

# Introduction to the helminth parasites

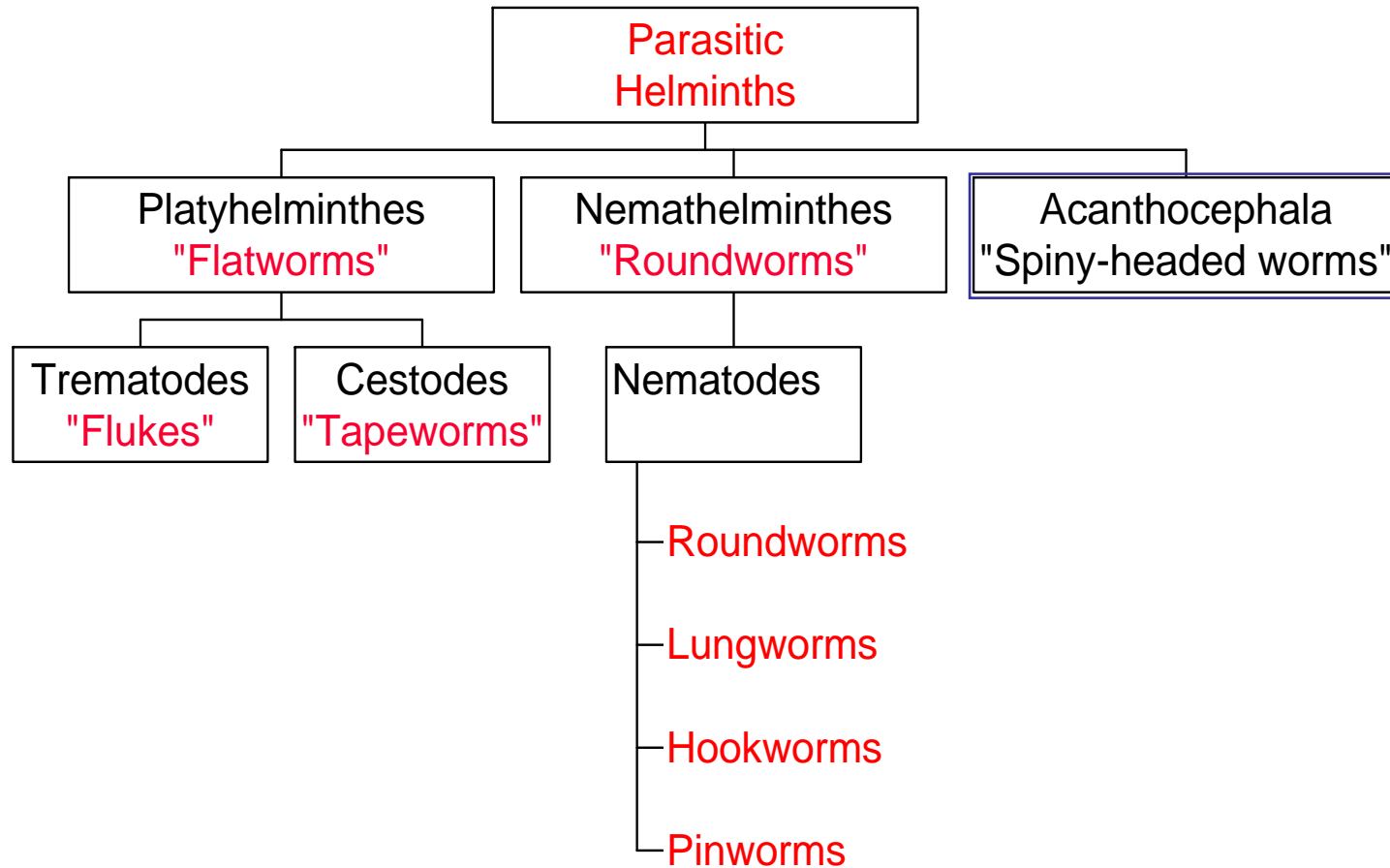
BVM&S Parasitology

Tudor W Jones



*Ancylostoma duodenale*

# Taxonomic Relationships of the Helminth Parasites

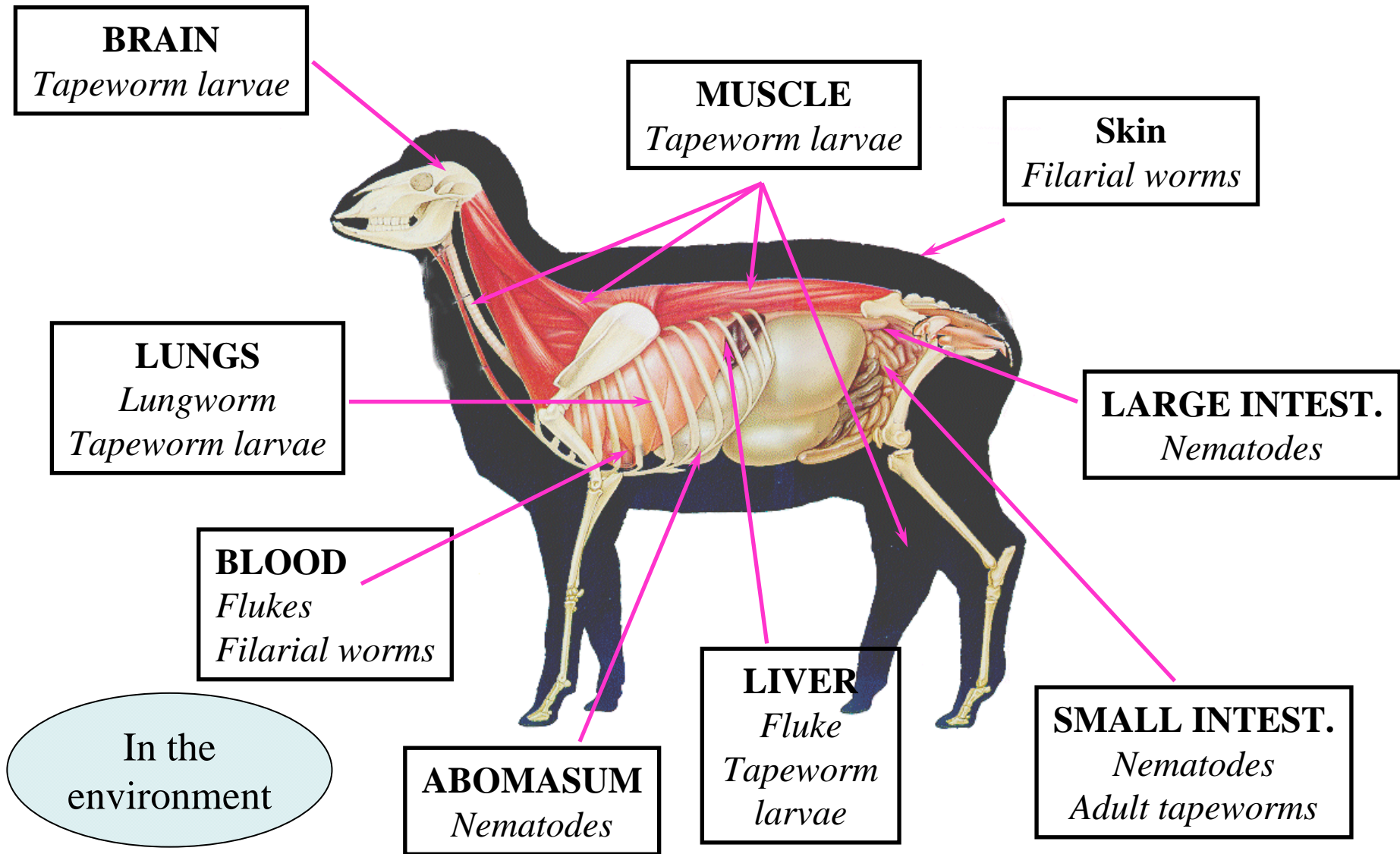


# Why are helminths important ?

- 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)



# Where do helminths live?



# Lecture topics

- Diagnosis & disease
  - [Morphology](#)
  - [Feeding](#)
  - [Reproduction](#)
  - [Behaviour in the host](#)
- Epidemiology & control
  - [Life cycles](#)
  - [Survival strategies](#)

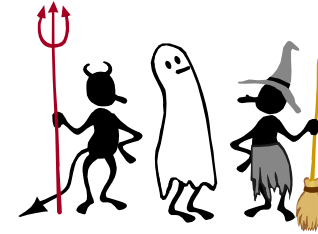


# Morphology

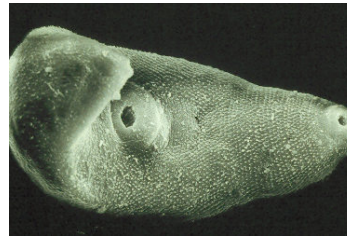
- External features
  - Size
  - Shape
  - Functional anatomy
- Internal features
  - Outer layer
  - Structural
  - Functional



