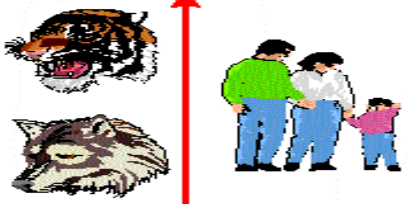
The parasite reproduces asexually in the snail and free-swimming cercariae are produced.

The cercariae infect the second intermediate host, a decapod.

The cercariae encyst in this host, forming metacercariae.

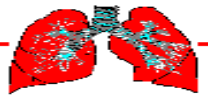


The definitive host is infected when it ingests a raw or undercooked host.

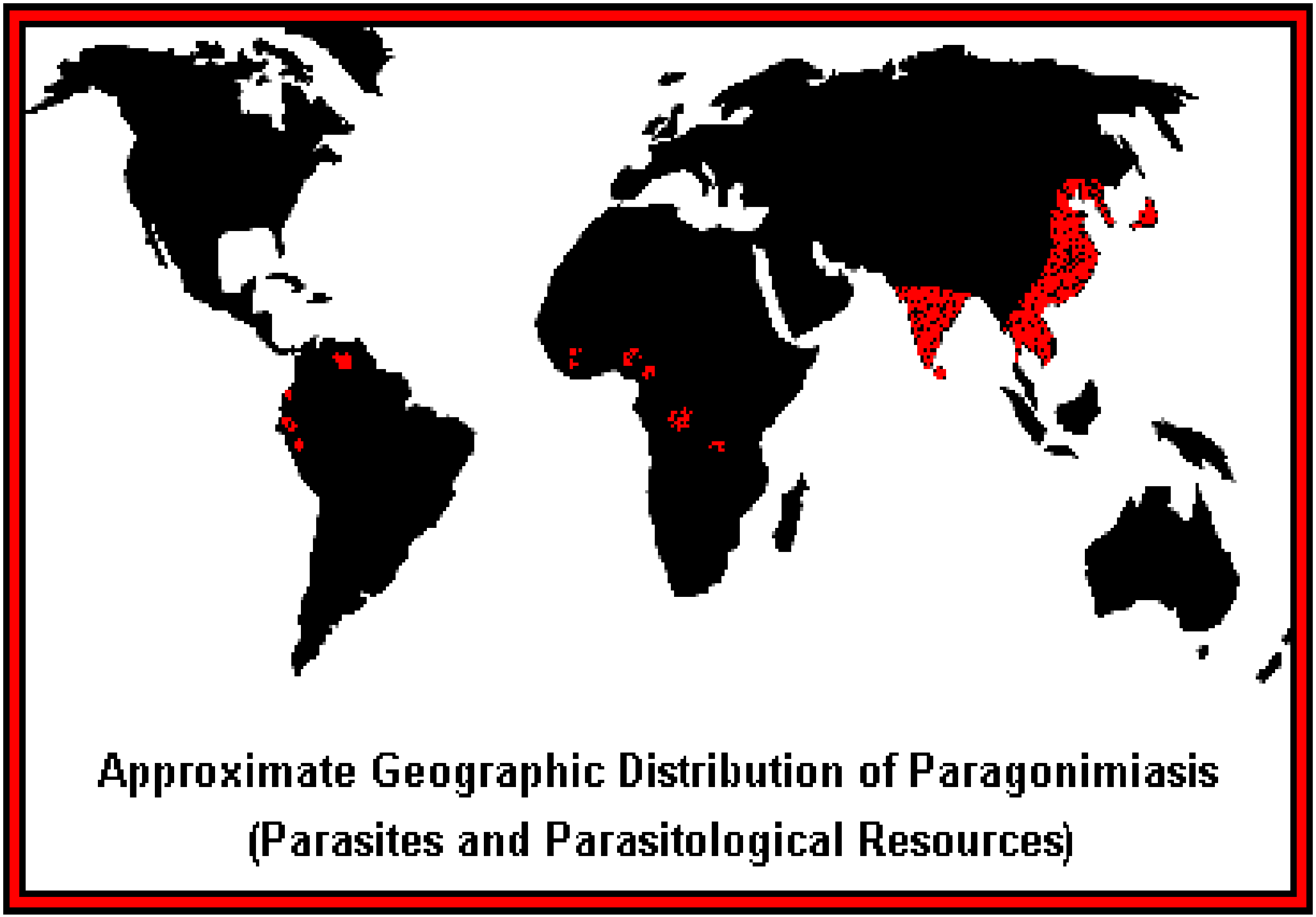


The metacercaria "excysts" in the smalll intestine.

The immature worm penetrates the gut wall and migrates through the peritoneal and pleural cavities to the lung.



(Parasites and Parasitological Resources)



Approximate Geographic Distribution of Paragonimiasis
(Parasites and Parasitological Resources)

