Class: Trematoda

Family: Opistorchiidae

Genus: Opisthorchis

Species and their definitive hosts:

***Opisthorchis felineus* (syn. *tenuicollis*)- Cat liver fluke: in cat, dog, fox, pig, man, etc.**

***Opisthorchis* (syn. *Clonorchis*) *sinensis*-Chinese liver fluke: in man, dog, cat, pig, rat, etc.**

***Opisthorchis viverrini*: in man, dog, cat, etc.**

Predilection Site: Bile ducts and pancreatic ducts.

Distribution: Endemic, especially in South-East Asia (China, Taiwan, Korea, Vietnam, Japan, India) and Siberia.

ALSO SEEN IN TURKEY.

Intermediate hosts:

1st intermediate host: Aquatic snails (*Bulinus* sp.,*Bithynia* sp.)

2nd intermediate host: Cyprinoid fish; Metacercaria develop in the musculature of cyprinoid fishes.

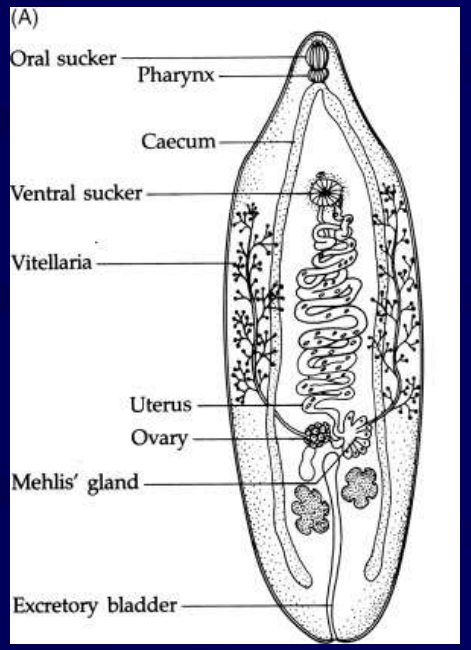
Morphology

Adults;

- **Length: 7-15 mm**
- **Transparent.**
- **Testes are posterior to the ovary and uterus.**

Opisthorchis viverini

https://www.cdc.gov/dpdx/opisthorchiasis/index.html



Opisthorchis felineus

https://ars.els-cdn.com/content/image/3-s2.0-B9780128137123000102-f10-05-9780128137123.jpg?

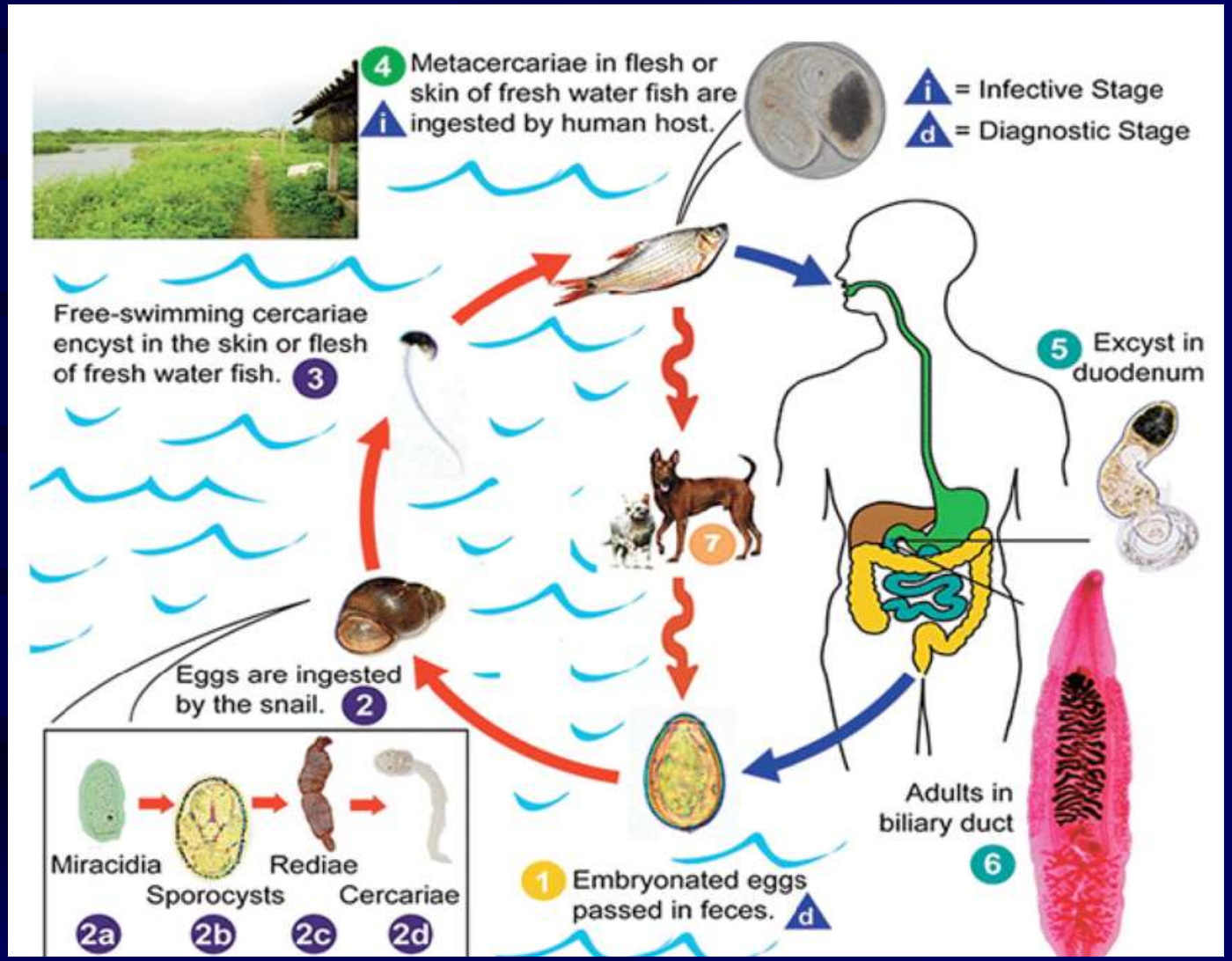
https://www.google.com/url?sa=i&url=https%3A%2F%2Fen.wikipedia.org%2Fwiki%2FOpisthorchis_felineus&psig=AOvVaw2_S-jfhNtPl09wUxTSQFzW&ust=1603276501194000&source=images&cd=vfe&ved=0CAIQjRxqFwoTCLCY28r8wuwCFQAAAAAdAAAAABAJ

