Bioedical Parasitology

CESTODES

Prof. Peter O'DONOGHUE

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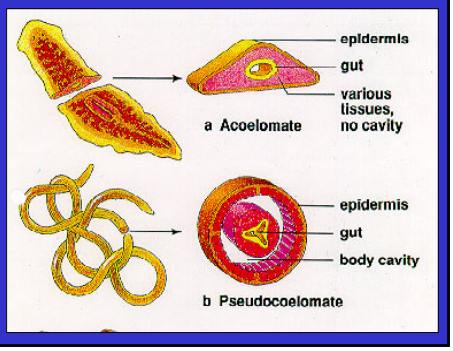
HELMINTHS (worms)

Flatworms

Roundworms



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Platyhelminths (flatworms)

CESTODES (tapeworms)

TREMATODES (flukes)

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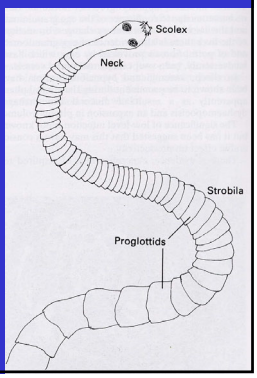
Cestodes

Morphological characteristics

- scolex (head) for attachment, not feeding
- strobila = the tape (segments/proglottids)
- gut lacking in all stages
- hermaphroditic (male and female organs)



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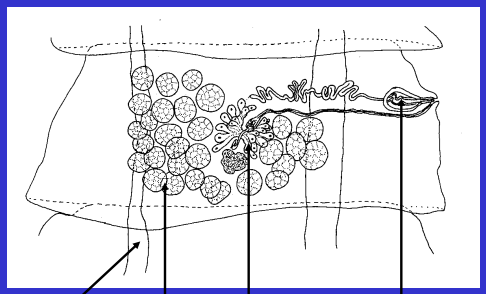
Typical segment



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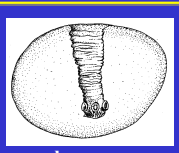
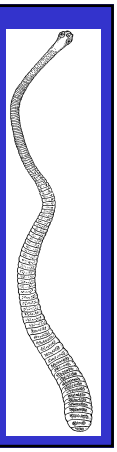
Life cycle

egg



larva (metacestode)

adult



- predator-prey transmission (2-3 hosts)
- eggs/coracidia eaten to infect intermediate host
- larva in intermediate host eaten to infect definitive host
- adults internal parasites of vertebrate gut

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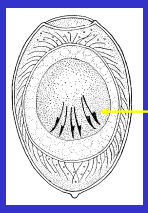
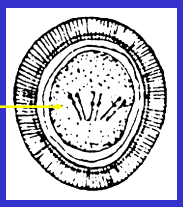
Eggs



3 pairs posterior hooks



operculate eggs
aquatic species

thick-walled eggs
terrestrial species

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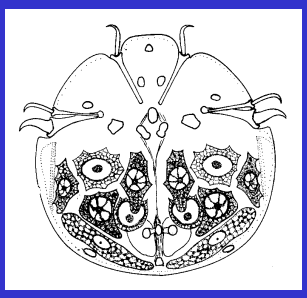
Hexacanth embryo (oncosphere)



- released from eggs
- 3 pairs of hooks used to penetrate gut of intermediate host

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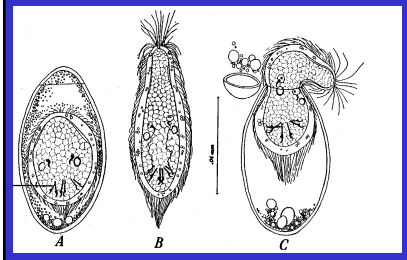
Coracidium



- aquatic species
- egg hatches releasing ciliated coracidium
- eaten by intermediate host and penetrates gut