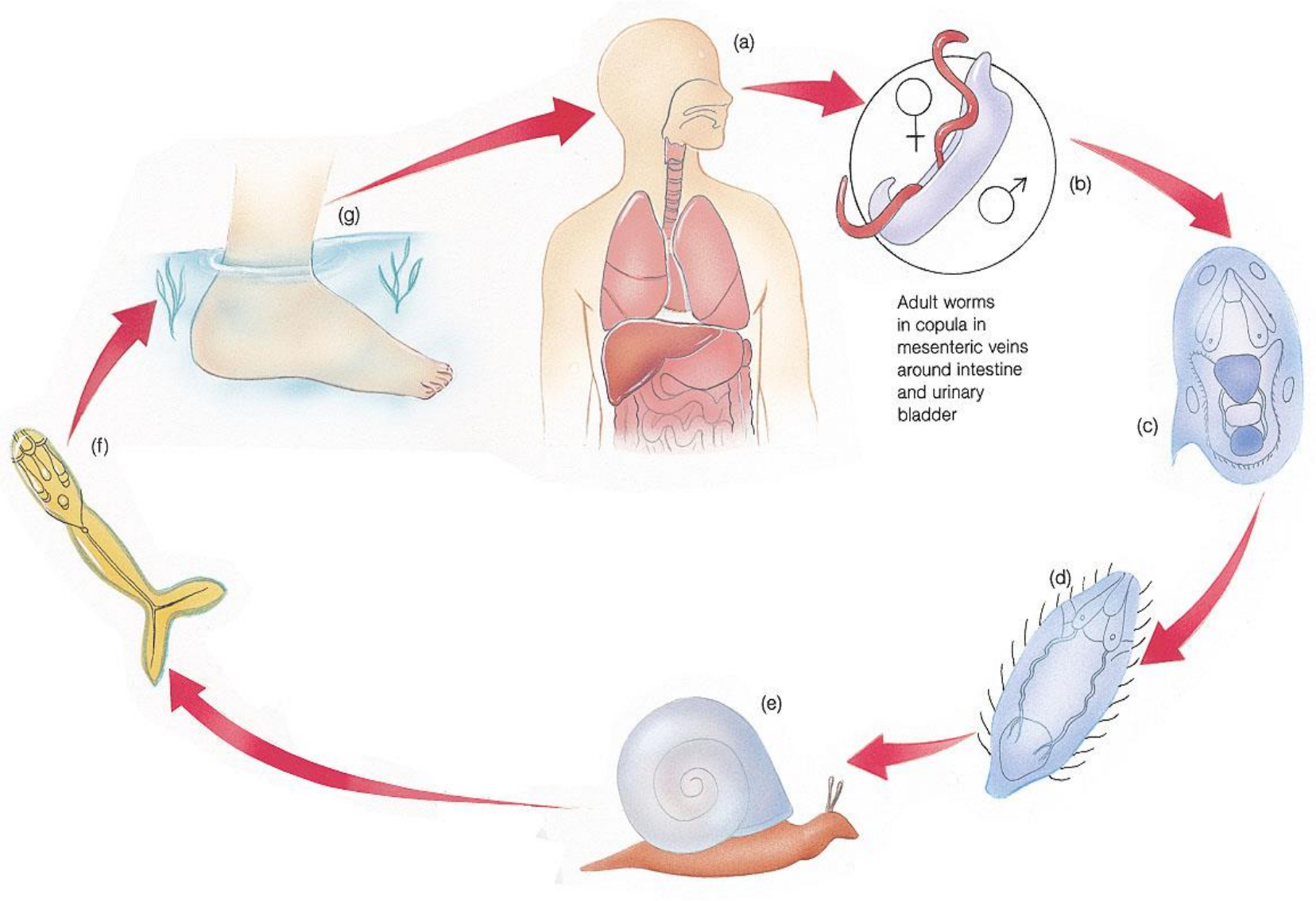
Schistosoma(裂体吸虫)

- Schistosoma(裂体吸虫　　)

They belong to Genus Schistosoma, live in blood vessel and cause schistosomiasis. People call them blood flukes. There are four species infecting human body. They are:

1. <u>Schistosoma japonicum</u>（日本血吸虫）is prevalent in Far East .The adults live in the portal vein system, causing liver cirrhosis（肝硬化）and portal vein hypertension syndrome（门脉高压征候群）.

