

Paramphistomosis

Etiology:

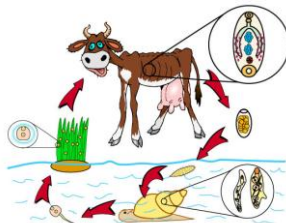
- *Paramphistomum cervi*
- *P. daubneyi*
- *P. ichikawai*
- *P. microbothroides*



P. microbothrium

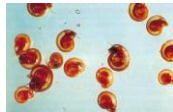


P. cervi

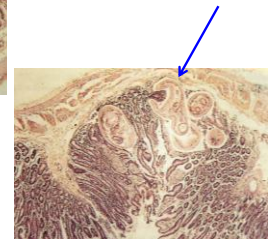
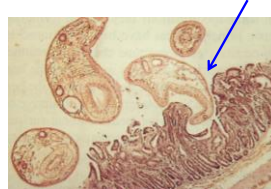


Prepatent period: 3-5 months

Intermediate hosts: freshwater or amphibious snails, genera *Planorbis* or *Lymnaea*;



Pathogenesis



Juvenile forms in duodenum, Duodenitis and enteritis



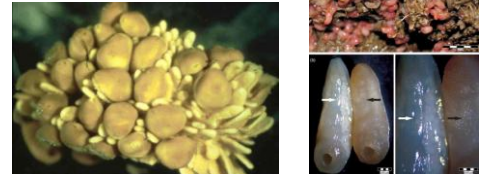
Acute or intestinal paramphistomatidosis

- In heavy infections only, mostly in young animals; masses of juvenile flukes (in sheep) induce acute, **necrotic**, occasionally **haemorrhagic duodenitis** by 2-3 weeks p.i.
- Course in cattle 2–3 weeks, in small ruminants 5–10 days.
- **Major signs:** extensive diarrhoea, anorexia, thirst, anaemia, hypoalbuminaemia, oedema, emaciation, mortality may be high;



Chronic or rumen paramphistomatidosis

- The typical form of infection;
- Adults flukes attached to the mucosa of the rumen and reticulum are **well tolerated**;
- **symptoms are usually absent**;

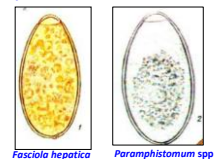


Factors affecting the epidemiological pattern

- The infection of cattle, sheep and goats with paramphistomes is **very common**.
- These parasites **may survive for years**, so there is a virtually constant source of infection for successive generations of snails. The intermediate hosts (snails of the genus *Planorbidae* and for some species *Lymnaeidae*) are extremely adaptable and prolific breeders, which ensures a widespread availability of the snails within infested areas.
- Massive asexual multiplication of the parasites in infected snails and the survival of snails for several months may result in the **shedding of large numbers of cercariae**. Infected snails may also survive in mud for months.
- Clinical outbreaks of paramphistomiasis are usually confined to the drier months. During this period, the snail population becomes concentrated around natural sources of water and as these areas may provide the only dry season grazing, animals may become heavily infected. Older animals, especially cattle, seem to acquire immunity to the infection.

Diagnosis

- **During pathology**
 - Profuse, fetid, fluid diarrhea
 - Young flukes in feces
 - Marked weakness
 - Necropsy
 - Swampy or wet pastures.
 - (No ova, as immature flukes cause pathology)
- **After Pathology (adult flukes)**
 - Fecal sedimentation for ova
 - Swampy or wet pastures.



Therapy

- Oxydianid (15 mg/kg per os)
- Closantel (10 mg/kg per os)
- Albendazol (in increased dose: 15-20 mg/kg per os)
- Bithional (25-100 mg/kg per os)
- Bithional SO₂ (40 mg/kg per os)

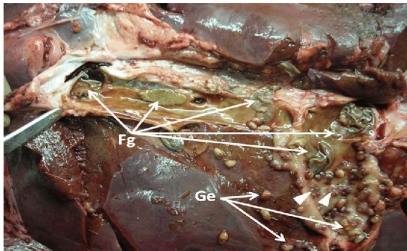
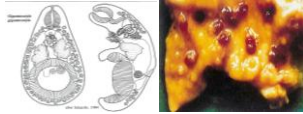


Control

- Snail control??
- Pasture control – management/ grazing control /Restrict access to wet areas