Egg;

small in size (*O.sinensis*: 27-35x12-20 µm; *O. felineus*: 26-30x11-15 µm), operculate,
contain the Miracidium when they are laid.

*****Opisthorchiids may be mistaken from Dicrocoeliids**

Opistorchis felineus life cycle:



https://www.researchgate.net/figure/The-life-cycle-of-Opisthorchis-felineus-as-a-representative-for-Fish-borne-Zoonotic_fig2_339691624

Pathogenesis & Clinical signs

- Often remains unnoticed (subclinical infection).
- Heavier infections may cause proliferative cholangitis, choleystitis, gastro-duodenitis, anorexia, liver cirrhosis, anemia
- Indigestion, epigastric discomfort, diarrhea
- *O. viverrini* in man is considered to be carcinogenic, often leading to cholangiocarcinoma and death.

Diagnosis

This is entirely based on faecal examination (sedimentation tecnique) for eggs and necropsy findings.

Control

The fish (second intermediate host) should be eaten cooked.

Class: Trematoda

Family: Opistorchiidae

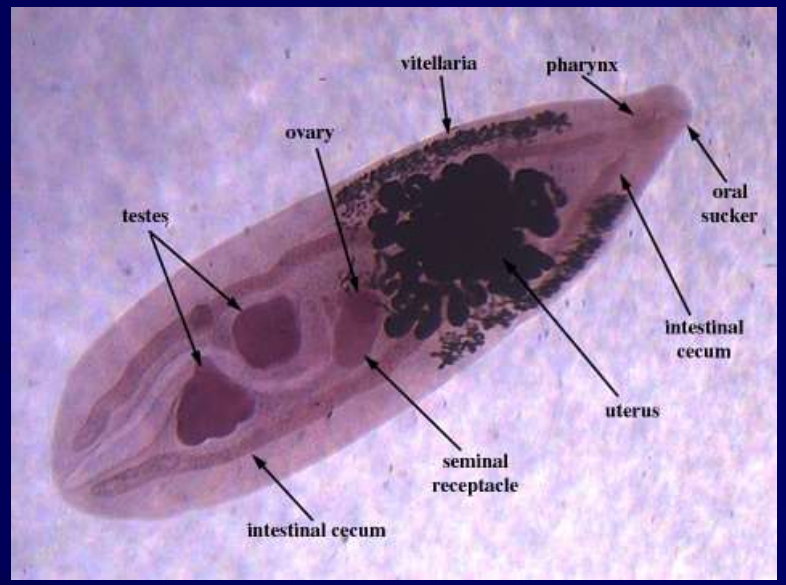
Genus: Metorchis

Species: *Metorchis albidus, M. conjunctus*

Definitive hosts: Cats and dogs, foxes, seal and is rarely human.

Predilection Site: Bile ducts, gall bladder

Life cycle: Similar with opisthorchis spp.



https://www.google.com/imgres?imgurl=https://web.stanford.edu/group/parasites/ParaSites2006/Metorchiasis/morphology.jpg&imgrefurl=https://web.stanford.edu/group/parasites/ParaSites2006/Metorchiasis/references.html&tbnid=p7BJ_z1Ta9q5xM&vet=1&docid=9zPPrNqSL5_MkM&w=477&h=357&itg=1&source=sh/x/im

Intermediate hosts:

1st intermediate hosts: freshwater snails

2nd intermediate hosts: freshwater fish

Prevalence:

Located in Europe, Asia and North America.

Metorchis albidus were detected in cats in Turkey.

Pathogenicity: *Metorchis* can cause fatal liver diseases in cats and dogs.