Life Cycle of a Schistosome Fluke



Schistosome

- Cercaria have forked tail

Class Cestoidea

- Tape worms
- No digestive system
- 40 feet long

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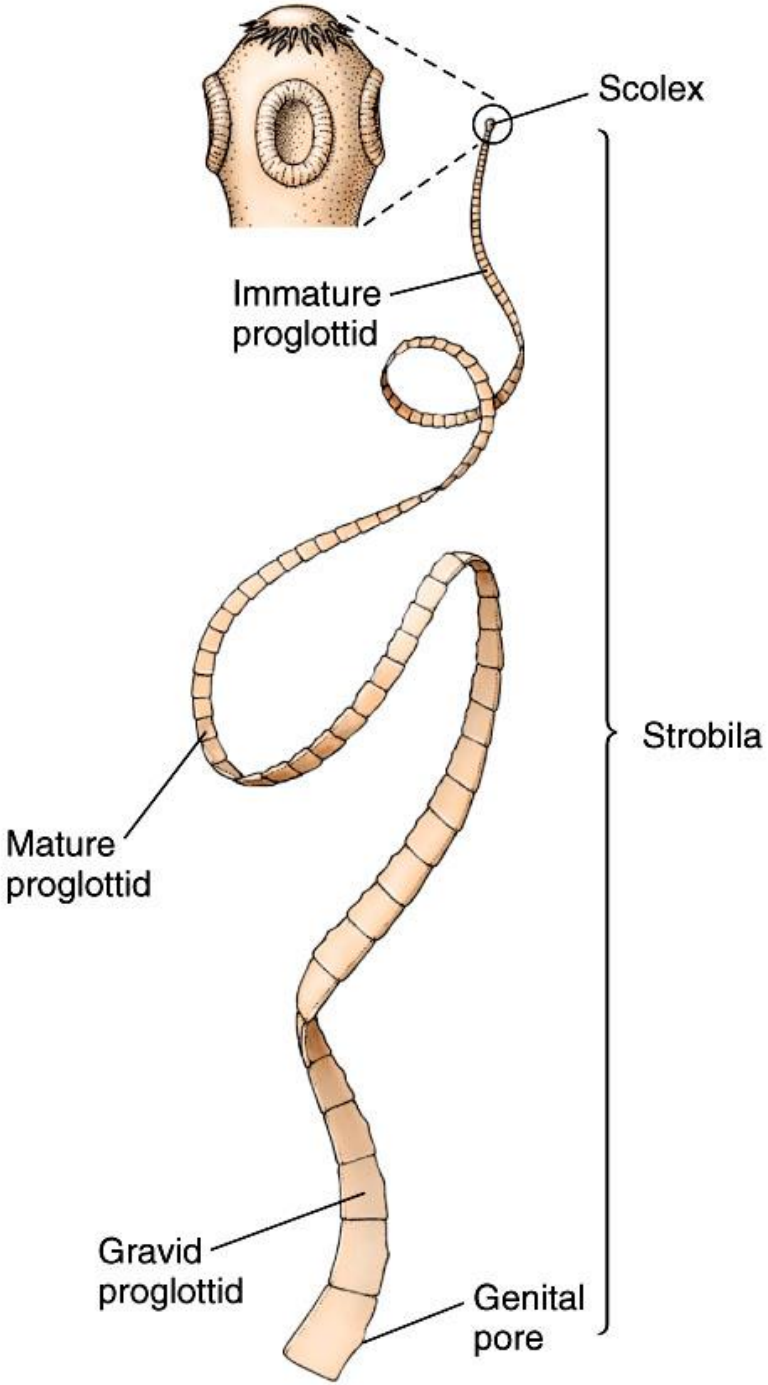
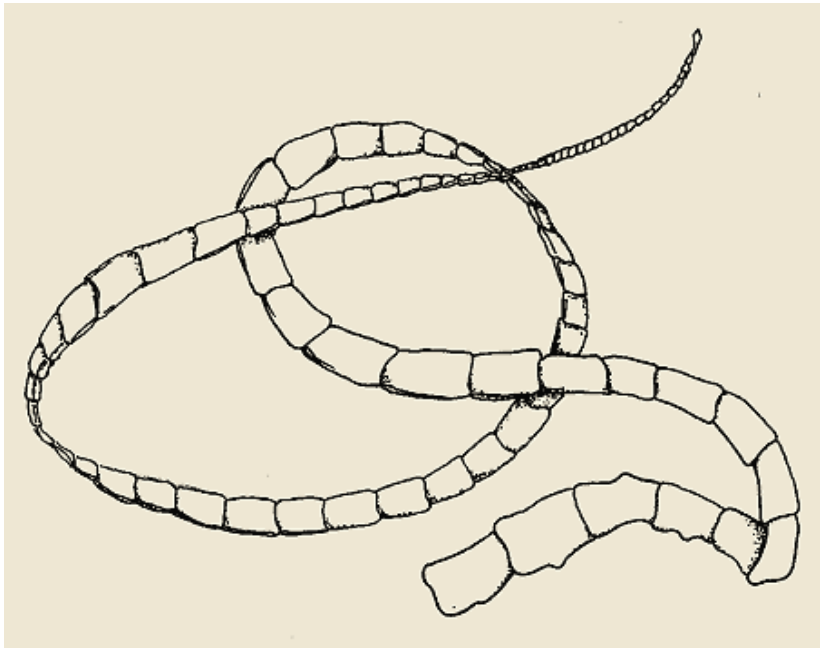
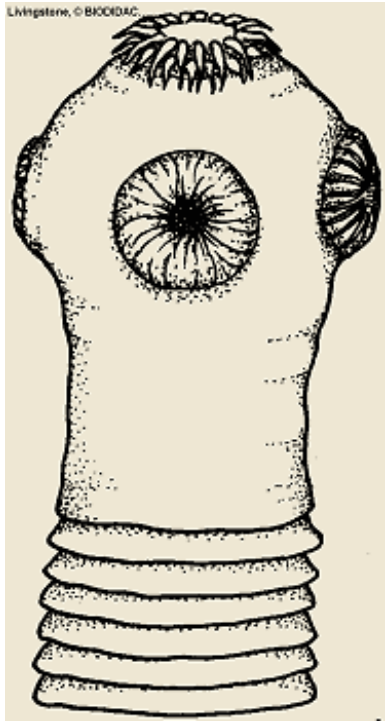
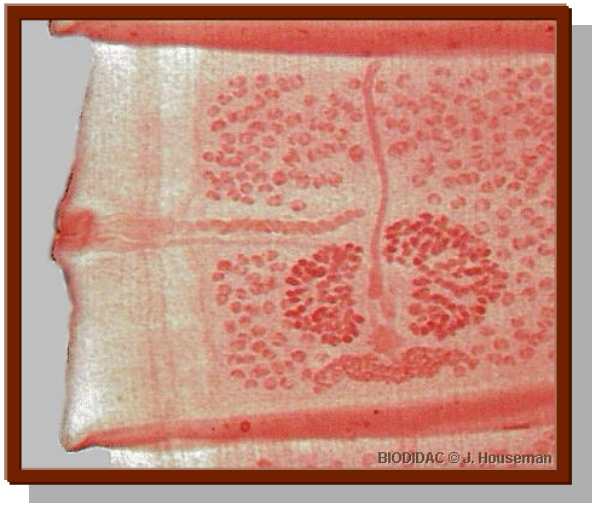