Gigantocotyle explanatum

- biliary duct of cattle, buffaloes, ...
- Africa, Asia, South America

**Family: Dicrocoeliidae**

- small - medium trematode
- Adults – **bile ducts, bladder, pancreatic pathways** - mammals, birds, reptiles
- **IH** – 2 land snails, ants, ...
- embryogony pass in the body of **FH** (eggs are always embryonated)

<i>Dicrocoelium dendriticum</i> 8-12x1,5-2,5 mm	2 IH – terrestrial snail and ant	FH – ruminants, camels, rabbits, horses, man	Bladder, biliary ducts
<i>Dicrocoelium hospes</i> 4,8-6,7x0,7-0,9 mm	2 IH – terrestrial snail and ant	Sheep, goat, cattle, buffalo, pig, rabbit, man	Bladder, biliary ducts

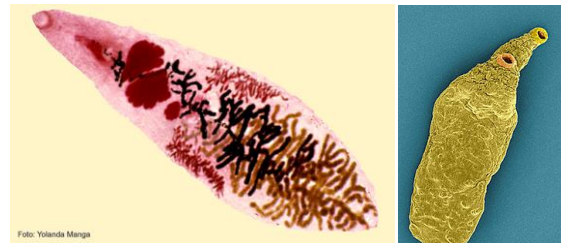
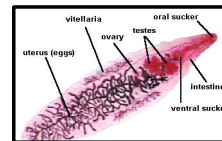
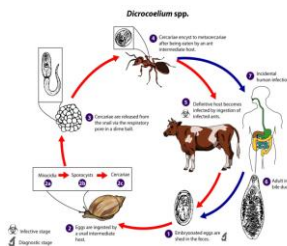
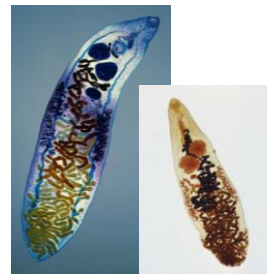


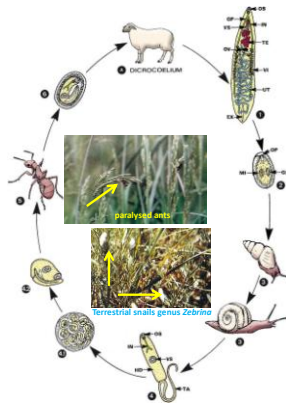
Foto: Yolanda Manga

Dicrocoelium dendriticum***Dircoeleum dendriticum* (lancet fluke)**

- **Host and Location:**
- Biliary tract of **sheep (most often)**.
Cattle, goats horse, dogs, roe – deer, buffalo, camel, rabbit, occasionally pig, and man serve as hosts.
- Distributed throughout the world,
- This fluke is slender more transparent and much smaller than *F. hepatica*.

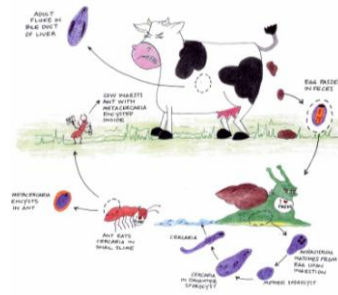


Life cycle



Life cycle

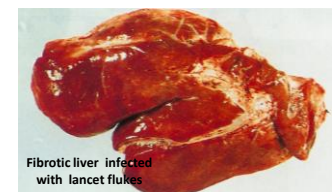
- **Infection:** take place by ingestion of ants harbouring MC, young flukes migrate up to the bile ducts via the ductus choledochus; there is **no migration in the liver**;
- **Prepatent period:** 7 – 9 weeks
- **Total life cycle** takes about 6 months



Epidemiology/Dicrocoeliosis

- Intermediate hosts do not require a moist environment;
- The eggs can survive **up to one year** on dry pasture;
- Massive infection of snails and ants occurs in **summer, autumn and spring**;
- Over wintering is possible in the snail and the ants;
- Peak risk of host infection in temperate regions in **in spring**, but infection is possible in the whole grazing season;

Pathogenesis

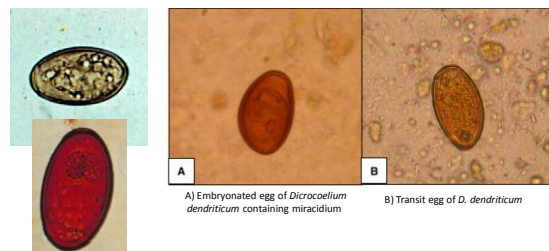


Clinical Manifestation:

- Symptoms apparently are not observed unless there are large numbers of worms.
- However, such an occurrence is not uncommon.
- When signs do occur they would be very **similar to** those of animals infected with *F. hepatica*.
- **Anemia, emaciation, decreased milk and wool production.**

Diagnosis

- Sedimentation-concentration technique
- The eggs measure 36-45 by 22-30 microns and are much smaller than *F. hepatica* (130-150 by 63-90 with miracidium).