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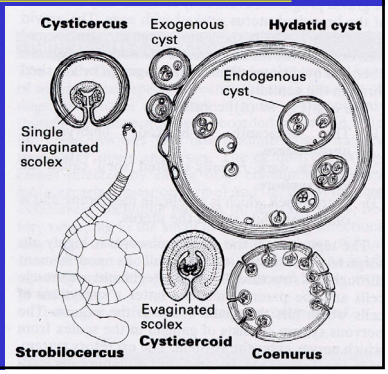
Metacestode

- larval cestode in tissues of intermediate host
- infective to definitive host by ingestion



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Pathogenicity

adult stages
no mouthparts
benign

larval stages
encyst in tissues
chronic lesions

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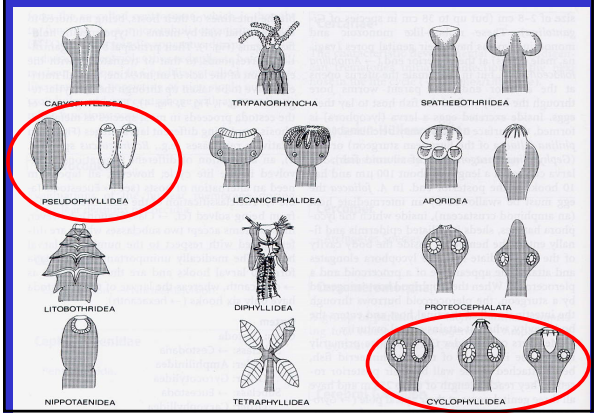
Cestode Orders



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Cestodes of medical importance

Order	Family	Genus
Pseudophyllidea (aquatic cycles)	Diphyllobothriidae	*Diphyllobothrium*
		Spirometra
Cyclophyllidea (terrestrial cycles)	Hymenolepidae	*Hymenolepis*
	Dipylididae	*Dipylidium*
	Taeniidae	*Taenia*
		Echinococcus

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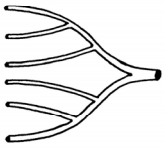
Cestode infections

gastro-intestinal	vascular	tissues, organs
		
adult tapeworms usually benign	nil	larval tapeworms space-occupying lesions

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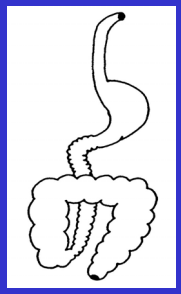
ENTERIC CESTODES



Diphyllobothrium latum
Diphyllobothrium pacificum

Hymenolepis nana
Hymenolepis diminuta
Dipylidium caninum
Taenia saginata
Taenia solium

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TISSUE CESTODES

Taenia solium
Taenia multiceps
Echinococcus granulosus
Echinococcus vogeli
Echinococcus multilocularis
Spirometra

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Order: PSEUDOPHYLLIDEA

- aquatic tapeworms
- egg hatch (coracidium stage)
- adult scolex simple (most with sucking grooves)
- never armed rostellum

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Diphyllobothrium

Order: Pseudophyllidea
Family: Diphyllobothriidae

- scolex with 2 spatulate sucking grooves (bothria)
- segments with uterine pore through which eggs are discharged
- aquatic 3-host cycle
  - copepod
  - fish
  - piscivore (incl. humans)

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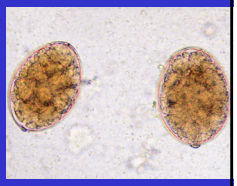
Diphyllobothrium latum (broad fish tapewormf)



adult 3-10m long
in small intestine

operculate eggs 65x45µm
passed in faeces

common in temperate/subarctic zone
where fish from freshwater lakes are eaten raw

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- eggs hatch
- coracidium eaten
- procercoid in copepod