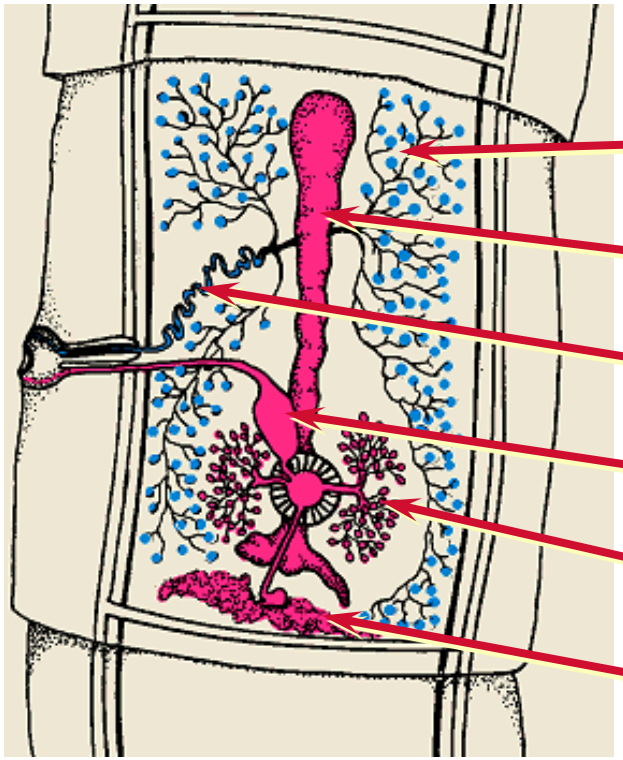
Scolex





Proglottid





Testes

Uterus

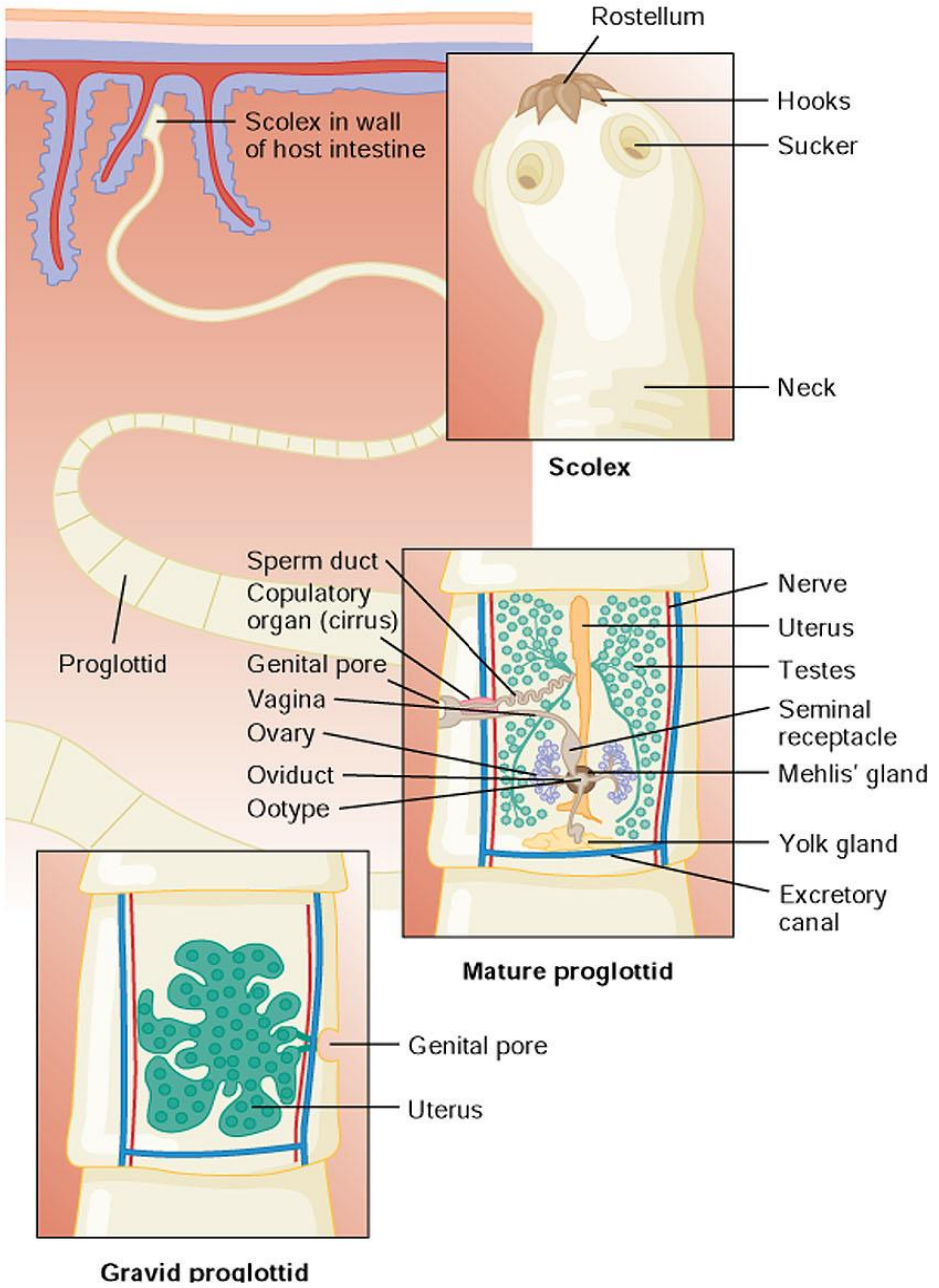
Vas deferens

Seminal receptacle

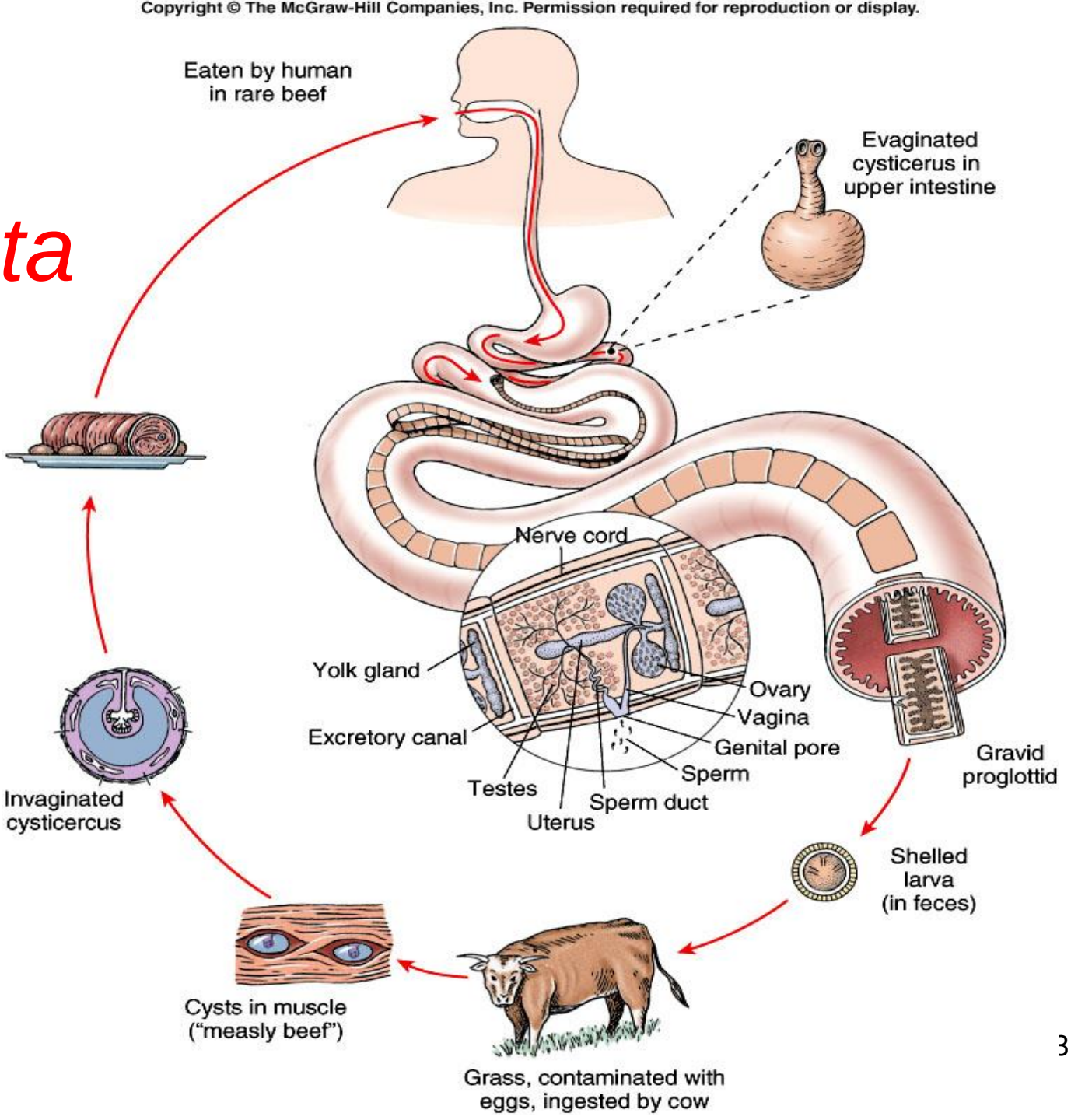
Ovary

Yolk gland

Pork Tapeworm (*Taenia solium*)

