**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, Mink, Muskrats (lungs)
   2. Ova passed in the lung mucus & sputum, swallowed then passed in the feces.
   3. Pomatiopsid lotic snails.
   4. Crayfish
   5. Young Flukes
      - Young flukes migrate from intestine through the peritoneal cavity and across the diaphragm.
      - 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 (dogs, cats, mink, raccoons, bob cats)

D. Pathology
   - Bronchiolar inflammation and eosinophilic granulomas in the lung parenchyma.
   - 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. Lotic snails (stream / river)  
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)  
   - 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: Potomac Horse Fever  
   - *Neorickettsia risticii* — in tissue of fluke  
   - Colitis — diarrhea, fever, depression  
2. Accidental ingestion of caddisflies or mayflies infected with fluke metacercariae that is infected with *N. risticii*
**Platysonomum 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 (Domestic & Wild) (bile ducts) & opossum  
2. Ova passed in the feces.  
3. Miracidia develops in ova  
4. Ova ingested by snail host  
5. Terrestrial snails  
6. Cercaria released in “slime balls” ingested by 2nd Intermediate host  
7. 3rd IH or Paratenic hosts ??  
8. Flukes mature in the bile ducts.  
   - Terrestrial Isopods (Rolly-polly bugs)  
   - Anoles, skinks, toads  
   - Metacercaria  
   - 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**
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. Miracidia
   4. Molluscan 1st Intermediate Host
      • Aquatic snails (Pond / puddle / ditch)
      • Sporocysts
   5. **Cercaria penetrate definitive host**
   6. Young Flukes or Schistosomula
      • Flukes migrate to the mesenteric vessels to mature.
   7. 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"

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