# Same parasite - different appearance

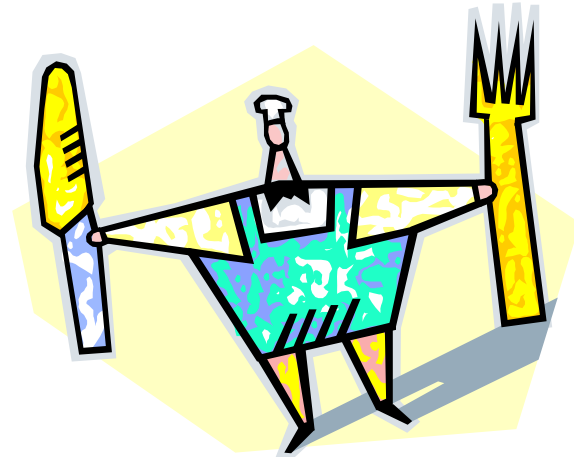


- Adults
  - Males
  - Females
- Eggs
- Juvenile
  - Cysts
  - Larvae



# Feeding

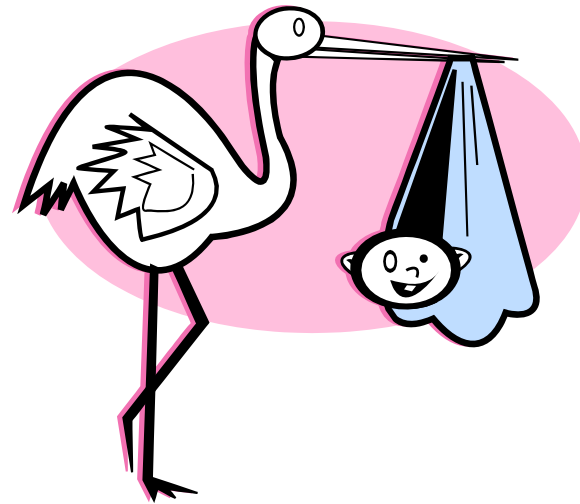
- Passive feeders
- Browsers
- Tissue feeders
  - Solid tissues
  - Blood





# Reproduction

- Asexual
  - Multiplication
  - Parthenogenesis
- Sexual
  - Monoecius
  - Dioecius



