

Class: Trematoda

Family: Paramphistomatidae

Genus : PARAMPHISTOMUM

Common name: Rumen flukes, Conical flukes

Species:

Paramphistomum cervi

Paramphistomum microbothrium

Paramphistomum ichikawai

Definitive hosts : Ruminants

Predilection site: : **Adult flukes** locate in rumen and reticulum
Immature flukes in the duodenum

Intermediate host: Snails of the genus *Planorbis* , *Bulinus*

Distribution: : Worldwide

It is seen in certain regions of our country

Morphology

Length 6-12 mm. Pink, conical rather than flat

Ventral sucker well visible and located subterminally

Life cycle outside the final host is similar to those of *F.hepatica* .

But intermediate hosts are different

In the final hosts:

Metacercariae release in duodenum.

They penetrate the intestinal wall by actively destroying the mucosa

Young parasites migrate from the duodenum and abomasum and settle in the rumen.

Duration of migration in the duodenum 6 weeks

Prepatent time 7-10 weeks

Pathogenesis and clinical signs:

1. Acute or intestinal paramphistomosis

Paramphistomiasis causes **enteritis** and **anaemia** in livestock mammals and result in substantial production and economic losses.

Pathological symptoms are produced by **immature flukes**. When the young flukes start to gather in the intestine, there is a **watery and fetid diarrhoea** which is often associated with high mortality (even up to 80-90%) in ruminants.

At a given time, as many as 30,000 flukes may accumulate, fervently attacking the duodenal mucosa to induce **acute enteritis**.

2. Chronic or rumen paramphistomosis

Adult flukes are relatively harmless.

Liver tissue are generally damaged extensively, indicated by swelling, haemorrhage, necrosis bile duct hyperplasia and fibrosis

Diagnosis:

In the acute period, pink-white colored young parasites in the size of rice grains are sought in diarrhea stools.

In the chronic period, eggs are searched in the stool by sedimentation technique.

Eggs are 90-160 micron in diameter, gray-white in color and have a operculum.

Treatment:

Active ingredient	Application	Dose (mg/kg)	
		Sheep, goats	Cattle
Niclosamide	oral	50-125	90
Niclopholan	oral	10-15	6-9
Closantel	oral i.m	10 5	15
Rafoxanide	oral	7.5-23	15-20
Resorantel	oral	65-75	
Oxyclozanide	oral	15-25	10
Bithionol	oral	75	35
Brotianide	oral	5.6-15	
Albendazole	oral	4.75-7.5	
Clixanide	oral		20
Hexachlorophene	oral	10-15	15-20
Hexachloroethane	oral	200-300	200-300
Hexachloroparaxylene	oral	150	125

Class: Trematoda

Family: Schistosomatidae

Genus :

SCHISTOSOMA

ORIENTOBILHARZIA

- 1-Adult parasites are found in the veins of the last hosts (mammals and poultry).
- 2-Not hermaphrodite, male and female parasites are separate.
- 3 Adult parasites have cylindrical bodies.
- 4 Eggs are capless and spinly.
- 5There is no metaserker period in their development.
- 6-Serker form is infective.
- 7-Serkers (furko serker) are fork-tailed and enter the last host by penetrating the skin or mucous membrane when taken orally.

Species	Definitive hosts	Predilection vein
<i>S. mansoni</i>	Man	Caudal mesenteric veins
<i>S. haematobium</i>	Man	Bladder veins, veins of uragenital system
<i>S. japonicum</i>	Man, domestic and wild animals	Portal and mesenteric veins
<i>S. bovis</i>	Ruminants	Portal and mesenteric veins
<i>S. matthei</i>	Domestic and wild ruminants	Portal and mesenteric veins
<i>S. nasale</i>	Ruminants, Horse	Veins of nasal mucosa
<i>S. mekongi</i>	Man, Dog	Mesenteric veins
<i>O. turkestanicum</i>	Mammal	Portal and mesenteric veins

Definitive hosts : Mammals and Poultry

Predilection site : **VEINS**

Intermediate host : Freshwater snails (*Planorbis* , *Bulinus*)

Distribution :

Orientobilharzia turkestanicum seen in sheep in Turkey

Morphology Separate sexual. Their bodies are cylindrical
Length 2 cm
Males are larger and flat than females.
Female every time is located in the male's ventral canal (Gynaechophoric channel)
Serkers are fork tailed (Furcoserker).
There are **no metaserker** periods.
Their eggs are spiny and without operculum
Eggs are capless and prickly.