Class: Trematoda

Family: Heterphyidae

Genus: Heterophyes

Species: *Heterophyes heterophyes*

Hosts: Cat, dog, pig, man etc.

Predilection Site: Intestine

Intermediate hosts: first: aquatic snails
second: fish

Morphology

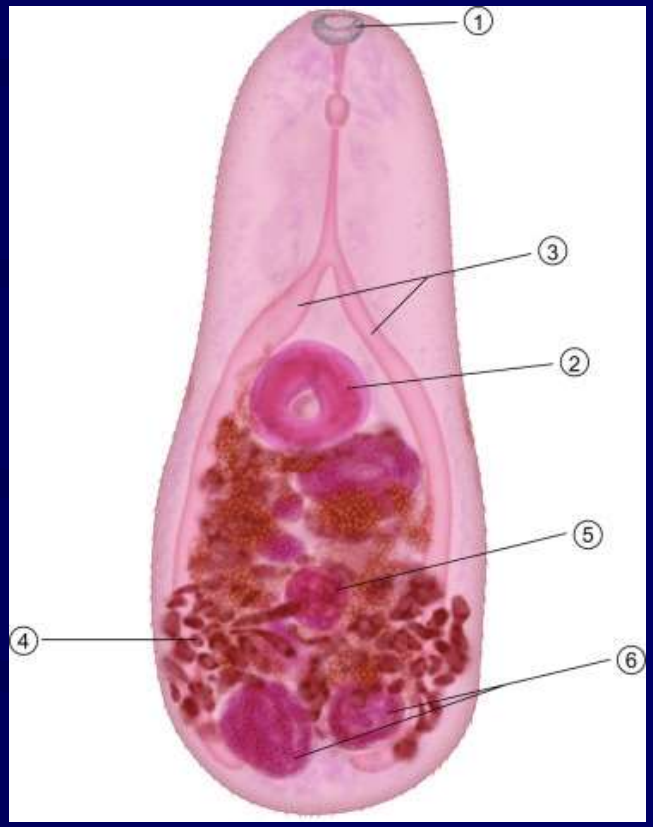
Lenght: 0.3-0.7 x 1-1.7 mm.