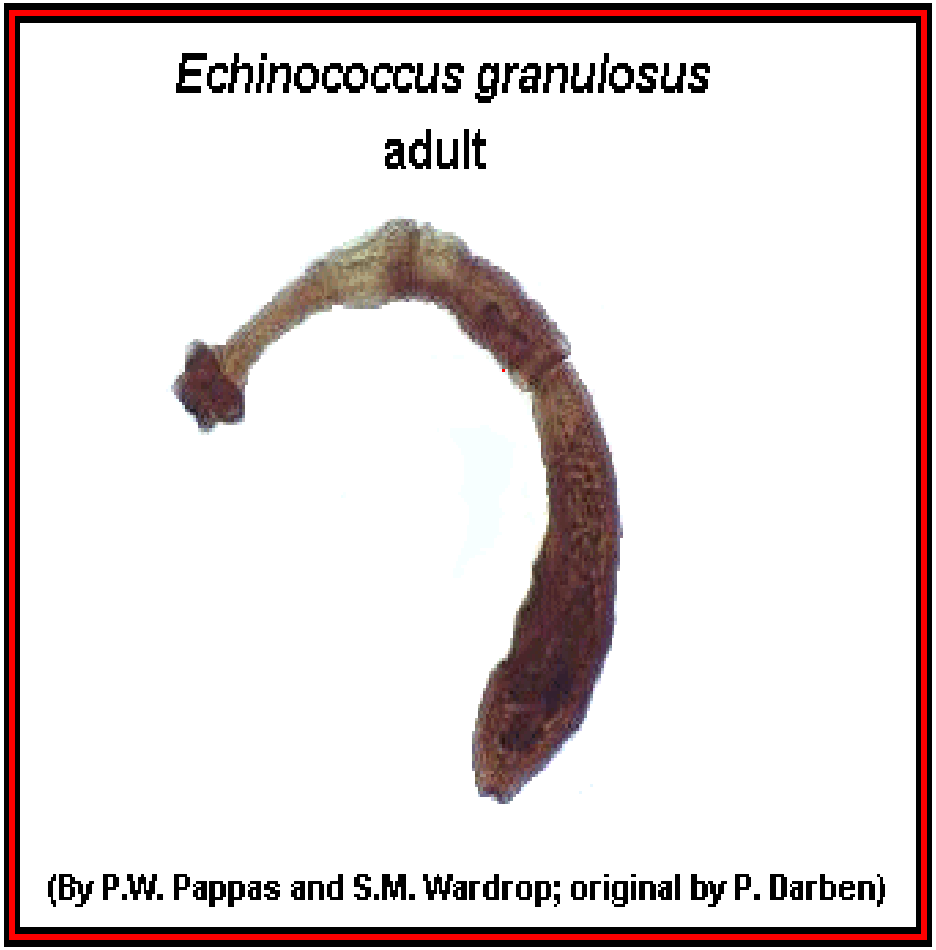


Taenia saginata

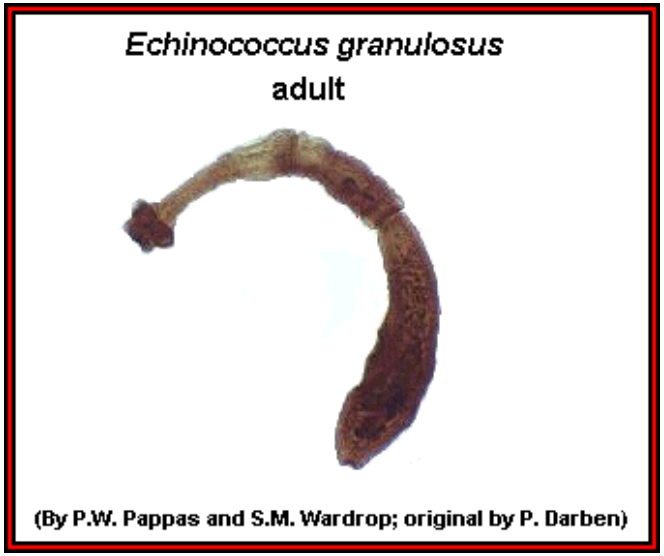


Echinococcus granulosus

- Parasite of dogs
  - Host
- Juveniles in sheep, man and other mammals
  - Intermediate host
- Hydatid cyst



