

Helminths

Nematodes (roundworm)

- *geohelminths*
- *Strongyloides*

Cestodes (tapeworm)

- *Taenia*
- *Echinococcus*

Trematodes (flukes)

- *Schistosoma*
- *Food born trematodes*

CLINICAL REVIEW

Manifestation, diagnosis, and management of foodborne trematodiasis

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Box 1 Foodborne trematode species of public health importance

Liver flukes

- Clonorchis sinensis*
- Opisthorchis felineus*
- O viverrini*
- Fasciola gigantica*
- F hepatica*

Lung flukes

- Paragonimus spp*

Intestinal flukes

- Echinostoma spp*
- Fasciolopsis buski*
- Gymnophalloides seoi*
- Haplorchis spp*
- Heterophyes spp*
- Metagonimus spp*



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Fish
again??



Food-borne trematode infections: >100 species infect humans

Table 2 Habitat, infection sources, number and infections, population at risk, and treatment of choice of major food-borne trematodes and their underlying diseases

Species	Habitat	Source of infection	Number of infections (10 ⁶) ^a	At-risk population (10 ⁶) ^a	Treatment (dose)
<i>Clonorchis sinensis</i>	Liver	Freshwater fish	601	601	Praziquantel (3 × 25 mg/kg for 2 days or single dose of 40 mg/kg)
<i>Opisthorchis</i> spp.	Liver	Freshwater fish	112	79.8	Praziquantel (3 × 25 mg/kg for 2 days or single dose of 40 mg/kg)
<i>Paragonimus</i> spp.	Lung	Freshwater crabs, crayfish, wild boar meat	20.7	292.8	Praziquantel (3 × 25 mg/kg for 2 days)
Echinostomatidae	Intestine	Freshwater fish, frogs, mussels, snails, tadpoles	Not known	Not known	Praziquantel (single dose of 25 mg/kg)
<i>Gymnophalloides seoi</i>	Intestine	Oysters	Not known	Not known	Praziquantel (single dose of 10 mg/kg)
Heterophyidae	Intestine	Freshwater fish	Not known	Not known	Praziquantel (single dose of 25 mg/kg)
<i>Fasciola</i> spp.	Liver	Freshwater vegetables, contaminated water	2.4-17	2.4-17	<u>Triclabendazole (single dose of 10 mg/kg or 20 mg/kg in two split doses within 12-24 h)</u>

^aBased on data from references [1, 2]