There are 3 suckers. 1. Oral, 2. Ventral, 3. Genital

Patogenesis: Heavier infections may cause enteritis

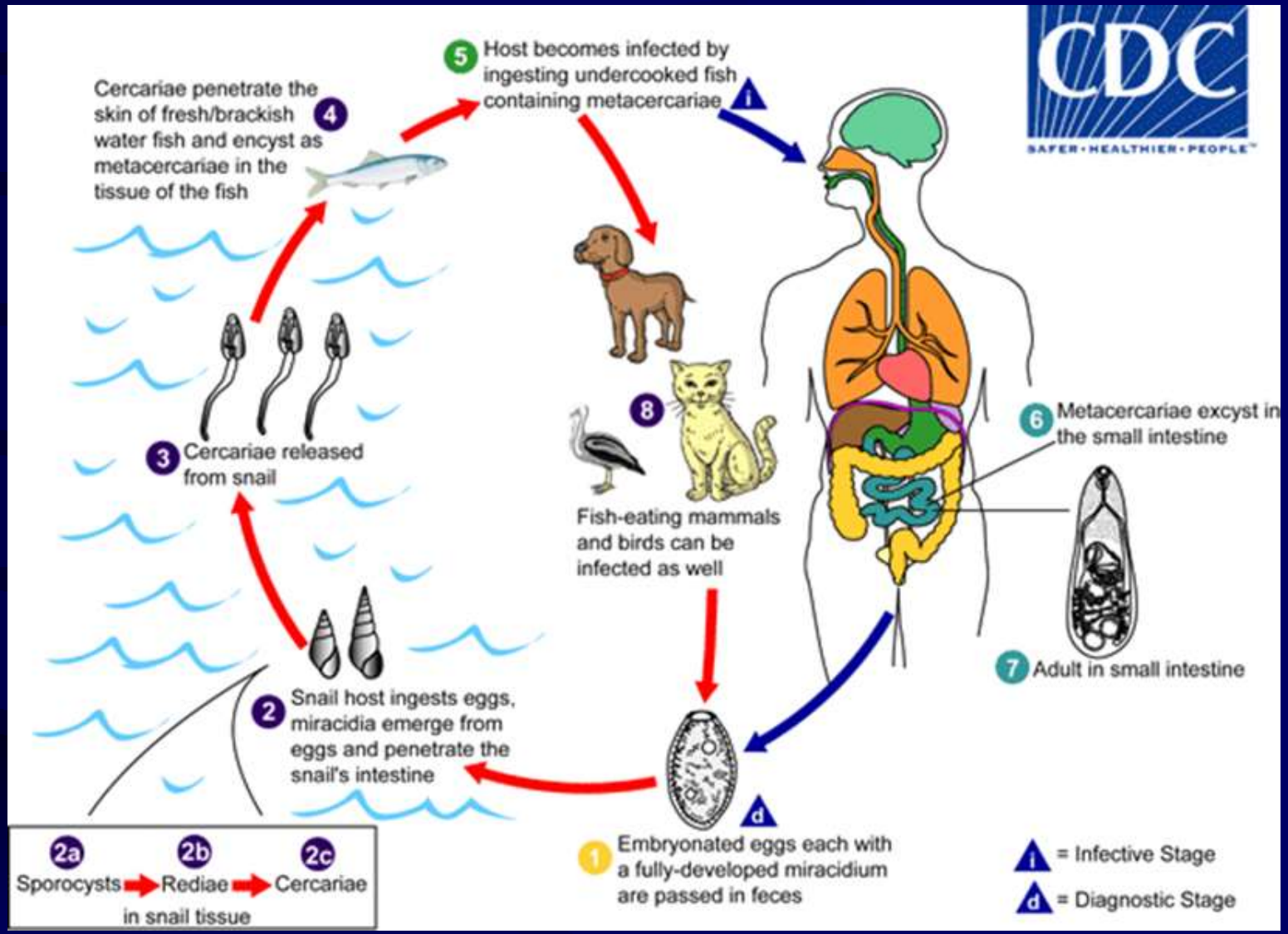
Diagnosis: Sedimantation

This is entirely based on faecal examination for eggs and necropsy findings.



https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.sciencedirect.com%2Ftopics%2Fbiochemistry-genetics-and-molecular-biology%2Fheterophyes&psig=AOvVaw1hTq_JGqZScpgxCo5tY5Ly&ust=1603431973061000&source=images&cd=vfe&ved=0CAIQjRxqFwoTCLjQ2-O_x-wCFQAAAAAdAAAAABAD

Heterophyes spp life cycle



https://www.cdc.gov/dpdx/metagonimiasis/index.html

Class: Trematoda

Family: Heterphyidae

Genus: Metagonimus

Species: *Metagonimus yokogawai*

Metagonimus yokogawai, a minute intestinal fluke (and the smallest human fluke)

Definitive hosts: Fish-eating mammals (e.g., cats and dogs), man

Predilection Site: Small intestine

Life cycle: Similar with *Heterophyes* spp.

Intermediate host: Snails and fish (Cyprinid, mullet, trout)

Distributions:

It is spread in East Asia and Balkans.

ALSO SEEN CATS IN TURKEY

Pathogenesis:

The main symptoms are diarrhea and abdominal pain similar to colic symptoms..

Class: Trematoda

Family: Diplostomatidae

Genus: Alaria

Species: *Alaria alata, Alaria americana, Alaria canis,*

Definitive hosts: Domestic carnivores (dog, cat), wild carnivores and human

Predilection Site: Small intestine.

Distribution: North America and Eastern Europe.

Alaria alata observed in foxes and dogs in Turkey.

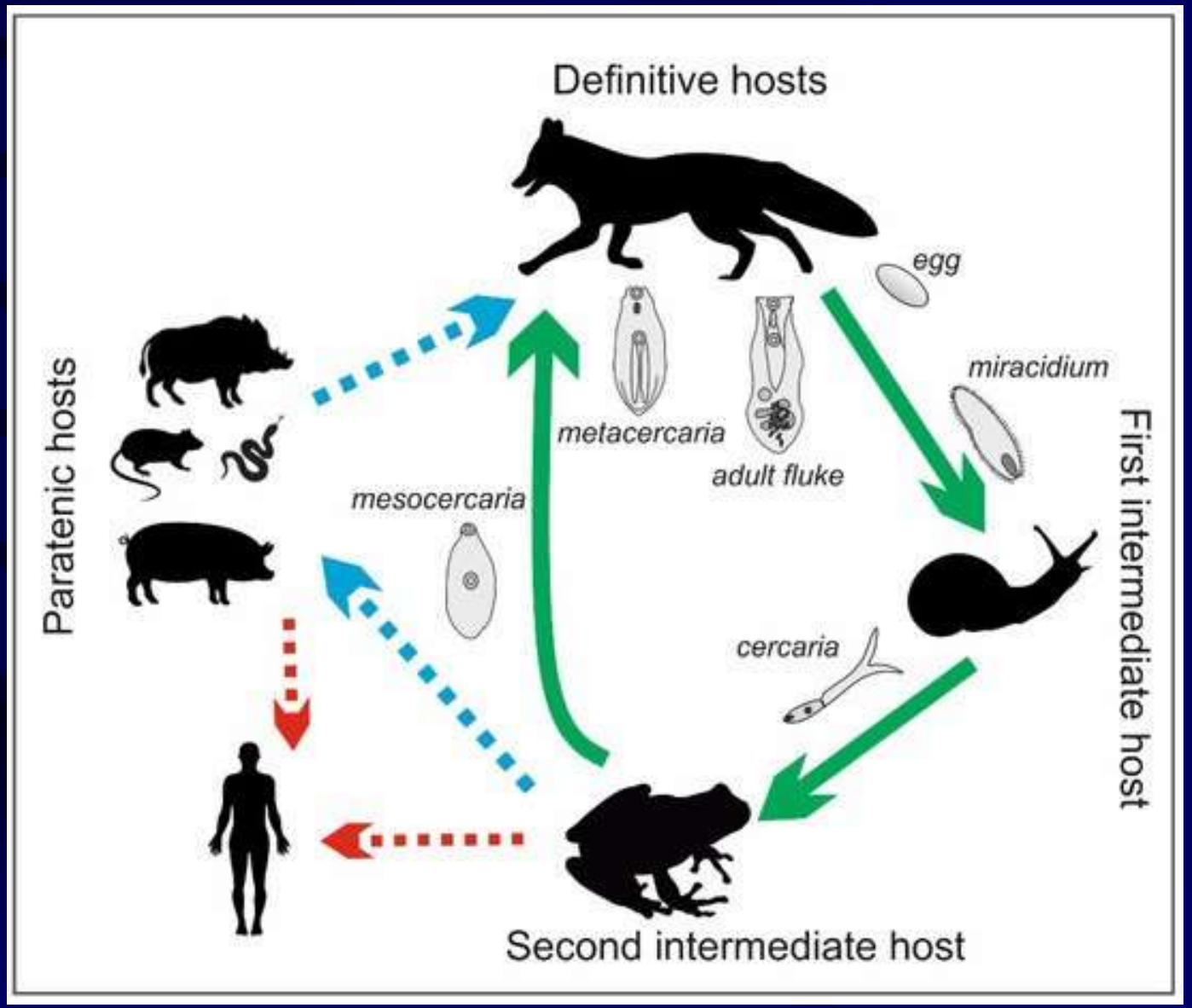
Intermediate hosts:

