TREMATODE

Lung fluke

Liver fluke

BENJAWAN PITASAWAT
Helminths

1. Roundworm (Nematode)

2. Flatworm
   2.1 Trematode (Fluke)
   2.2 Cestode (Tapeworm)

3. Acanthocephala
   (A spiny-headed worm)
1. Lung fluke
2. Liver fluke
3. Intestinal fluke
4. Blood fluke

Habitat (Organ of host)
- Lung tissue
- Liver
- Intestines
- Veins
OBJECTIVES

To describe 4 groups of trematodes of medical importance in Thailand: Lung, liver, intestinal and blood flukes

To explain in more details of lung fluke & liver fluke
  - Morphology & Habitat in host
  - Life cycle
  - Pathology
  - Transmission
  - Diagnosis
  - Treatment
  - Prevention & Control
หนังสือและตำรา


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Welcome to Chiang Mai Parasite Homepage! This site has been selected by ISI for inclusion in Current Web Contents.

- Founded in 1970, now the department consists of 16 teaching staffs, 4 academic assistants, 1 permanent employee and 4 temporary employees in the department. The primary responsibility is teaching medical parasitology to medical and health science students.

- Major fields of research include immunology and molecular biology of parasites, epidemiology of parasitic infections, mosquito ecology, mosquito genetics and mosquito taxonomy. Many publications have been made.

The department also offers a short-course training program in Medical Parasitology for foreign scientists upon request.

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http://www.med.cmu.ac.th/dept/parasite/default.htm
General characteristics

- Leaf shape & Non–segmented body
- Dorso–ventrally flattened
- Varied sizes (0.6 mm–75 mm)
- Attachment organs: Suckers
  I. Oral sucker
  II. Ventral sucker *(Acetabulum)*
  III. Genital sucker *(Gonotyl)*

- No body cavity
General system

• Integument system
  : Smooth & Spine

• Alimentary system
  : Incomplete (No anus)

• Excretory system
  : Excretion & Osmoregulation

• Nervous system
  : Bilateral symmetry (Ganglia + Nerve)

• Reproductive system
  : Hermaphrodite ( )
General system

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Integument system

No special respiratory organ
General system

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General system

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  : Smooth & Spine
- Alimentary system
  : Incomplete (No anus)
- Excretory system
  : Flame cells (Bilateral symmetry)
- Nervous system
  : Ganglia + Nerve trunks + Transverse commissures
- Reproductive system
  : Hermaphrodite ( )

Nervous system

- Ganglia : 1 pair
- Nerve trunks : 3 pairs
- Simple & Bilateral symmetry
General system

• Integument system
  : Smooth & Spine

• Alimentary system
  : Incomplete (No anus)

• Excretory system
  : Flame cells (Bilateral symmetry)

• Nervous system
  : Ganglia + Nerve trunks + Tranverse commissures

• Reproductive system
  : Hermaphrodite (♂ + ♀)

Reproductive system

กะเทย = Blood fluke (Separated sex)
General system

• Integument system
  : Smooth & Spine

• Alimentary system
  : Incomplete (No anus)

• Excretory system
  : Flame cells (Bilateral symmetry)

• Nervous system
  : Ganglia + Nerve trunks + Tranverse commissures

• Reproductive system
  : Hermaphrodite (♂ + ♀)
General system

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  : Smooth & Spine

• Alimentary system
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• Nervous system
  : Ganglia + Nerve trunks + Tranverse commissures

• Reproductive system
  : Hermaphrodite (♂ + ♀)

Reproductive system

Genital pore

Uterus

Ovary

Vitellaria

Ovary shape:

♀
Reproductive system

- Genital pore

General system

- Integument system
  - Smooth & Spine

- Alimentary system
  - Incomplete (No anus)

- Excretory system
  - Flame cells (Bilateral symmetry)

- Nervous system
  - Ganglia + Nerve trunks + Tranverse commissures

- Reproductive system
  - Hermaphrodite (♂ + ♀)

Fertilization: Ootype
(Sperm + Egg)
General system

- Integument system
  : Smooth & Spine
- Alimentary system
  : Incomplete (No anus)
- Excretory system
  : Flame cells (Bilateral symmetry)
- Nervous system
  : Ganglia + Nerve trunks + Tranverse commissures
- Reproductive system
  : Hermaphrodite (♂ + ♀)

Reproductive system

- Reproductions
  - Adult: Sexual (Self & Cross fertilization)
  - Immatures: Asexual
Developmental stages of fluke

- Adult
- Egg
- Immatures
  - Miracidium
  - Sporocyst
  - Redia
  - Cercaria
  - Metacercaria (Infective stage)

Definitive host
Life cycle of fluke: Complex

Definitive host
Mammals, Rodents, Avians

1st Intermediate host
Egg (Miracidium)
Miracidium
24 hr

2nd Intermediate host
Sporocyst I,II
Redia I,II
Cercaria

Lung, Liver, Intestinal flukes
Crayfish, Snail, Crab, Fish, Water plant

Metacercaria

Cercariae
1. Lung fluke
2. Liver fluke
3. Intestinal fluke
4. Blood fluke
Lung flukes