Current status of food-borne trematode infections

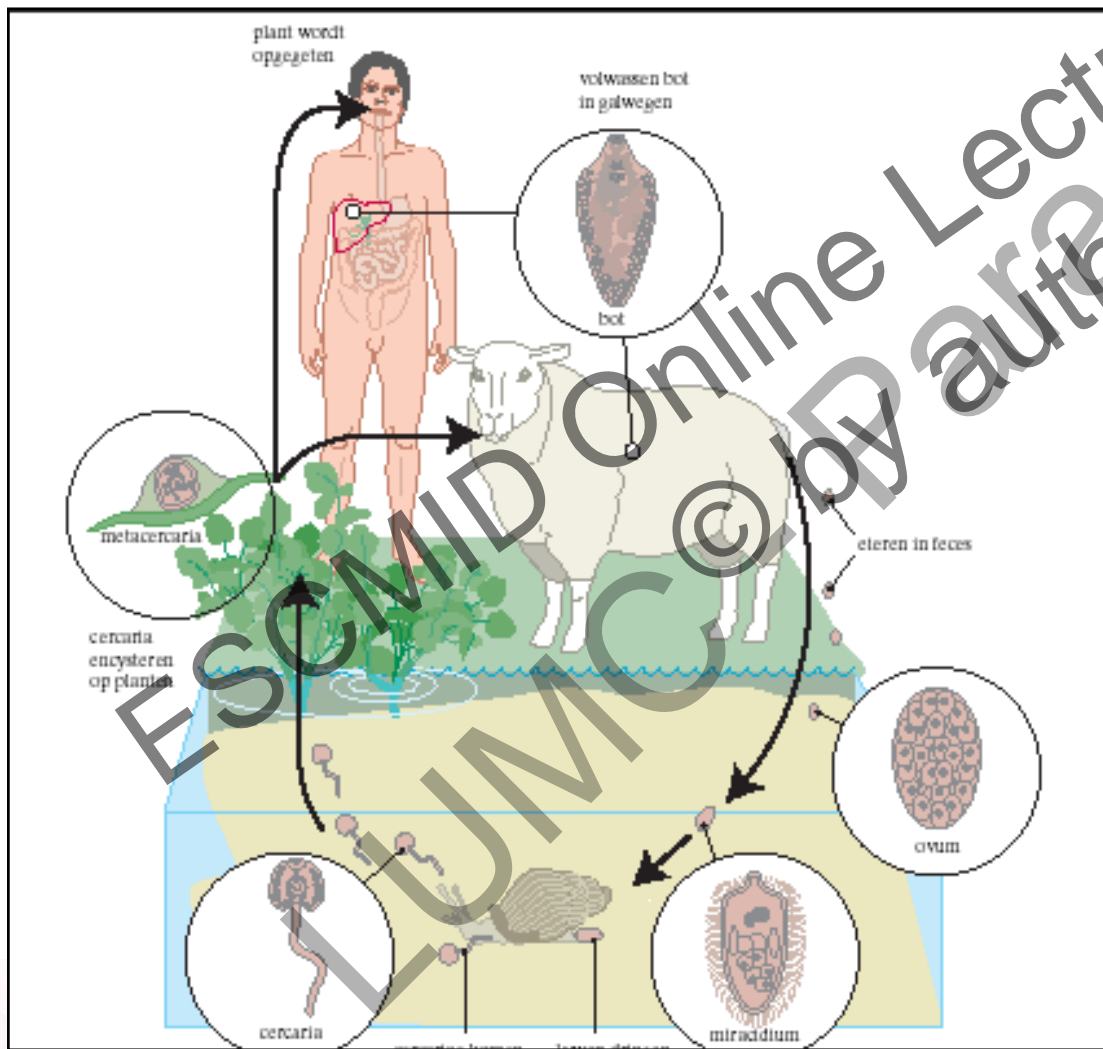
R. Toledo · J. G. Esteban · B. Fried

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Fasciola hepatica



(& *Fasciola hepatica*)

- Abdominal pain, (fever)
- Eosinophilia!!!

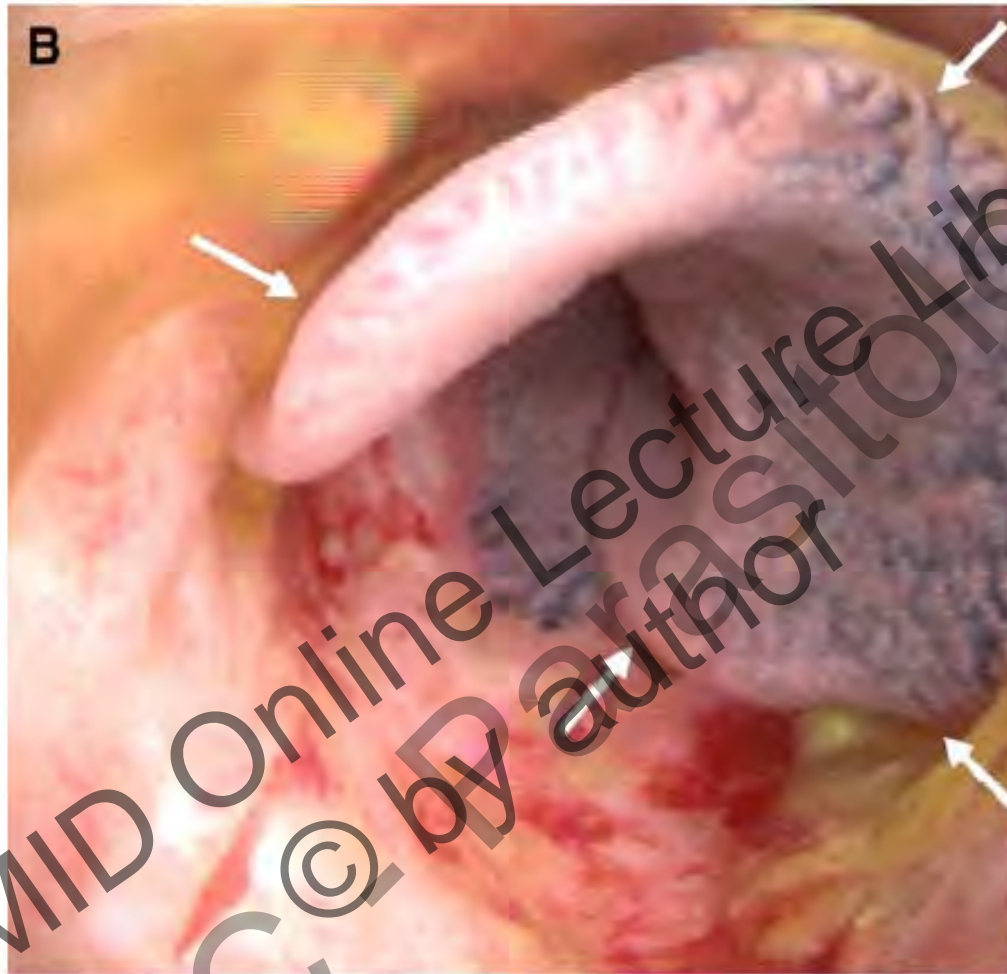
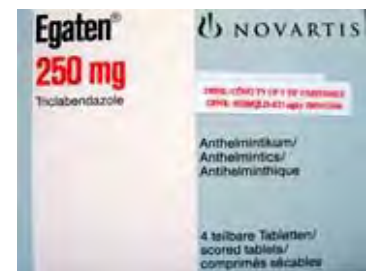
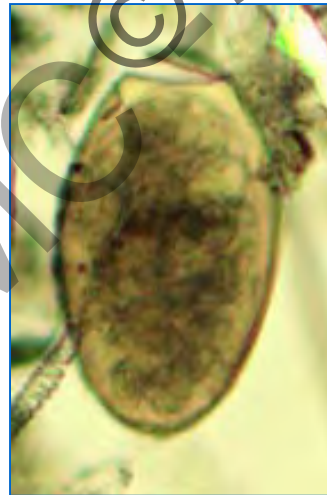