1st intermediate host: Snails (*Planorbis* sp.)

2nd intermediate host: Frogs, toads

Paratenic host: snakes, rodents (*A. alata, A. marcianae*) .

Alaria alata life cycle



https://encyclopedia.pub/entry/13005

Class: Trematoda

Family: Nanophyetidae

Genus: *Nanophyetus*

Species: *Nanophyetus salmincola (syn: Troglotrema salmincola)*

Definitive hosts: Dogs, fox, cat, raccon, mink, bear, other fish-eating mammals rarely human.

Predilection Site: Small intestine.

Intermediate hosts:

1st intermediate hosts: Snails (Oxytrema, Goniobasis)

2nd intermediate hosts: Fish.

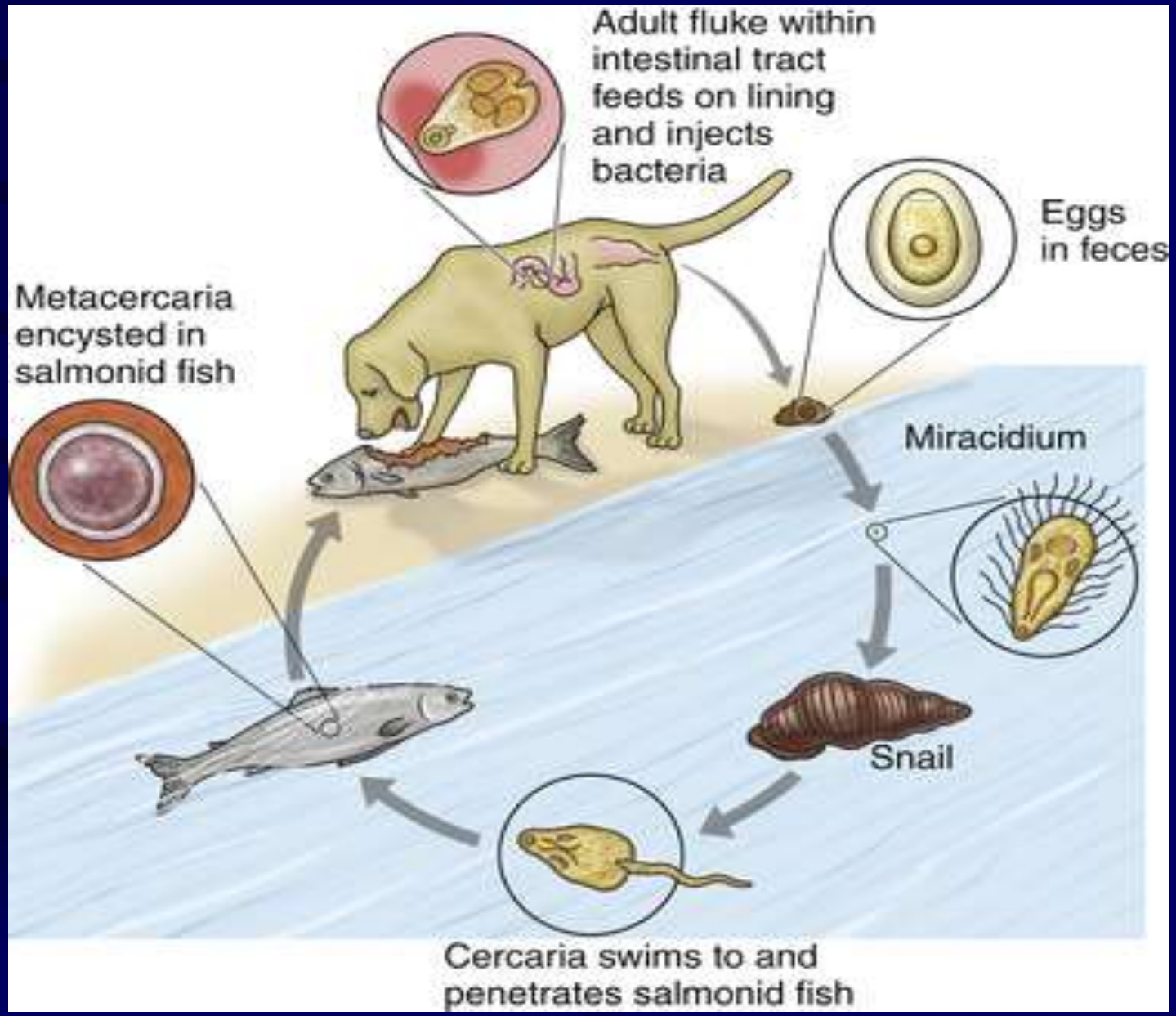
Distribution: USA and Russia.