Genus *Paragonimus*

- *Paragonimus heterotremus*
- *P. westermani*
- *P. bangkokensis*
- *P. harinasutai*
- *P. macrorchis*
- *P. siamensis*
Lung fluke infecting humans in Thailand

Paragonimus westermani

Paragonimus heterotremus
Lung flukes

Distribution: Asia

- Thailand
- Laos
- China
Morphology of adult

- Large size (6-8 x 11-14 mm)
- Thick body
- Coffee bean-shaped
- Tegument with scale-like spines
- Intestinal tracts: 2
- Branched testes: 2
- Branched ovary: 1
- Coiled uterus: 1
- Vitellaria: Branched follicles (2 lateral fields)
Morphology of *Paragonimus* egg

- **Large size** (77-80 x 40-55 µm)
- Oval shape
- Thick, golden brown eggshell
- Big operculum
- Thickened operculum rims (Shoulders)
- Unembryonated egg

“ไข่ใหญ่ กลมรี สีทอง เปลือกหนา ฝำใหญ่ ไหล่กว้าง”
Paragonimus spp. eggs
Paragonimus heterotremus

Life cycle

- **Definitive host:** Mammals (Human, Cat, Dog)
- **Habitat in definitive host:** Lung tissue
- **1st Intermediate host:** Freshwater snail
- **2nd Intermediate host:** Freshwater crab (Mountain, Waterfall, Rice-field crabs) & Crayfish
- **Infective stage:** Metacercaria
1st Intermediate host

Freshwater snails: *Thiara* spp.
2\textsuperscript{nd} Intermediate host
(Freshwater crab & crayfish)
Inadequately cooked food: Freshwater crab & crayfish

Papaya salad

Crayfish salad
Paragonimus heterotremus

- **Disease:** Paragonimiasis (Lung fluke disease)
- **Transmission:** By eating raw or uncooked infected crab & crayfish
- **Sign & Symptom:** Cough, Chest pain, Bronchitis, Hemoptysis
- **Diagnosis:** Finding ova in sputum, aspirated pleural effusion, feces
- **Treatment:** Praziquantel (25 mg/kg: 3 times daily for 2 days)
- **Prevention:** Avoiding eating raw or uncooked crab & crayfish
Paragonimus eggs

Blood-stained sputum: Rusty brown flecks of materials
Liver fluke

I. Family Opisthorchiidae
II. Family Dicrocoeliidae
III. Family Fasciolidae
Liver fluke

Family: Opisthorchiidae
- C. sinensis
- O. felineus
- O. viverrini

Dicrocoeliidae
- E. pancreaticum
- D. dendriticum

Fascioliidae
- F. gigantica
- F. hepatica

Thailand: The most important liver fluke infecting human

Opisthorchis viverrini
Liver flukes

Distribution: Southeast Asia

- Thailand (North & Northeast)
- Laos
- Cambodia

Opisthorchis viverrini
Morphology of adult

- **Small size** (2-3 x 5-10 mm)
- Flat and elongate body
- Lancet-shaped
- Smooth integument
- Intestinal tracts: 2
- Lobed testes: 2
- Lobed ovary: 1
- Uterus: A long coiled tubule
- Vitellaria: Transverse follicles (Middle portion)
Opisthorchis viverrini

Living worms: Lancet shape & Transparent yellowish color
Morphology of *O. viverrini* egg

- Small size (11-22 x 22-32 µm)
- Elongate ovoid in shape
- Light yellowish-brown eggshell
- Operculum with shoulders
- Prominent knob (Posterior end)
- Embryonated egg
Opisthorchis viverrini eggs
Opisthorchis viverrini

Life cycle

- Definitive host: Mammals (Human, Cat, Dog)
- Habitat in definitive host: Bile ducts of liver
- 1st Intermediate host: Freshwater snail
- 2nd Intermediate host: Freshwater fish
- Infective stage: Metacercaria
1st Intermediate host

Freshwater snails: *Bithynia* spp.
2\textsuperscript{nd} Intermediate host

Freshwater fish: Cyprinoid group

“ปลาหน้าจิ้ตมีเกล็ด”
Inadequately cooked food: Freshwater fish

Fermented fish

ปลาร้า: Pla-ra

ปลาส้ม: Pla-som
Opisthorchis viverrini

- **Disease:** Opisthorchiasis (Liver fluke disease)
- **Transmission:** By eating raw & uncooked infected freshwater fish
- **Sign & Symptom:**
  - Mild to moderate infections: Asymptomatic & Few symptoms
  - Heavy infections:
    - Acute: Abdominal pain, Diarrhea, Anorexia, Malaise
    - Chronic: Hepatomegaly, Obstructive jaundice, Cholangitis, Pancreatitis, Cirrhosis, Cholangiocarcinoma
- **Diagnosis:** Finding ova in feces (Stool examination)
- **Treatment:** Praziquantel (25 mg/kg: 3 times daily for 1-2 days)
- **Prevention:** Avoiding eating raw & uncooked freshwater fish