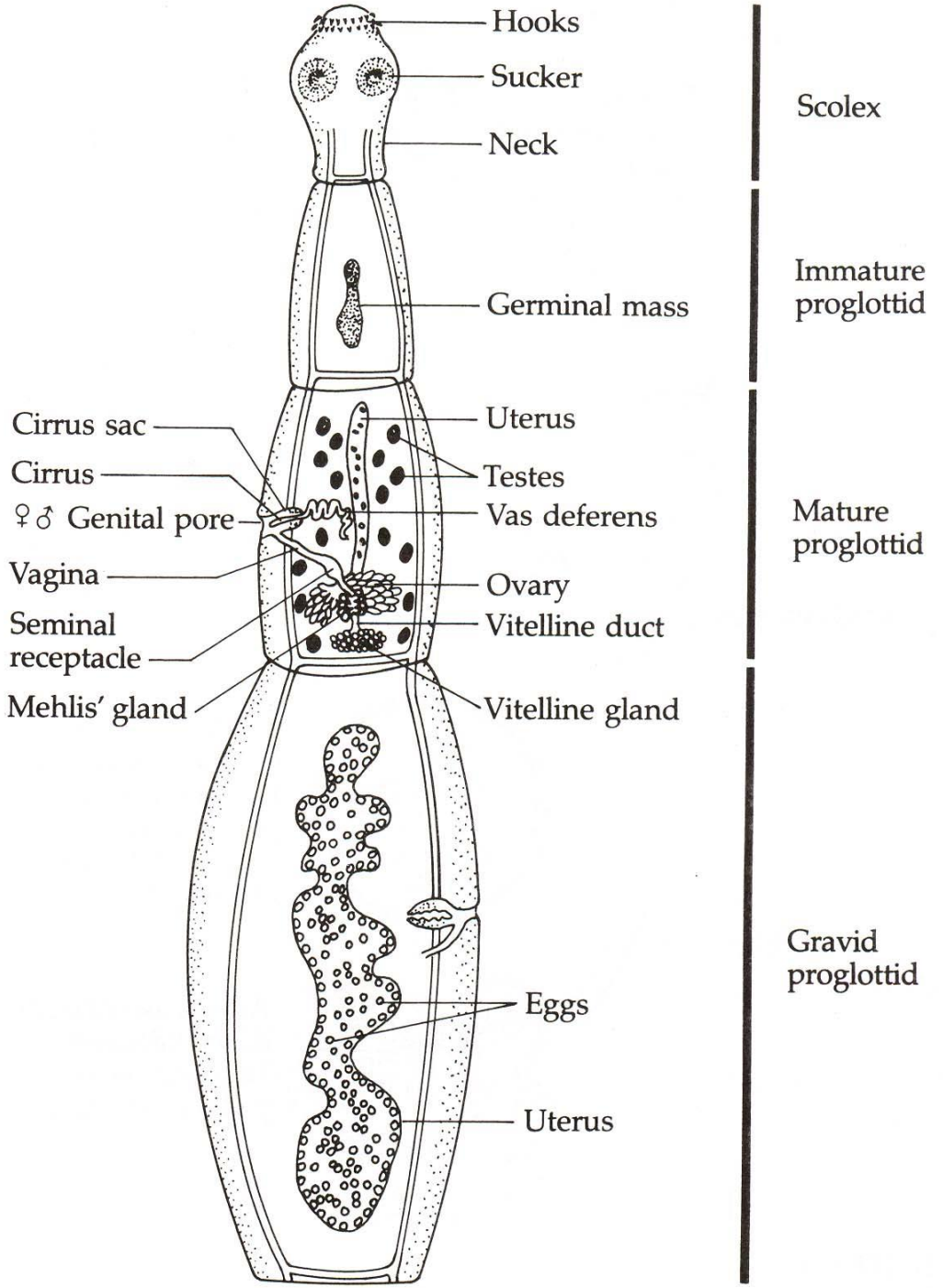
Echinococcus granulosus



Adult

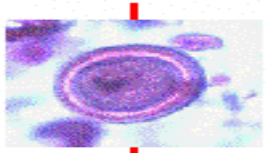
note that the tapeworm's body (strobila) consists

of only three proglottids and measures only about 5 mm in length.


Hooks
Sucker
Neck
Scolex
Germinal mass
Immature proglottid
Cirrus sac
Cirrus
♀♂ Genital pore
Vagina
Seminal receptacle
Mehlis' gland
Uterus
Testes
Vas deferens
Ovary
Vitelline duct
Vitelline gland
Mature proglottid
Eggs
Uterus
Gravid proglottid

THE LIFE CYCLE OF *ECHINOCOCCUS GRANULOSUS*
(HYDATID DISEASE OR HYDATIDOSIS)

The adult tapeworm is found in the small intestine of the canine (definitive) host.

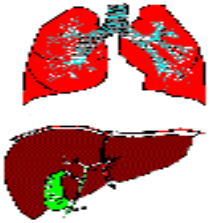


Eggs are passed in the host's feces.

The eggs are ingested by an intermediate host. Many species of warm blooded vertebrates can be infected.

The larva hatches from the egg in the small intestine, penetrates the intestinal lining, and enters the blood stream.

The larvae can be distributed to almost any organ, but the liver is the most common.



The larva develops into a hydatid cyst.

The definitive host is infected when it ingests the hydatid cyst (protoscoleces).

The protoscolex attaches to the host's intestine and develops into a tapeworm.

(Parasites and Parasitological Resources)

Pathogenesis

(Hydatid disease, echinococcosis, hydatidosis)

The hydatid cysts are mainly located in the liver and lungs. Rarely, the cysts may be found in the brain. eye, kidney, muscles and bones.

The early stage of infection is generally asymptomatic. As the cyst enlarges, symptoms of a space-occupying lesion develop.

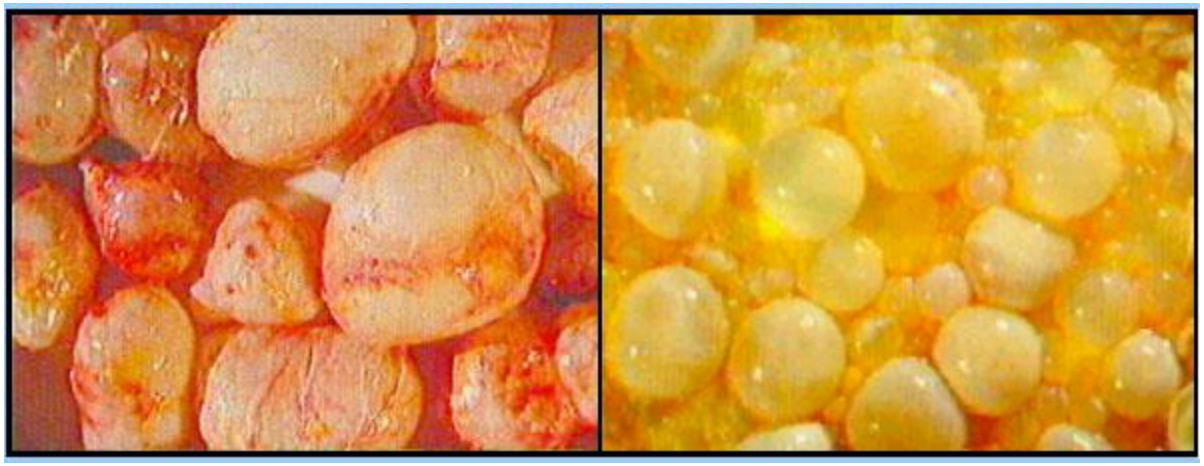
Allergic reactions and sometimes anaphylactic shock may occur if the cyst ruptures.