Pathogenicity and clinical symptoms:

It has no significant pathogenicity.

But it is a vector of the Rickettsia "*Neorickettsia helminthoeca*". This cause to acute, febrile, fatal "salmon fish poisoning ''characterized by growth of lymph nodes and a hemorrhagic enteritis in canids

Nanophyetus salmincola life cycle



https://veteriankey.com/salmon-poisoning-disease/

Class: Trematoda

Family: Paragonimidae

Genus: Paragonimus

Species:

Paragonimus westermani, P. kellicotti,

Definitive hosts:

Paragonimus westermani: Dog, cat, pig, goat, cattle, fox, other carnivores human, primates

P. kellicotti: cat, dog, pig

Predilection Site: Lung.

Life cycle: Their secondary intermediate hosts are different.

Otherwise, they are similar to other trematodes in cats and dogs.

Intermediate hosts:

1st intermediate host: freshwater snails (Melania, Ampullaria, Pomatiopsis),

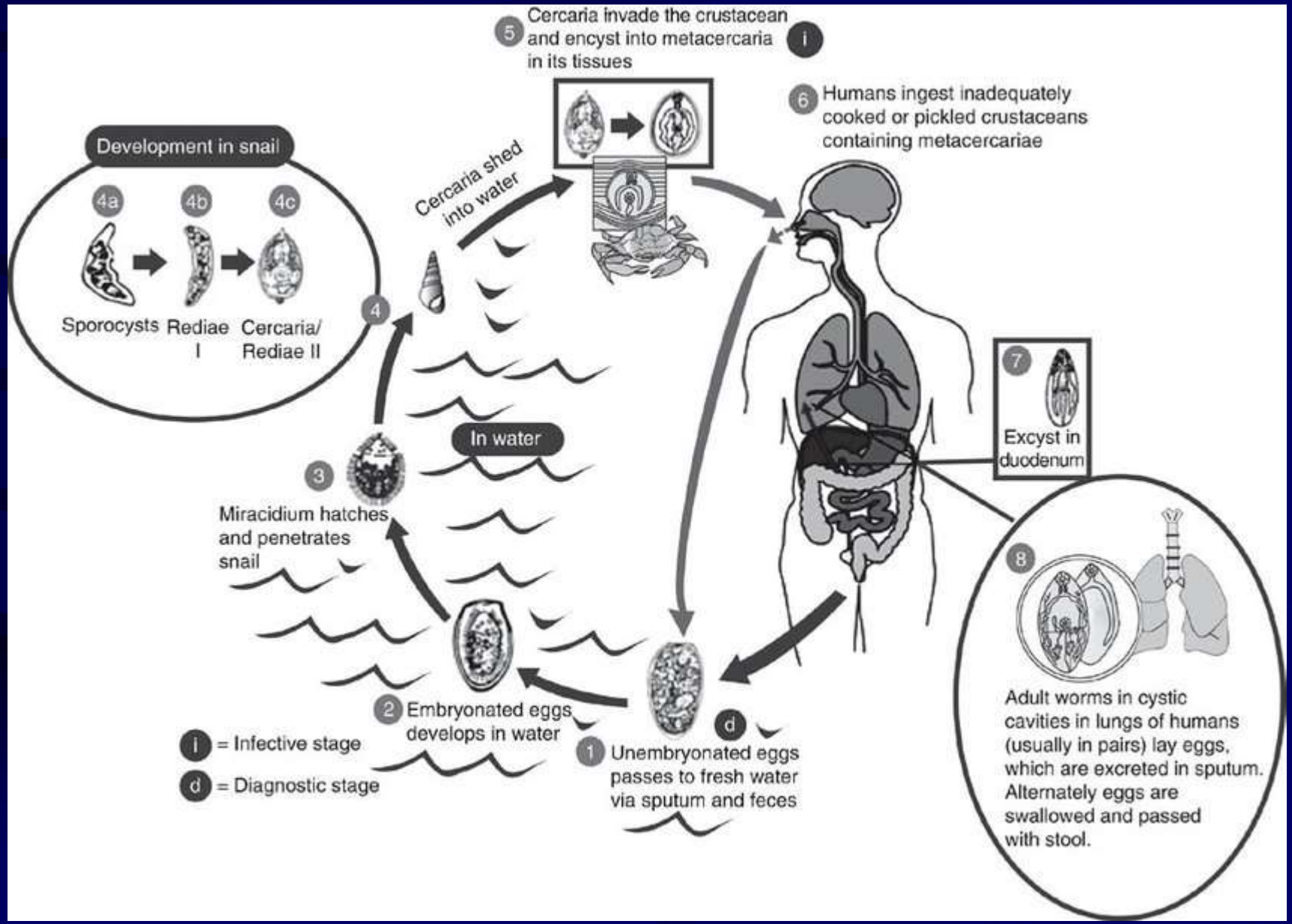
2nd intermediate host: crayfish and crabs (Crustacean).