Fig. 18. A 69-year-old man with biliary fascioliasis. **A** Endoscopic retrograde cholangiogram shows several elliptical filling defects in the distal common bile duct representing adult flukes of *F. hepatica* (arrows). **B** Endoscopic view of an adult *F. hepatica* in the distal common bile duct (arrows). (Courtesy of Jae Ho Byun, MD, Department of Radiology, Asan Medical Center, Seoul, Korea).

Lim et al., 2007

Fasciola hepatica

- 2-17 milj. Infected, worldwide
- Cattle (NL), mainly import infections
- Low egg excretion
- Passage – spurious infections
- Large eggs, operculum
- Triclabendazol (not PZQ)

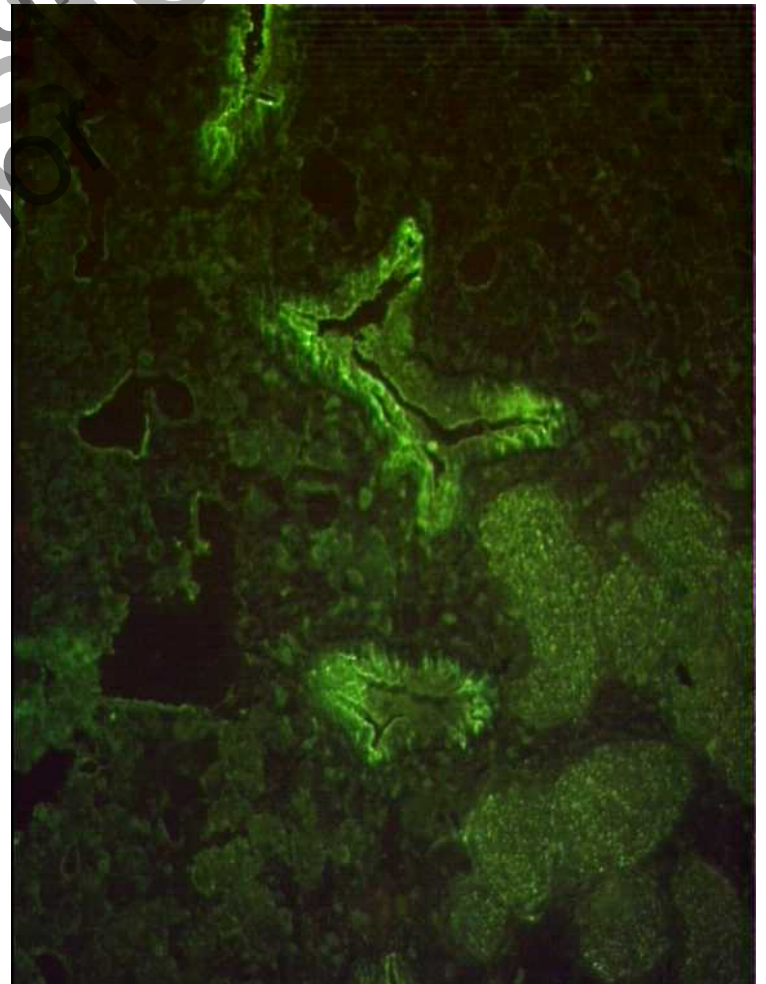


Serology *Fasciola*

- Early diagnosis
- Higher sensitivity compared to microscopy