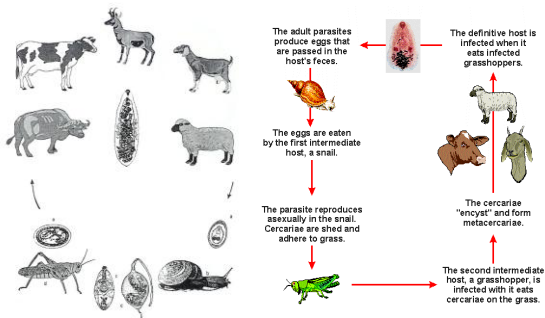


Control:

- Since terrestrial snails are the intermediate hosts some knowledge about their habits can help **reduce the snail population** on a pasture without treating.
- Although, terrestrial snails are found outside of stream, environment as beneath loose stone, logs, and debris such as fertilizer bags, burlap bags, boards, etc., maintains enough moisture for their activity in this part of the country.
- Keeping the pasture free of such debris reduces the snail population drastically.

Therapy:

- **albendazole** (2x 15 mg/kg per os every 15-20 days)
- **fenbendazole** (5 x 20 mg/kg per os)
- **netobimin** (20 mg/k. per os; cattle)
- **praziquantel** (50 mg/kg per os)



➤ The prepatent period is 80-100 days.

Genus: *Eurytrema*

Eurytrema pancreaticum

Eurytrema coelomaticum

Host:

Cattle, sheep, goat, buffaloes in Eastern India, SE Asia, S. America (Brasil)

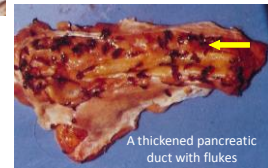
Location:

Pancreas, bile ducts, duodenum

Pathogenesis



A large number of flukes is visible When the pancreatic ducts are opened



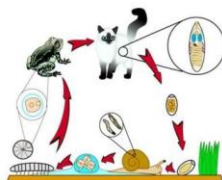
A thickened pancreatic duct with flukes

Platynosomum fastosum

„the lizard poisoning fluke of cats“

Host: cat

- 1.IH: Snails *Sublimina octona*,
- 2.IH: Lizards, toads, geckos, and skinks.
- Fluke of bile and pancreatic ducts of cats



Clinical Signs

- Frequently the cat will exhibit a temporary inappetence due to **hepatic dysfunction**. Grossly the **bile ducts** may be **dilated** and the **duct epithelium desquamated**.
- Clinical signs observed are **diarrhea**, **vomiting**, **icterus**, and **death**.

Diagnosis:

- **sedimentation** methods

Treatment:

- Praziquantel 20 mg/kg
- Nitroscanate 100 mg/kg

Order: PLAGIORCHIIDA

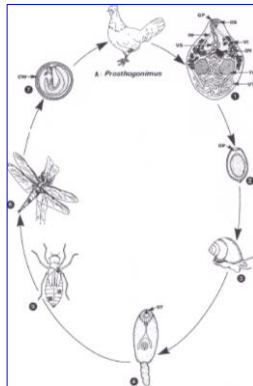
Dicrocoelidae	<i>Dicrocoelium</i> , <i>Eurytrema</i> , <i>Platynosomum</i>
Prosthogonimidae	<i>Prosthogonimus</i>
Troglotrematidae	<i>Collyriclum</i> , <i>Troglotrema</i> , <i>Nanophyetus</i>
Paragonimidae	<i>Paragonimus</i>

Prosthogonimus/Prosthogonimosis

- *P. pellucidus* - in the Bursa Fabricii, oviduct and posterior intestine of the fowl, duck, and various wild birds. Size: 8-9 x 4-4 mm;
- *P. macrorchis* - in the Bursa Fabricii, oviduct of domestic poultry and ducks and also wild birds in North America, Size: 5-7 mm;
- cause considerable damage to organs, even preventing egg laying in some cases;
- *P. ovatus* - in the Bursa Fabricii, oviduct of fowl and geese and wild birds in Europe, Africa, and Asia. Size: 3-4 mm.
- *P. cuneatus*
- *P. anatinus*