Pathogenicity and clinical symptoms:

Bronchitis occurs in infected animals. Clinically, cough occurs.

https://www.cdc.gov/dpdx/paragonimiasis/index.html

Paragonimus spp. life cycle



https://www.researchgate.net/figure/Life-cycle-of-Paragonimus-westermani_fig2_340294476

Class: Trematoda

Family: Troglotrematidae

Species: *Troglotrema acutum*

Definitive hosts: Fox, mink

Location: Frontal sinuses

Class: Trematoda

Family: Echinostomatidae

Genus: *Echinochasmus*

Echinostoma

Species: *Echinochasmus perfoliatus*

Definitive hosts : Dogs, cats, foxes and pigs.

Predilection Site: Small intestine.

Life cycle: Similar to other trematodes in cats and dogs. Metacercariae are taken by eating fish.

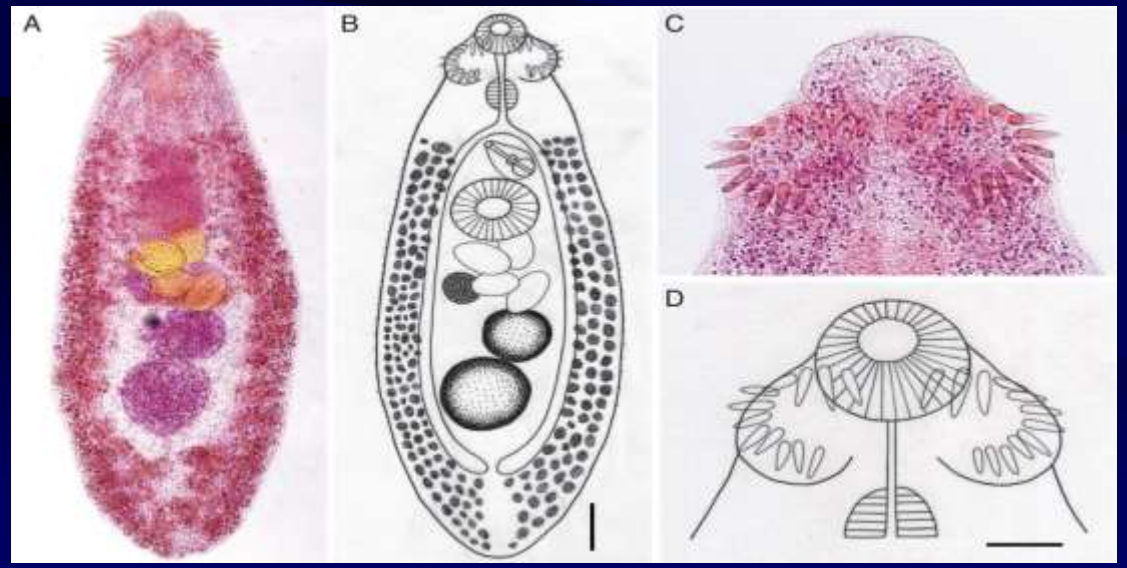
Intermediate hosts: Uses two intermediate hosts.

1st intermediate host: freshwater slugs

2nd intermediate host: fish

Prevalence: Europe and Asia

This species have been found in dogs in Turkey.



https://www.parasitol.kr/journal/view.php?number=2339

*** Echinochasmus is characterized by the possession of a single row of typical Echinostomatid hooks on the anterior collar.

Echinochasmus caninus

Drugs used in trematode infections of dogs and cats.		
Active ingredient	Route of administration	Dose (mg/kg)
Praziquantel	oral, s.c., i.m.	100 (single dose) or 25 (3 days)
Albendazole	oral	30 (12 days)
Fenbendazole	oral	200 (3 days, in dogs)
Levamizole	oral	100 (in cats)
Epsiprantel	oral	2-8
Nitroscanate	oral	100
Hexachlorophene	oral	20

Species: *Echinostoma revolutum, E. paraulum*

Definitive hosts:

Echinostoma revolutum: *Duck, goose, pigeon, various fowl, aquatic birds,* man

E. paraulum: *Duck, pigeon*

Predilection Site: Caeca and rectum

Life cycle: Similar to other trematodes in cats and dogs. Metacercariae are acquired by eating fish.