Ruptures of the cyst may also lead to the escape of protoscolices into the surrounding tissues, these can then develop into further cysts.

The great danger lies in the rupture of the cyst causing the escape of hydatid fluid and hydatid sand, then the anaphylactic shock occurs, and the escaped scolices can form new hydatid cysts.

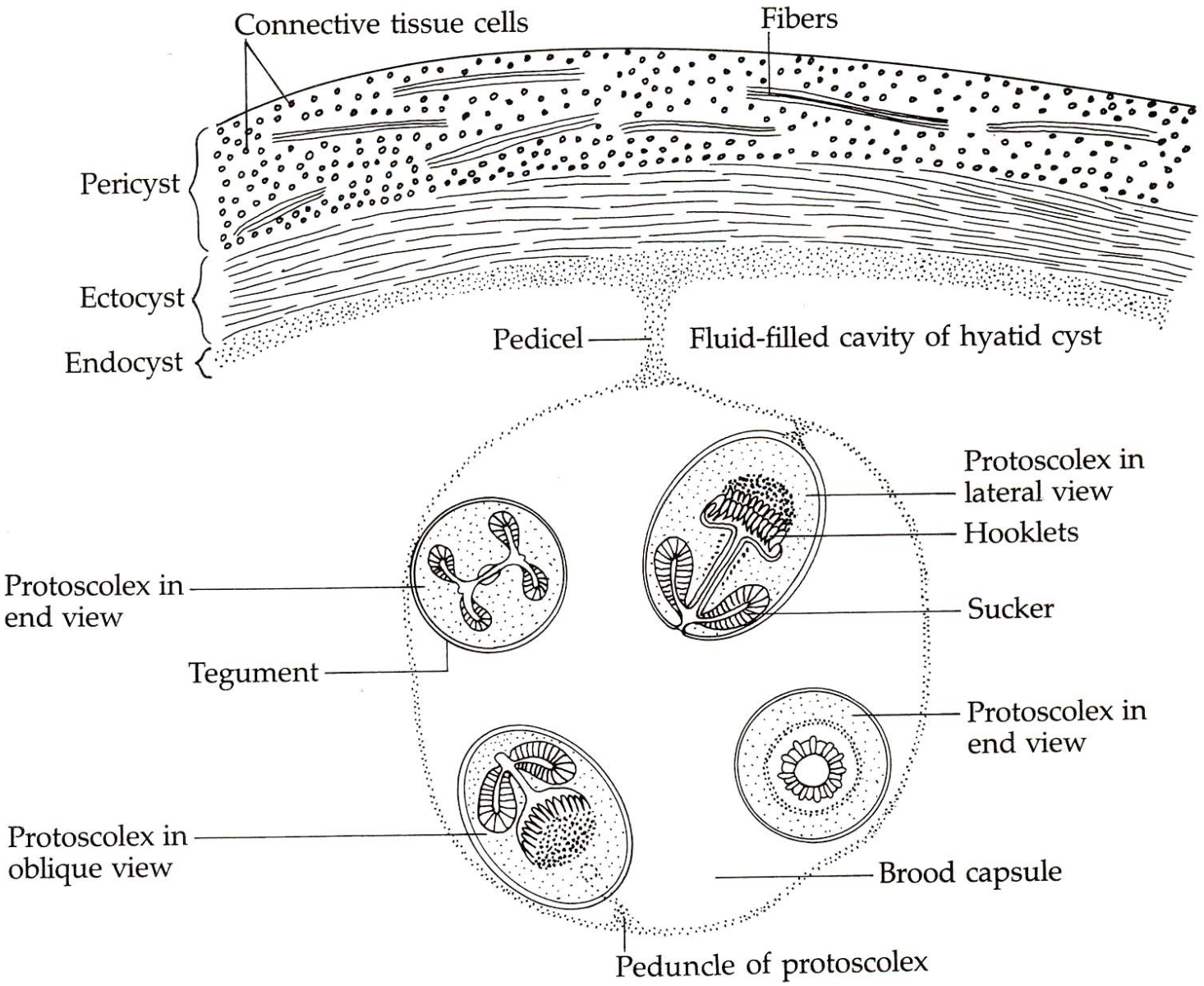
Hydatid cyst
(Hydatid disease)

Mother cyst (left) daughter cyst (right)