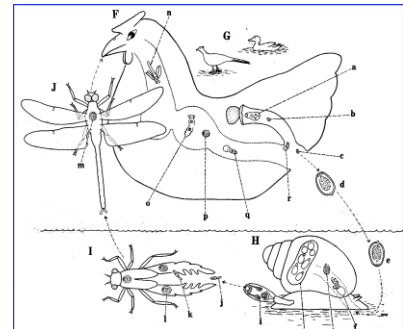


Life cycle



Prosthogonimus macrorchis

Life cycle:



Pathogenesis

- *Prosthogonimus* spp. are considered to be the most pathogenic trematode of poultry in Europe and America;
- In the oviduct they cause irritation, resulting in an acute inflammation of the oviduct;
- The production of abnormal eggs and discharges of albumen from the cloaca;
- The irritated oviduct readily performs retroperistaltic movements, causing broken yolk, albumen, bacteria and parasite to enter the abdominal cavity, where they set up peritonitis, usually with fatal results;

Clinical signs

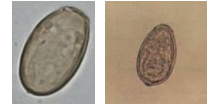
- At first the general health is not disturbed, but several hens may begin to lay eggs with soft or without any shell;
- There is a tendency of hens to sit on the nest;
- Discharge from the cloaca; the irritated oviduct passes the eggs through so rapidly that no shell is deposited, although the lime secreting glands act normally;
- The birds become listless, abdomen is pendulous and the legs are held widely apart in walking;
- The feathers around the cloaca are soiled with albumen;
- If peritonitis develops, the comb and wattles become cyanotic and birds soon prostrated and die;

Post mortem finding

- **Inflammation of the oviduct** - from catarrh to a croupous inflammation with a dirty, cheesy mass in the lumen (concrement of yolk and albumen);
- The parasites are not easily seen on the mucous membranes;
- In case of peritonitis the abdominal cavity contains a **dirty fluid** and the organs are stuck together by a cheesy mass;
- The serous membranes show a marked congestion and **haemorrhages** may be present;

Diagnosis

- Coprological examination and finding the eggs (26-32 x 10-15 µm)



Therapy

- Albendazole; fenbendazole; praziquantel

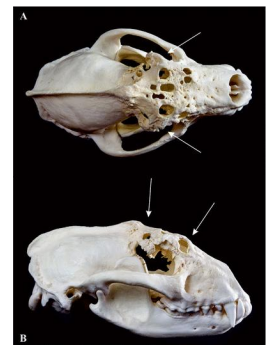
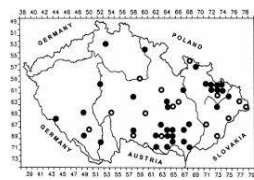
Troglotreematidae (PLAGIORCHIIDA)

- Small flukes
- Under the skin of birds
- Nasal cavity (sinuses) - **badger, fox, ...**
- **2 IH** (snails, frogs)
- **Bone perforation, penetration into the brain**

Troglotrema acutum

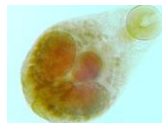
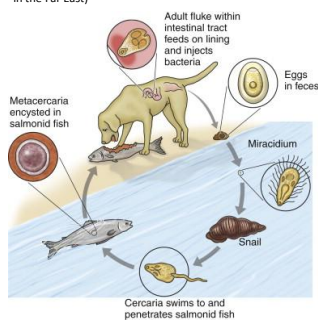


Adult fluke are 3.2x2mm large

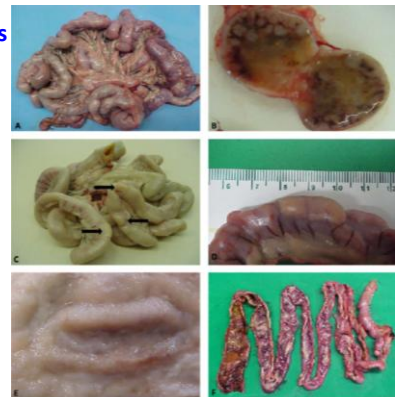


Nanophyetus / Nanophyetosis

Nanophyetus salmicolae salmicolae (beast North America);
Nanophyetus salmicolae schikobalowi (the predatory carnivores in the Far East)



