**Paragonimus kellicotti**  
**Lung Fluke**

A. Morphology
- Oval, thick, lung flukes.
- Ventral sucker located mid-ventral.
- Lobed Opposite Testes Posterior, Lobed Ovary lateral to mid-ventral genital pore.

B. Life Cycle
1. Dogs, cats, pigs, raccoons, mink, muskrats, bobcats
2. Stream / River snails.
3. Crayfish
4. Adult flukes pair-up in cyst in lung parenchyma w/ bronchiole connections.
- Prepatent period: about 4 week

C. Geographic Distribution
- Throughout North America
- Found in North Carolina

D. Pathology
- Bronchiolar inflammation and eosinophilic granulomas in the lung parenchyma.
- Rarely, Acute Pneumothorax and sudden Death

E. Diagnosis
- Clinical signs: lethargy, chronic intermittent cough, "rusty" sputum or mucus.
- Fecal Sedimentation
- Sputum Smear
- Thoracic radiographs 3-4 four weeks post-infection
- History of possible access to crayfish.

F. Treatment
1. Albendazole or Fenbendazole
   - Daily for 1-3 weeks
2. Praziquantel
   - 3 times a day for 3 days

G. Control
1. Snail Control
   - Molluscicides: check government restrictions
2. Environmental Control
   - Restrict access to crayfish (streams, creeks, rivers)

H. Zoonosis: Has been reported.

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**Nanophyetus salmincola**  
**Vector for Salmon Poisoning**  
A. Morphology  
- Minute intestinal flukes.  
- Ventral sucker located mid-ventral.  
- Oval, Opposite, Posterior Testes; Spherical Ovary Anterior to Testes.  
B. Life Cycle  
1. Dogs, cats. Fox, Coyote, raccoon, opossum, otter, mink, lynx, etc.  
2. Stream / River snails  
3. Salmon, Trout, etc.  
4. Flukes mature in the small intestine.  
- Prepatent period: 5 to 8 days  
C. Geographic Distribution ---- Only in the Pacific Northwest (northern CA, OR, WA)  
D. Pathology  
1. Flukes alone -- No Pathology to minor enteritis.  
2. Flukes carrying the rickettsia, *Neorickettsia helminthoeca*  
   - "Salmon Poisoning"  
   - Severe pathology (50% to 90% mortality)  
   - Only affects canids (dogs, fox, coyote, wolves)  
   - 5 to 7 day incubation period  
   - Sudden onset of fever & loss of appetite.  
   - Later hemorrhagic enteritis with ocular discharge, profuse diarrhea, marked vomiting, swelling of lymph nodes.  
   - Those that recover are immune for life.  
E. Diagnosis  
1. Fluke infection: Ova in feces.  
2. Salmon Poisoning:  
   - Clinical signs (diarrhea, vomiting, ocular discharge, etc.)  
   - Demonstration of rickettsia in lymph node or splenic aspirate.  
   - History of possible access to raw salmon or trout.  
F. Treatment  
1. Fluke infection: Injectable Praziquantel.  
2. Salmon Poisoning: Broad Spectrum Antibiotics  
G. Control ---- Prevent access to raw fish (streams, creeks, rivers), when in Northwest US  
H. Zoonosis  
1. Fluke Infection: YES  
2. Salmon Poisoning: NO  

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**Acanthatrium oregonense**  
**Vector for Potomac Horse fever**  
A. Life Cycle  
1. Bats (small intestine)  
2. Stream snails  
3. Caddisflies & Mayflies  
B. Pathology  
1. Horse (dead-end host)  
   - Potomac Horse Fever  
   - *Neorickettsia risticii* — in tissue of fluke  
   - Colitis — diarrhea, fever, depression  
2. Accidentally ingest caddisflies or mayflies infected w/ fluke larvae that are infected w/ *N. risticii*  

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109
**Platynosomum fastosum**

**Feline Liver Fluke**

**Agent of “Lizard Poisoning”**

A. **Morphology**
   1. Translucent, elongate flukes.
   2. Ventral sucker in anterior half of body.
   3. Lobed Opposite Testes Posterior to the Ventral sucker, Lobed Ovary posterior to testes.