Morphology

Separate sexual.

Their bodies are cylindrical.

Life cycle:

Schistosoma eggs are eliminated with feces or urine, depending on species

Under appropriate conditions the eggs hatch and release miracidia which swim and penetrate specific snail intermediate hosts

The stages in the snail include two generations of **sporocysts** and the production of **cercariae**

There is no REDIA period

Upon release from the snail, the infective cercariae swim, penetrate the skin of the human host and shed their forked tails, becoming schistosomulae

Life cycle:

The schistosomulae migrate via venous circulation to lungs, then to the heart, and then develop in the liver, exiting the liver via the portal vein system when mature,

Male and female adult worms copulate and reside in the mesenteric venules, the location of which varies by species (with some exceptions)

For instance, *S. japonicum* is more frequently found in the superior mesenteric veins draining the small intestine and *S. mansoni* occurs more often in the inferior mesenteric veins draining the large intestine

Pathogenesis:

- 1 **Invasion period:** Cercarial (Bath) Dermatitis occurs.

Secretions and cytolytic enzymes released by the Cercariae entering the skin, and especially the body antigens of the dying Cercariae cause local delayed type hypersensitivity in the skin.

Skin Itching, Redness, Papules and Pustules occur.

- 2 **Migration period:** It is the period in which the schistosomula migrate through the blood to the heart, lung, liver and portal system. Pneumonia may in the lungs.

3- Maturation period: This is the period in which schistosomules mature in the liver. Usually no symptoms are seen. Vascular occlusion may be seen.

4- Ovulation period: The most pathogenic period. The eggs tear the veins. Causes bleeding. Anemia occurs. Some eggs are kept in tissues (intestinal mucosa, liver) without leaving the host. It causes inflammation and fibrosis.

Diagnosis:

Eggs are 100 micron in diameter, without operculum and with spines.

Treatment

Drugs used in the treatment of schistosomatidosis		
Active ingredient	Route of administration	Dose (mg/kg)
Praziquantel	oral	15 –20
Triclorophon	oral	50 – 70 (4 - 6 times with 3 - 4 days interval)
Niridazole	oral	100 (3 days)
Neguvon	oral	100 – 120 (in goats)
Stibophen	oral	7.5 (6 days)
Hycanthon	i.m.	3

in man

Oxamniquine (Vansil) 12-15 mg/kg

Metrifonate (Bilarcil) 10 mg/kg/

Species: *Phagicola* (syn. *Ascocotyle*) *italica*

Definitive hosts : Cat, dog.

Location: Small intestine.

Prevalence: It is spread in East Asia and Balkans.

ALSO SEEN DOGS IN TURKEY

Family : Diplostomatidae

Species: *Alaria alata*, *Alaria americana*, *Alaria minnesotae*, *Alaria canis*, *Alaria michiganensis*, *Alaria marciana*

Definitive hosts : domestic carnivores (dog, cat), wild carnivores (raccoon, poppy, red fox, badger) and human.

Location: Small intestine.

Prevalence: North America and Eastern Europe.

Alata alata were observed in foxes and dogs in Turkey

Intermediate hosts: First intermediate mansions are water slugs, second intermediate mans frogs.

Morphological characteristics: Adult parasites are 2-6 mm long.

body consists of two different parts. Front parts in wing shape and mouth shoot. Two tentacles at the front side corners similar protrusion.

The rear part is short and cylindrical and carries a short intestine

Family : Nanophyetidae

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

Definitive hosts : Dogs, mink and other fish-eating mammals. Rarely human.