Pathogenesis



Diagnosis

- Coprologic examination, eggs
- Intoxication - clinical symptoms;
- Evidence of rickettsia in lymph node aspirates;
- History - consumption of raw salmon;

Therapy

- praziquantel (flukes)
- symptomatic treatment and ATB coverage (intoxication)

Prevention

- Avoid eating raw fish

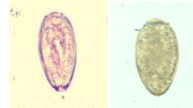
Paragonimidae

Paragonimosis – helminthozoonosis – chronic lung disease

- *Paragonimus westermani*
- *Paragonimus pulmonalis*
- *Paragonimus miazaki*

Location: "lung flukes", lungs, rarely brain, spinal cord

Hosts: pig, dog, cat, human, goat, cattle, tiger, fox, wolf, beaver, ...



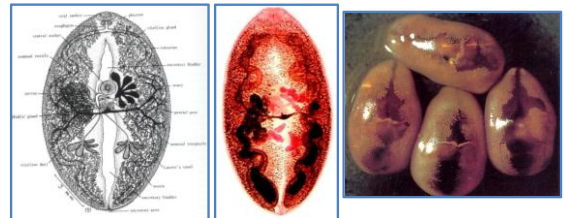
80-120 x 48-60 µm

Distribution of paragonimiasis, worldwide, latest year available



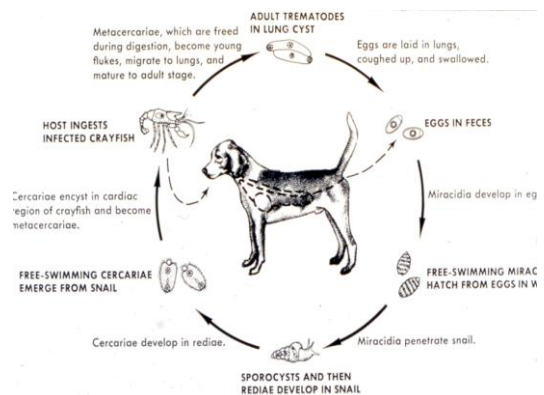
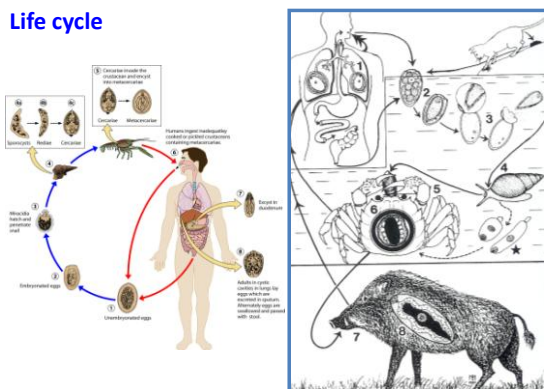
Morphology

Size: 7.5-16 x 4-8 mm



The cuticle is covered with small spines (their shape is important for differential diagnosis) character to distinguish species).

Life cycle





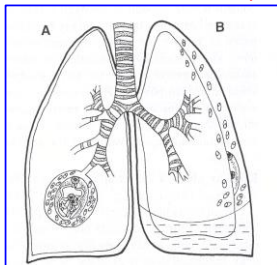
1. *Eriocheir japonicus* – Japan, Korea, Taiwan
 2. *E. sinensis* – imported from China to Japan
 3. metacercariae
 4. *Cambasoides similis* – Korea
 5. *Geothelphusa dehaani* – IH *P. westermani*, *P. japonicum*,
 6. *Procambarus* – less important IH

- **Infection:** ingestion of crabs, crayfish;
- **Incubation:** 2-20 days; *Paragonimus pulmonalis*
- **Pathology and clinical symptoms:**
 - **In the acute phase** - without symptoms, or - abdominal pain, diarrhea, fever, weakness, cough, sweating; in perforated tissues - bleeding, inflammation; In the lungs are **encapsulated cysts** (1-2 cm), their development takes about 6 weeks ;
 - **In the chronic phase** - cysts with adult parasites, eggs and purulent fluid; the **cyst sheath perforates into bronchioles** and the **eggs are expectorated**; patients have a **taste of fish in their mouth**; **Granulomas** are formed around the cysts, the walls of the older cysts **sclerotize and calcify**.