B. **Life Cycle**
   1. Cats (bile ducts) & opossum
   2. Ova passed in the feces.
   3. Miracidia develops in ova
      7. 3rd IH or Paratenic hosts ??
      • Anoles, skinks, toads
   4. Ova ingested by snail host
   5. Terrestrial snails
   6. Cercaria released in “slime balls” ingested by 2nd Intermediate host
      • Terrestrial Isopods (Rolly-polly bugs)
      • Metacercaria
   8. Flukes mature in the bile ducts.
      • Prepatent period: 8 to 12 weeks

C. **Geographic Distribution**
   1. Florida & Hawaii
   2. Caribbean, South America, Central America, Malaysia, Korea, West Africa

D. **Pathology**
   1. Does not normally cause pathology
   2. May cause mild, temporary in-appetence with hepatic dysfunction
   3. The rare severe cases cause progressive icterus and possibly death. ("lizard poisoning")

E. **Diagnosis**
   1. Clinical signs: diarrhea, vomiting (possibly continuous in severe terminal stages).
   2. Fecal Sedimentation
   3. History of possible access to lizards or toads.

F. **Treatment**
   1. Albendazole or Praziquantel.
   2. Surgical removal has also been suggested.

G. **Control**
   1. Environmental Control
      • Restrict access to lizards or toads (especially when in endemic areas like Florida)

H. **Zoonosis** ---- None

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**Eurytrema (Concinnum) procyonis**

**Raccoon Pancreatic Fluke**

A. **Morphology**
   1. Translucent, elongate pancreatic duct flukes.
   2. Ventral sucker in anterior half of body.
   3. Lobed Opposite Testes Posterior to the Ventral sucker, Lobed Ovary posterior to testes.

B. **Life Cycle**
   • Raccoons, Fox, Cats (Pancreatic duct)
   • Terrestrial snail
   • Grasshopper
   • New York, Connecticut, Maryland, Kentucky, North Carolina

C. **Pathology** --- Pancreatic duct fibrosis & Pancreatic atrophy

D. **Diagnosis**
   1. Vomiting & chronic weight loss
   2. Ova in sedimentation

E. **Treatment** ---- Six day course of Fenbendazole is suggested

F. **Control** ---- Restrict outdoor access

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110
**Heterobilharzia americana**

**Canine Blood Fluke**

A. **Morphology**
   - **Dioecious**, elongate blood flukes.
   - Female resides in the gynecophoric canal of the male

B. **Life Cycle**
   1. **Definitive Hosts**
      - Dogs (mesenteric veins)
      - Raccoons, wild canids, bobcat, nutria, etc.
   2. Ova with miracidia passed in the feces.
   3. Ova hatch immediately upon entering water
   4. Miracidiae swim to infect aquatic snail
   5. **Molluscan 1st Intermediate Host**
      - Aquatic snails (Pond / puddle / ditch)
      - Sporocysts
   6. **Cercaria penetrate definitive host**
   7. Young Flukes or Schistosomula
      - Flukes migrate to the mesenteric vessels to mature.
   8. Prepatent period: 68 days

C. **Geographic Distribution**
   1. Texas, other Gulf Coast States, Georgia, South Carolina & North Carolina
   2. North Carolina: sporadic throughout

D. **Pathology**
   1. **Adults** ---- Minor to no pathology.
   2. **Ova**
      - Lodge in mesenteric venules & transported to other organs.
      - Granulomatous reaction
      - Destruction & fibrosis of intestinal mucosa.
      - Intestinal dysfunction that leads to wasting and death.

E. **Diagnosis**
   1. Fecal sedimentation or smear.
   2. Miracidial Hatching
   3. Fecal PCR test @ Texas A&M
   5. Laparotomy
   6. History of possible access to water (streams, ponds, etc.).
   7. Water Loving Breed

F. **Treatment**
   1. Fenbendazole: repeat treatments.
   2. Praziquantel: 5 times the dose for treatment of tapeworms.

G. **Control** --- Prevent access to bodies of water (streams, creeks, rivers, ditches)

H. **Zoonosis** --- "Swamp itch" or "swimmer's itch"