Intermediate hosts:

1st intermediate host: Aquatic snails

2nd intermediate host: *Echinostoma revolutum: aquatic snails and tadpoles*

E. paraulum: Fish

Pathogenicity and clinical symptoms:

Echinostomatidae strains compress their attractors and intestinal villi, causing hemorrhagic enteritis and degeneration of the villi.

They also cause mechanical damage to the intestines and petechial hemorrhage with the collar and spines in the anterior part of the body. In severe infections, areas of necrotic ulcers, hyperemia, hemorrhagic diarrhea and weakness are seen with hemorrhagic enteritis.

Class: Trematoda

Family: Prosthogonimidae

Species: *Prosthogonimus pellucidus, P. cuneatus, P. ovatus, P. macrorchis*

Definitive hosts: Domestic and wild birds.

Predilection Site: Prostogonimus parasites are found in the cloaca and reproductive tracts of birds.

Biology: Birds become infected by eating nymphs or adult dragonfly carrying metacercariae.

Bursa fabricius, oviduct and cloaca.

Intermediate hosts:

1st intermediate host: Water snails (*Bithynia*)

2nd intermediate host: Dragonfly nymphs

Distribution: Worldwide , Occurence is seasonal peak in spring and summer in temperate areas.

https://en.wikipedia.org/wiki/Dragonfly

https://www.google.com/url?sa=i&url=https%3A%2F%2Fnature.mdc.mo.gov%2Fdiscover-nature%2Ffield-guide%2Fdragonfly-larvae&psig=AOvVaw3JgdwvM-JJXfR03jNGUzY_&ust=1603309926056000&source=images&cd=vfe&ved=0CAIQjRxqFwoTCIjmlpn5w-wCFQAAAAAdAAAAABAb

https://www.veterinaryparasitology.com/prosthogonimus.html

Class: Trematoda

Family: Notocotlylidae

Species: *Notocotylus attenuatus*

Definitive hosts: Chicken, duck, goose, wild waterfowl other aquatic birds

Predilection Site: Caecum and rectum.

Biology: It uses one intermediate host, metacercariae encyst on solid objects such as plants or snails shells.

Intermediate hosts: Vairous snails (*Planorbis* sp., *Bulinus* sp., *Lymnea* sp.)

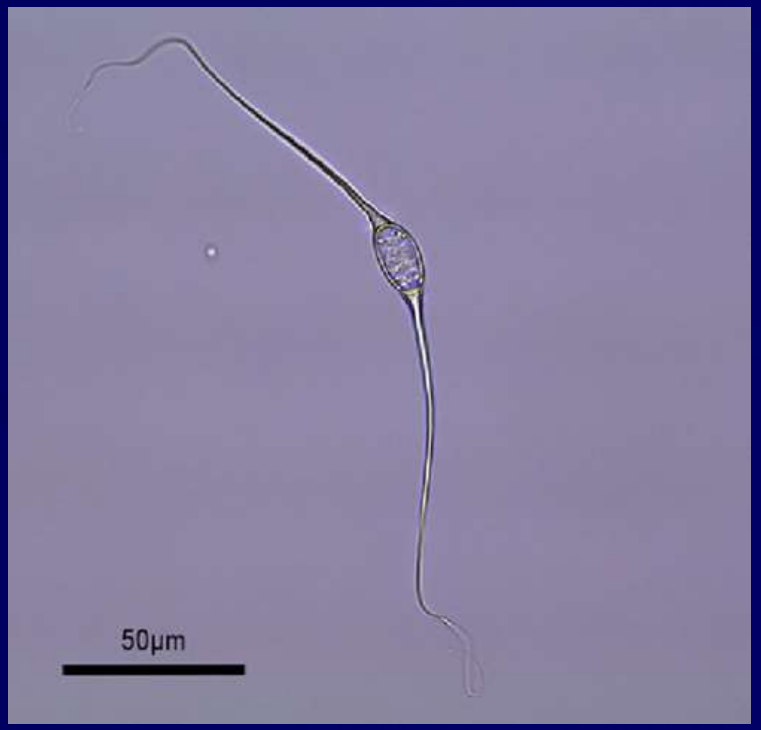
Distribution: Worldwide, This species has been found in geese and ducks in Turkey.

Pathogenicity & clinical symptoms:

Generally, present a mild disease.

In severe infections, weaknesses, diarrhea,

erosion of the secular mucosa and catarrhal enteritis occur.



https://www.researchgate.net/figure/Egg-recovered-from-the-feces-of-an-infected-bank-vole-indicating-the-extended-egg_fig4_230634718

Drugs used in trematode infections of poultry		
Active ingredient	Route of administration	Dose (mg/kg)
Praziquantel	oral	20-25 (several days)
Thiabendazole	oral	300-1500
Flubendazole	oral	5-10 (7 days)
Fenbendazole	oral	40
Febantel	oral	60 (7 days)
Albendazole	oral	2-5 (5 days)