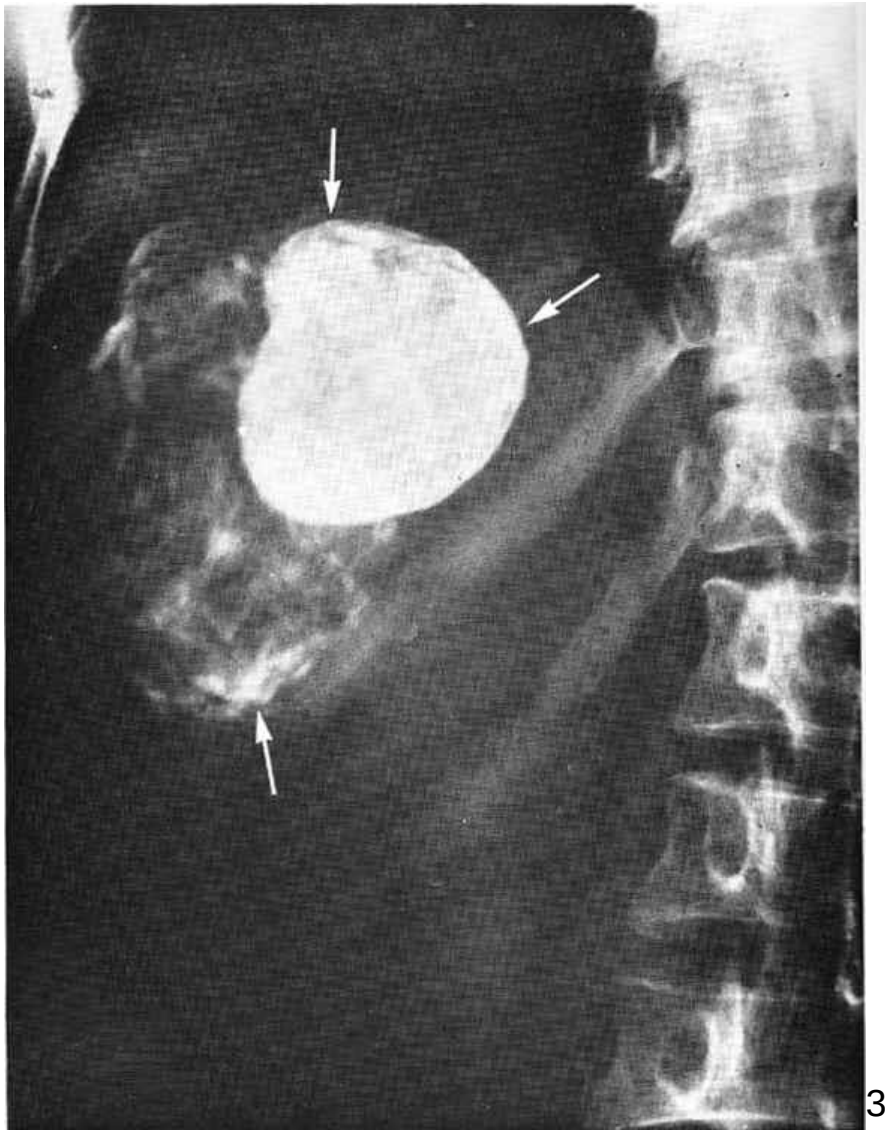


Hydatid Cyst

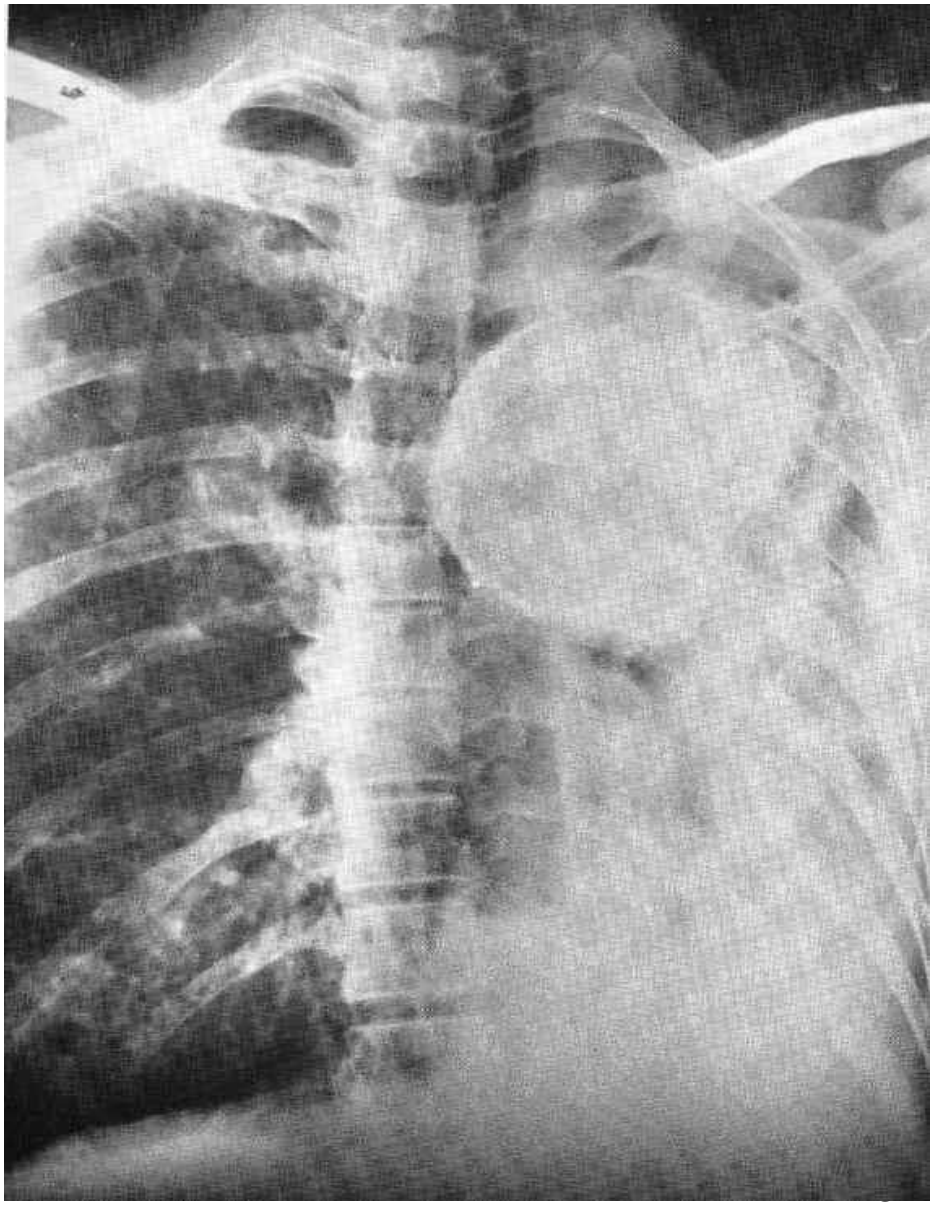
- Cysticercus
  - Juvenile stage


Connective tissue cells
Fibers
Pericyst
Ectocyst
Endocyst
Pedicel
Fluid-filled cavity of hyatid cyst
Protoscolex in lateral view
Hooklets
Protoscolex in end view
Sucker
Tegument
Protoscolex in end view
Protoscolex in oblique view
Brood capsule
Peduncle of protoscolex

Hydatid cysts in liver
This patient had 3 cysts (marked by arrows) in the right lobe.



Hydatid cyst in lung. This patient had a single large cyst in the left lung.



Hydatid disease

A hydatid cyst (*) in the skull of a child (the ruler at the top measures 15cm long, and the child's brain is below the hydatid cyst).

This infection resulted in the child's death.

Cerebral hydatidosis

Two hydatid cysts in the brain of a patient

Ecinococcus granulosus

- Adult stage in dog

Question

Which of the following description about hydatid disease is wrong?

A Canivores serve as final hosts.

B Human is infected by the egg of *Echinococcus granulosus.*

C Human hydatid disease is caused by adult worm.

D Herbivores serve as intermediate hosts.


The
End