- copepods eaten
- plerocercoid in freshwater fish

- fish eaten

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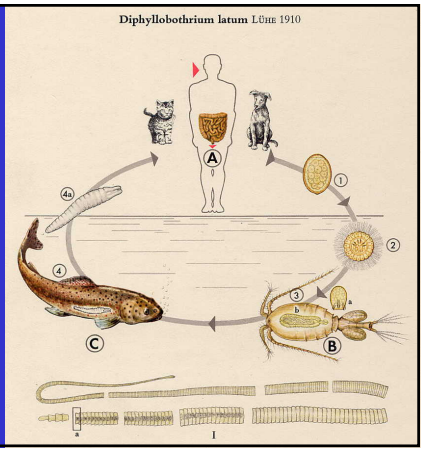
Food-borne transmission

cycle
4 months - years

1. egg
2. coracidium
3. procercoid
4. plerocercoid

A. adult



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Pathogenesis

- most infections asymptomatic
- apart from early transient eosinophilia
- some with abdominal pain, diarrhoea, vomiting
- rarely with dizziness, fatigue, numbness of extremities
- previously linked to pernicious anaemia in Finland (related to B12 insufficiency)

- treatment
  - anthelmintic (praziquantel/niclosamide)
- prevention
  - cook/freeze/pickle fish

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Spirometra (tapeworms)

Order: Pseudophyllidea
Family: Diphyllobothriidae

- simple scolex (grooves)

- aquatic 3-host cycle
  - copepod
  - amphibia (incl. humans)
  - carnivores (not humans)

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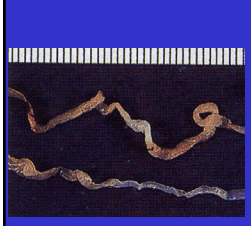
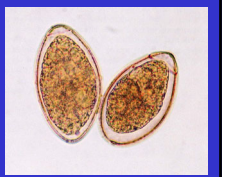
Spirometra spp.





adults 1-2m
in intestines

operculate eggs 60x35µm
in faeces

various species in carnivores
larval stages (spargana) cause problems in humans

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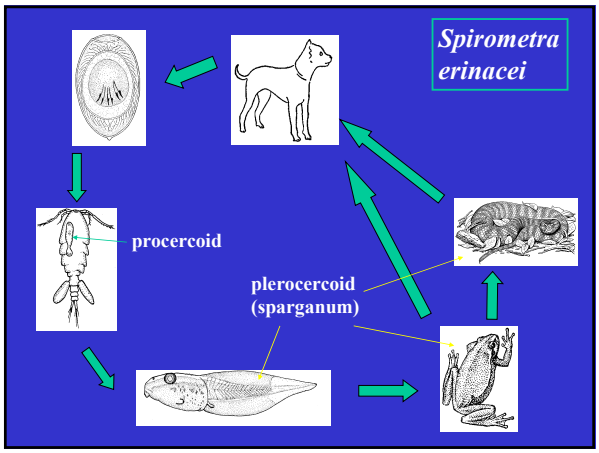

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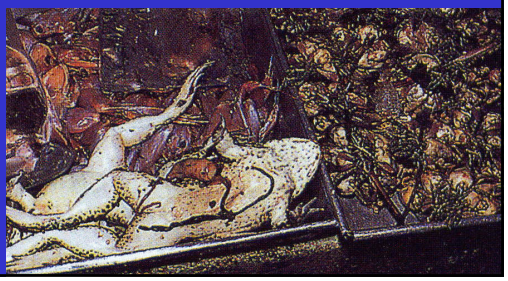
Food/water-borne transmission

Infections acquired by:

- ingesting procercoids in copepods in drinking water
- ingesting spargana in amphibious animals
- applying amphibia as poultices to eyes/sores



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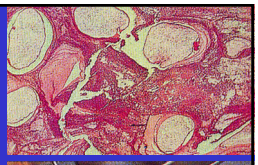
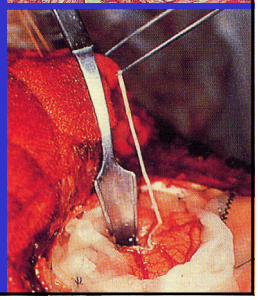
Pathogenesis

- spargana wander in deep tissues
- usually migrate to subcutaneous tissues
- elicit local inflammation
- eventually encyst forming fibrous nodules
- may migrate over eye causing intense pain, oedema and ulceration





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Summary

aquatic cycle (3-hosts)	adult worm	larva	
		procercoid	plerocercoid
Diphyllobothrium	piscivore (+human)	copepod	fish
Spirometra	carnivore	copepod	amphibia (+human)

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