Paragonimus westermani - pathology

Paragonimus pulmonalis
 parasitic cysts

Paragonimus westermani
Paragonimus miyazaki
 Migration in the pleural cavity,
 no cysts



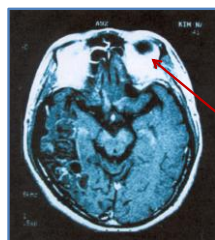
Paragonimus westermani - clinical signs



Cough, haemoptysis - similar to TBC

← adult fluke in the lungs 7 year old child

Paragonimus westermani – pathology ectopic localization in the brain

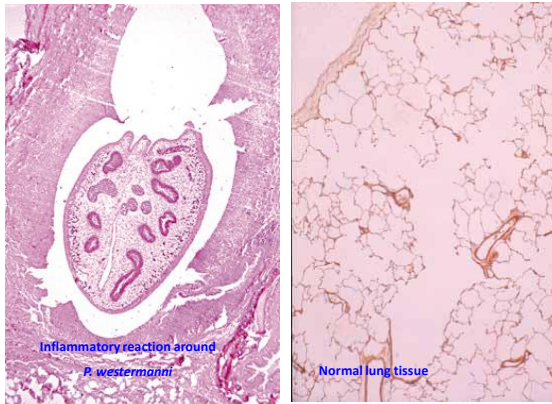


Chronic cerebral paragonimosis,
 localization in occipital lobe.



Paragonimus westermani

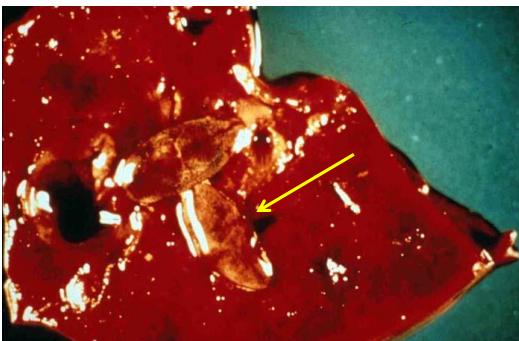
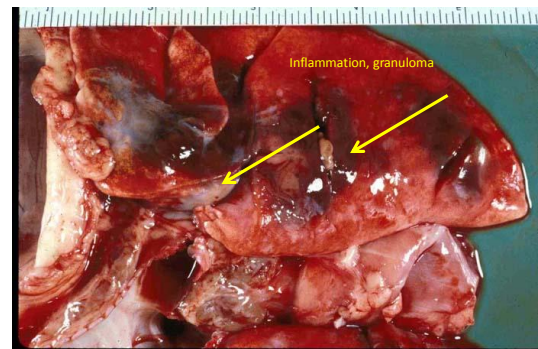
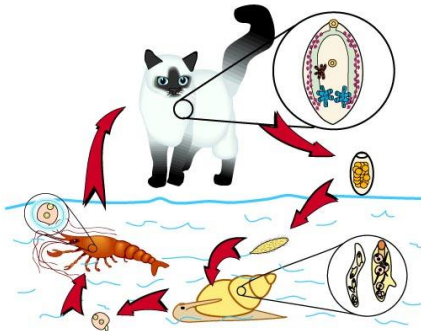
- **Pathogenesis:** adult flukes stimulate the **inflammatory response**, the **formation of granulomas**; Migration of fluke into the heart and brain will cause death ;
- **Signs:**
 - **Chronic cough**, difficulty breathing, sputum with blood or brownish streaks.
 - When **migrating to the brain**, it can cause blindness, paralysis, imbalance, and sudden onset of epilepsy.
- **Diagnosis:** finding eggs in sputum
- **Therapy:** praziquantel



Paragonimus kellicotti

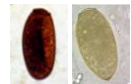


- FH: dog, cat, pig
- 1. IH – snail
- 2. IH – crayfish



Diagnosis

- Clinical signs: lethargy, chronic intermittent cough, "rusty" sputum.
- Coprological examination.
- Examination of sputum.
- Radiographs 3-4 four weeks after infection
- History/Anamnesis – Eating crayfish, crab, ...



Therapy

- Albendazole, fenbendazole – daily, for 1-3 weeks
- Praziquantel – 3 times a day, for three days

Prevention

- reduce the occurrence of snails
- Crayfish and Crab farms – Health check