

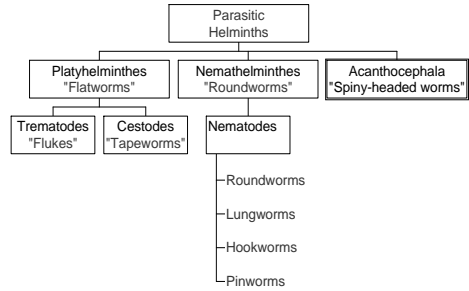
Introduction to the helminth parasites

BVM&S Parasitology
Tudor W Jones



Ancylostoma duodenale

Taxonomic Relationships of the Helminth Parasites



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Why are helminths important ?

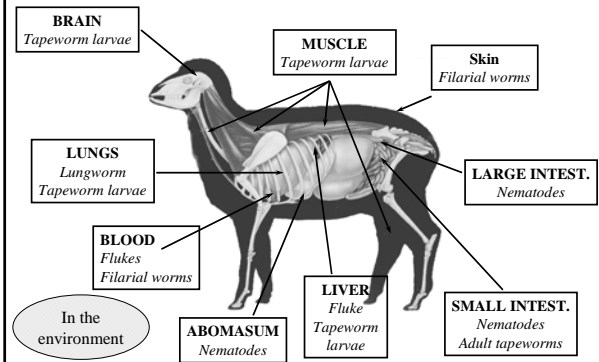
- Production losses due to
 - Competition for nutrients
 - Damage to body systems e.g. gut, liver
 - Death
- Animal welfare
 - Companion animals
 - Food animals
- Public health (zoonotic infections)



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Where do helminths live?



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Lecture topics

- Diagnosis & disease
 - Morphology
 - Feeding
 - Reproduction
 - Behaviour in the host
- Epidemiology & control
 - Life cycles
 - Survival strategies



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Morphology

- External features
 - Size
 - Shape
 - Functional anatomy
- Internal features
 - Outer layer
 - Structural
 - Functional



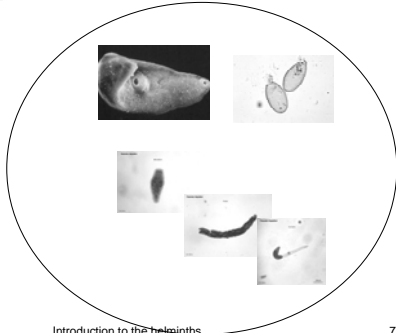
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Same parasite - different appearance



- Adults
 - Males
 - Females
- Eggs
- Juvenile
 - Cysts
 - Larvae



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Feeding

- Passive feeders
- Browsers
- Tissue feeders
 - Solid tissues
 - Blood



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Reproduction

- Asexual
 - Multiplication
 - Parthenogenesis
- Sexual
 - Monoecious
 - Dioecious



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Behaviour in the host

- Non-migratory
- Migratory
 - Hepato-tracheal
 - Somatic

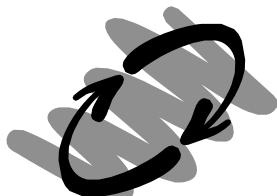


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Life cycles

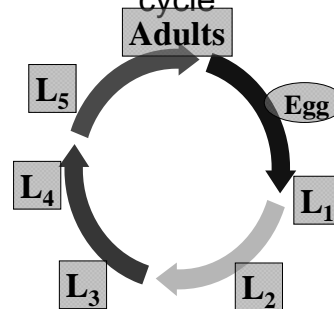
- Direct
- Indirect
 - Definitive Host
 - Intermediate host
 - Arthropod (vector) borne



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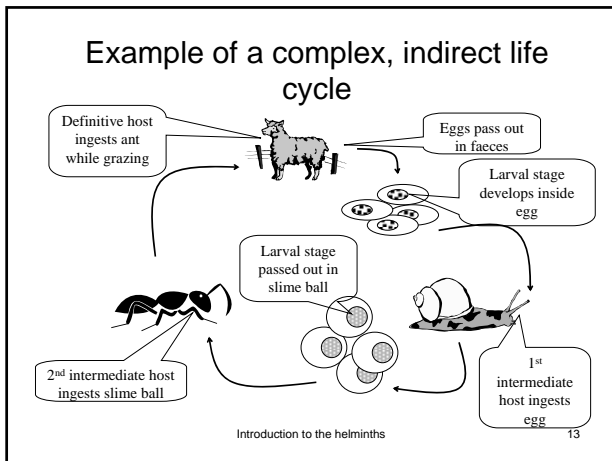
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Example of a simple, direct life cycle



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Host types

- **Definitive host**
 - Host where adult stages develop
- **Intermediate host**
 - Host where immature stages develop, indirect life cycle only
- **Transport host**
 - Immature stage not retained, no parasite development
- **Paratenic host**
 - Immature stage retained but no parasite development

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Survival strategies

- **Permanent parasites**
- **Temporary parasites**
 - Morphological adaptations
 - Physiological adaptations
 - Hypobiosis
 - Critical hatching conditions
 - Peripatruant rise

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Ascarid egg

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Hypobiosis

- **Physiological - Toxocara**
 - Larvae enter hypobiotic state in tissues
 - Larvae reactivated during pregnancy in dogs & cats and infect foetus
- **Seasonal - Ostertagia**
 - Larvae taken in during Autumn overwinter in the gastric glands of the abomasum
 - Larval development resumes in Spring giving rise to new generation of adults

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Critical Hatching Conditions

- Larvae overwinter on the pasture inside the egg stage.
- Larvae hatch onto pasture only after receiving an environmental trigger
- Trigger is usually a change in temperature.