Location: Small intestine.

Intermediate hosts: The first intermediate hosts are water slugs, the second intermediate hosts are fish.

Prevalence: Occurs in America and Russia. **Pathogenicity and clinical**

symptoms: The parasite itself has no significant pathogenicity. However, this parasite is the vector of the Rickettsia *Neorickettsia helminthoeca*.

This leads to lethal “salmon fish poisoning” characterized by growth of lymph nodes and a hemorrhagic enteritis in Rickettsia dogs. Therefore, it is important for veterinary medicine.

Family : Paragonimidae

Species: *Paragonimus westermanii*, *P. kellicotti*, *P. ohirai*,
P. miyazakii, *P. africanus*, *P. mexicanus*

Definitive hosts : *Paragonimus westermanii*; human, cat, dog, tiger, leopard, panther, pig, beaver and marten, *P. kellicotti*; mink, other species are seen in domestic and wild carnivores.

Location: Lung, rarely brain and spinal cord.

Intermediate hosts: The first intermediate hosts are freshwater slugs, the second intermediate hosts are crayfish and freshwater crabs.

Pathogenicity and clinical symptoms: Bronchitis occurs in infected animals. Clinically, cough occurs.

Family: TROGLOTREMATIDAE

Species: *Troglotrema acutum*

Definitive hosts : Fox, mink

Location: Frontal sinuses

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)
Levamisole	oral	100 (in cats)
Epsiprantel	oral	2-8
Nitroscanate	oral	100
Hexachlorophene	oral	20

Family : Echinostomatidae

Species: *Echinochasmus perfoliatus*

Definitive hosts : Dogs, cats, foxes and pigs. **Location**: Small intestine.

Intermediate hosts: Uses two intermediate hosts. The first intermediate host is freshwater slugs, the second intermediate host is freshwater fish.

Prevalence: It is seen in various countries of the world. These species have been found in dogs in Turkey.

Species: *Echinostoma revolutum*, *E. paraulum*, *E. columbae*

Definitive hosts : Domestic and wild birds and mammals, including humans.

Location: They are found in cloaca and secum of poultry, rectum, secum and small intestine of mammals.

Intermediate hosts: Freshwater slugs of the genus *Helisoma*, *Planorbis*, *Lymnea* and *Fossaria*. Sometimes the same snail or frog cubs may be the second intermediate host

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The most characteristic feature of the parasite is a collar of 37 spines around the mouth region.

Pathogenicity and clinical symptoms: Echinostomatidae family 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, bloody diarrhea and weakness are seen with hemorrhagic enteritis.

Their eggs are 90-126 X 59-71 μm in diameter.

Family : PROSTHOGONIMIDAE

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

Definitive hosts : Domestic and wild birds.

Location: Bursa fabricius, oviduct and cloaca.

Intermediate hosts: The first intermediate hosts are water slugs, the second intermediate hosts are female insects.

Pathogenicity and clinical symptoms: Oviduk is the most pathogenic species of *Prosthogonimus* species. As a result of acute inflammation caused by parasites oviduk, the egg can not take its normal form. The shell of the eggs either does not form at all or becomes thin. As a result, there is a decrease in egg production. The yolks, albumin, bacteria and parasites of the eggs that are broken down in the body due to the opposite peristaltic which occur as a result of irritation are poured into the peritoneal cavity. This causes acute peritonitis, resulting in death.

Because of the milk-like liquid from the cloak, the hairs around the cloak are stuck together

Family: NOTOCOTYLIDAE

Species: Notocotylus attenuatus

Definitive hosts : Chicken, duck, goose and wild waterfowl. **Location:** Secum and rectum.

Intermediate hosts: Freshwater slug.

Prevalence: It is seen in different countries of the world. This species has been found in geese and ducks in Turkey. **Pathogenicity and clinical symptoms:**

Species in this family generally present a mild disease. In severe infections, weaknesses in their hosts, diarrhea, erosion of the mucosa and catarrhal enteritis occur.

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)