- Ruling out "pseudofascioliasis"
- Follow-up after treatment

- Different tests available
- LUMC: in-house serology (ELISA, IFA)
- ELISA: IgG ES-antigen

- \pm 40- 65 requests/year
- < 1 positive/year

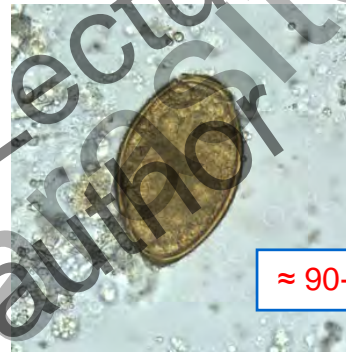


Other trematodes

Paragonimus (via crustaceans such as a crab or crayfish)

- >30 species
- sputum
- operculum small

<http://www.cdc.gov/dpdx/paragonimiasis/index.html>



≈ 90-55 μm

Clonorchis (oriental liver fluke, via fresh water fish))

- Small eggs, convex operculum, "shoulders"
- <http://www.cdc.gov/dpdx/clonorchiasis/index.html>
- *Opisthorchis* + many others



≈ 30-15 μm

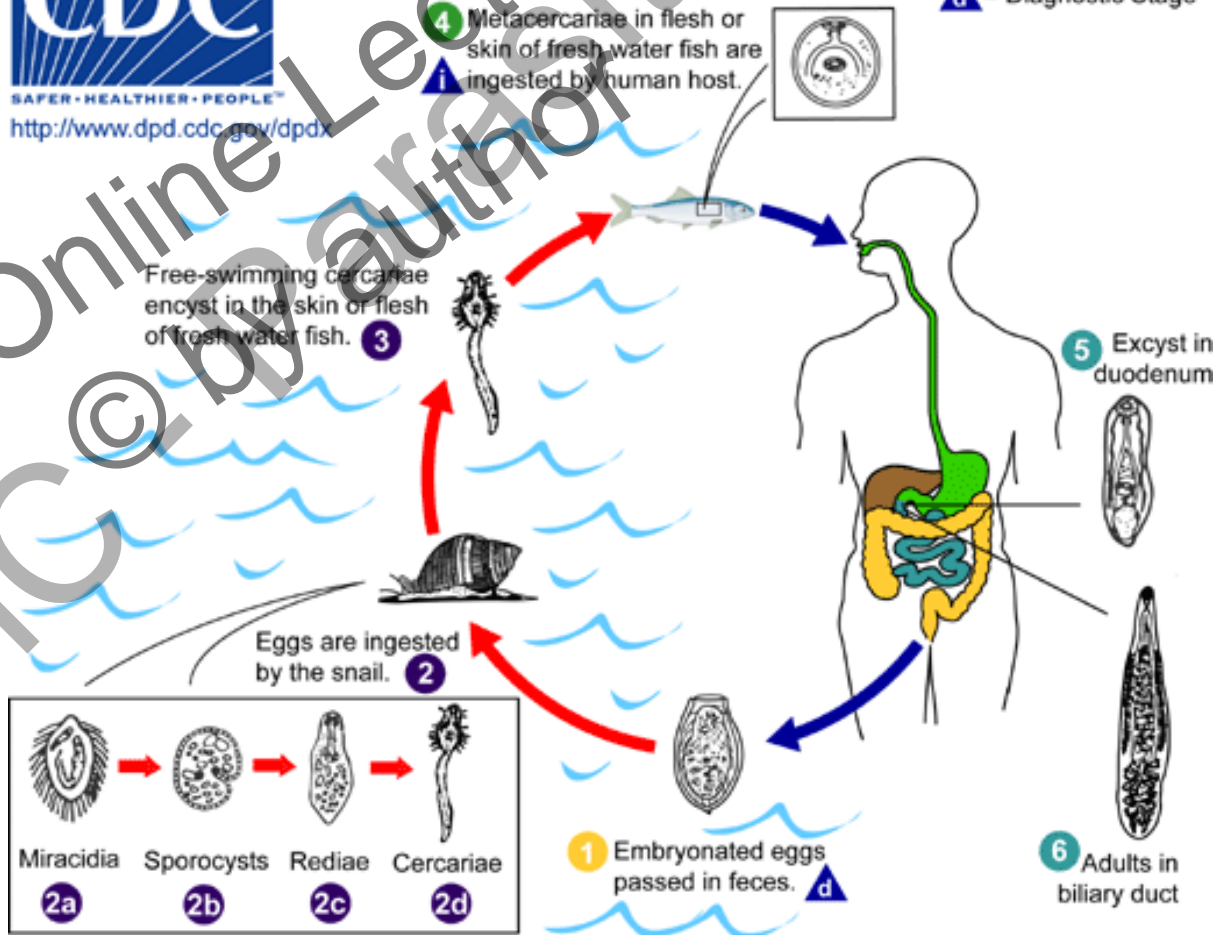
Cross reaction in Fasciola serology????