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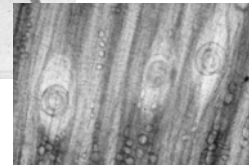
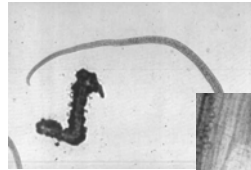
Periparturient (Spring) Rise



- Increase in parasite egg counts around parturition time – usually spring in UK
- Impact – large numbers of infective larvae on the pasture when
 - Pasture conditions optimum for survival
 - Young animals available for infection



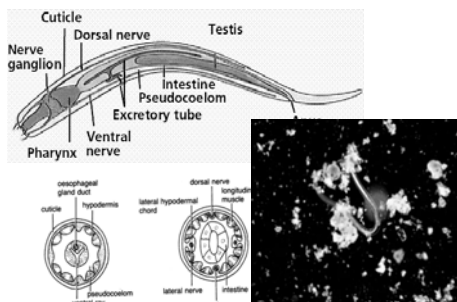
Trichinella



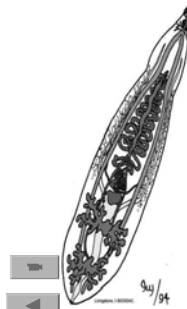
Characteristics of helminths

	Trematode	Cestode	Nematode
Appearance	Leaf-like	Tape-like	Worm-like
Cross-section	Flattened	Flattened	Cylindrical
Body cavity	Absent	Absent	Fluid-filled
Gut	Blind sack	Absent	True gut
Life cycle	Indirect	Indirect	Direct & indirect
Reproduction	Monoecious	Monoecious	Dioecious

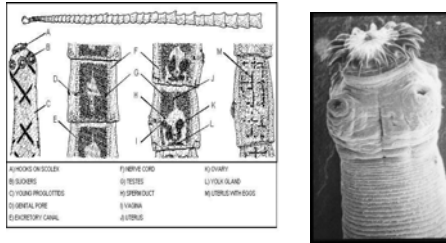
Internal structure - Nematodes



Internal structure - Trematodes



Internal structure - *Cestodes*



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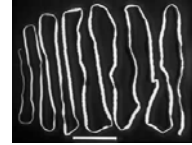
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Adult stages of the helminths (not to scale)

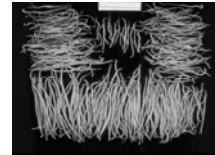
Trematodes



Cestodes



Nematodes

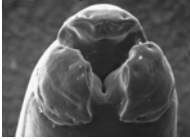


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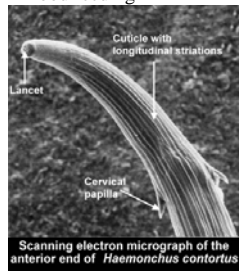
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Feeding adaptations

Browsing



Blood feeding



Tissue feeding

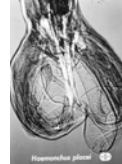


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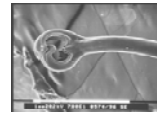
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Males & Females

Bursa



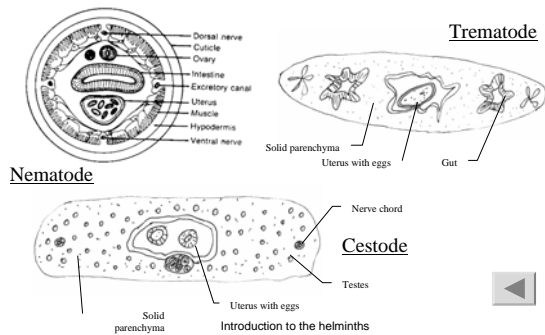
Vulval flap



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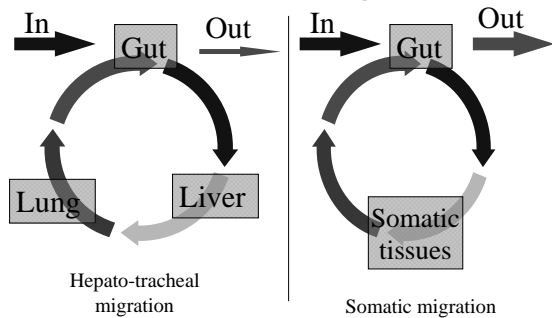
Helminth Body Structure (TS)



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Two forms of migration



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