Opisthorchis felineus / O. viverrini

<http://www.cdc.gov/dpdx/opisthorchiasis/index.html>



i = Infective Stage
d = Diagnostic Stage



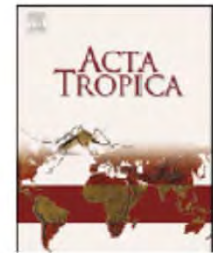


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Review

Opisthorchis felineus, an emerging infection in Italy and its implication for the European Union

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Foodborne Trematodiasis and *Opisthorchis felineus* Acquired in Italy

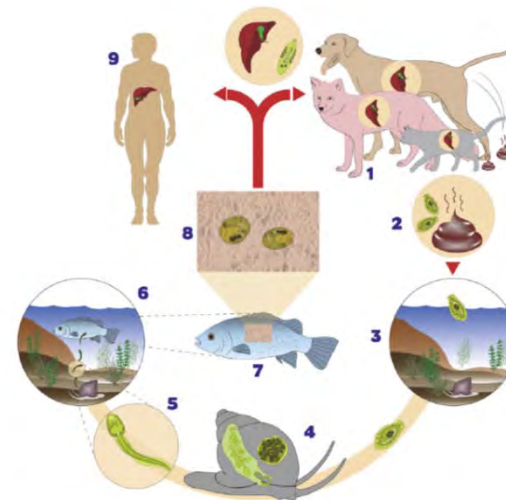


Fig. 4. Natural life cycle of *Opisthorchis felineus* in the Europe Union. Fish-eating mammals (final host) harbouring adult worms in the bile ducts (1) shed the parasite eggs (10–22 µm × 22–35 µm) with faeces (2); faecal samples containing the eggs can contaminate freshwater lakes (3) where snails of the genus *Bithynia* live (first intermediate host); eggs are ingested by snails in which the larval stage, miracidium, develops to a sporocyst, from which the redial stages (4) escape and migrate to the hepatopancreas, where they mature and give birth to cercariae (5); cercariae leave the snail host during the day and actively find a fish of the family Cyprinidae (second intermediate host); when cercariae reach a suitable fish, they attach themselves and enter the fish (6); after they penetrate the fish muscles, cercariae produce a cyst wall and develop to the infective stage, metacercaria (7), in a few weeks; when humans (or other final hosts) ingest raw fish, the young trematode escapes from the metacercarial cyst and migrates through the common bile duct into the bile duct and gall bladder, where it develops into an adult (9).