# Behaviour in the host

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

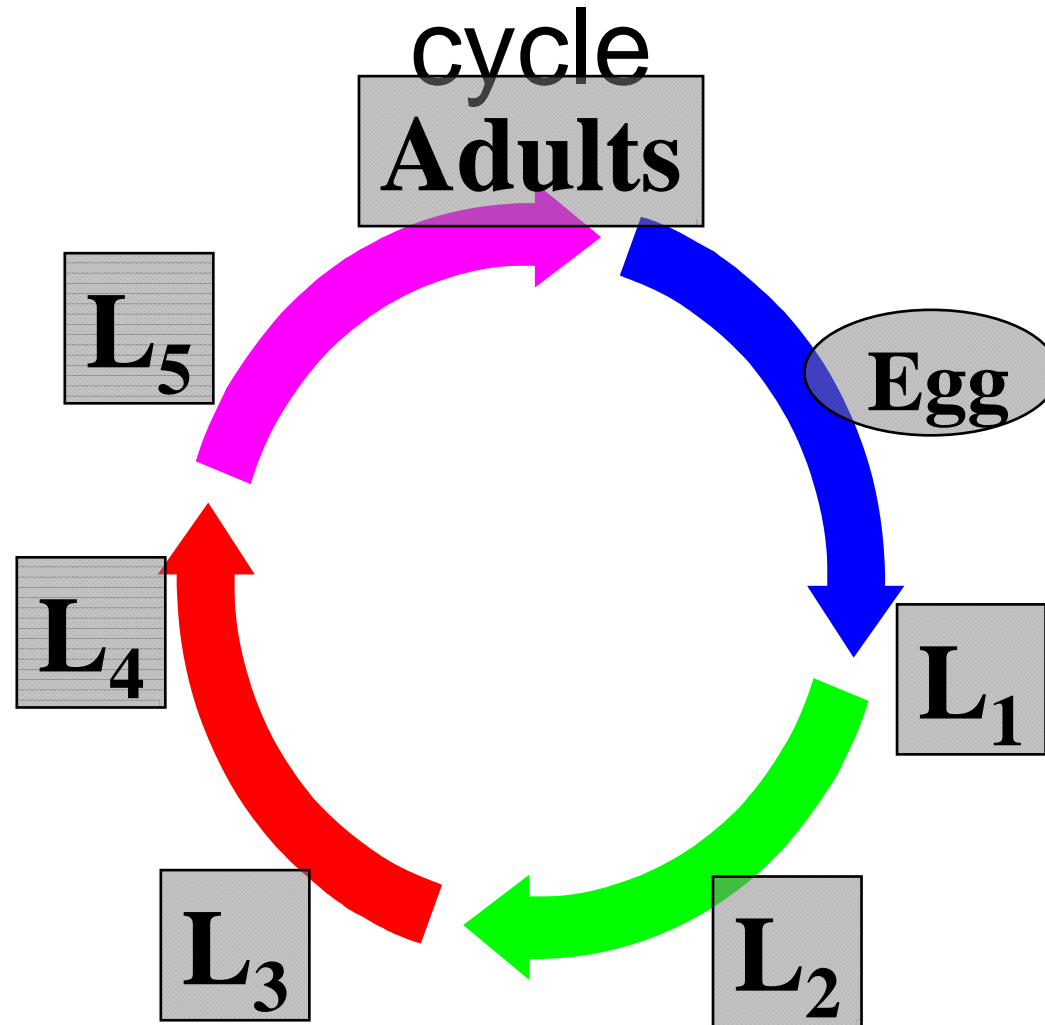


# Life cycles

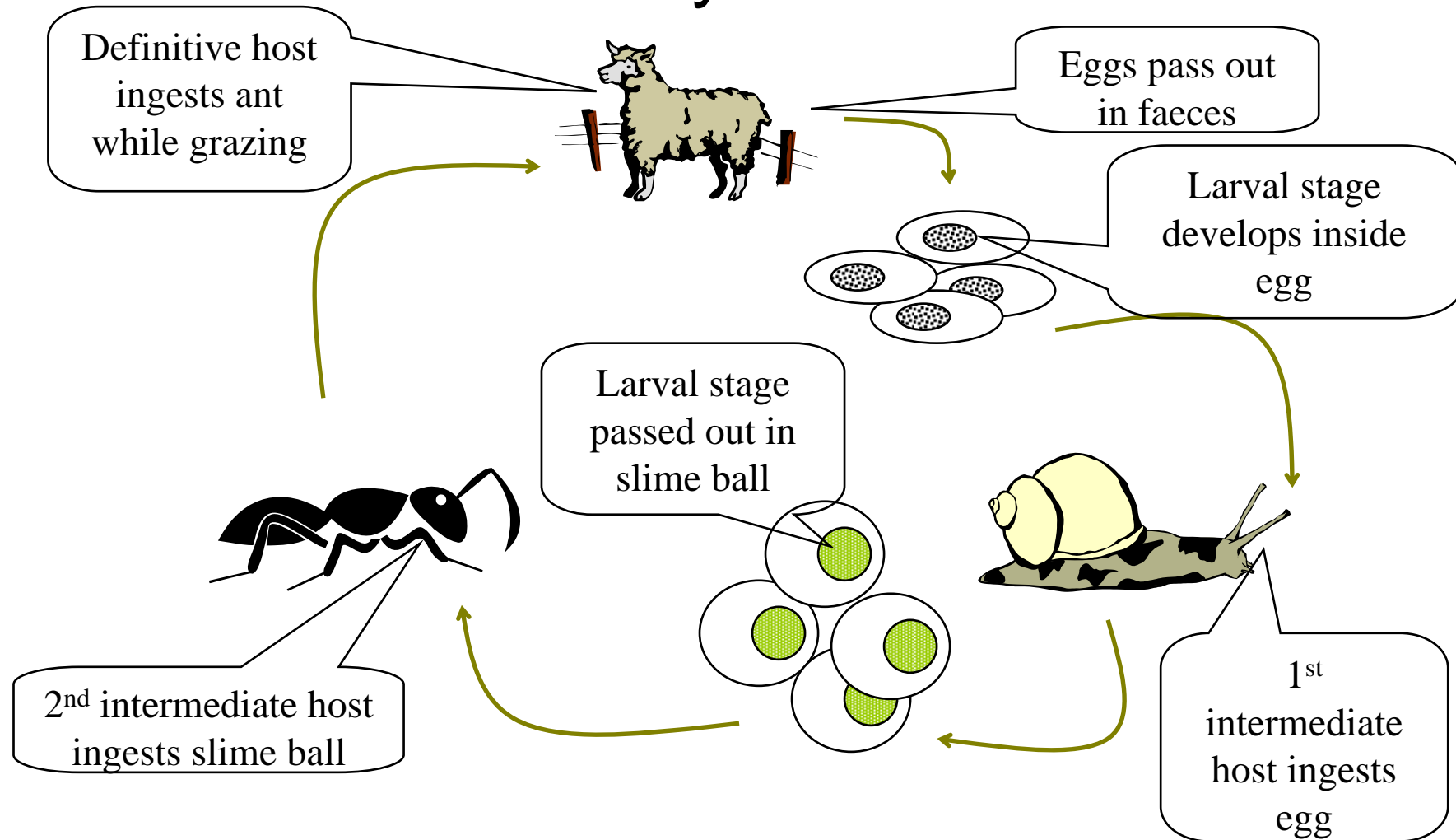
- Direct
- Indirect
  - Definitive Host
  - Intermediate host
  - Arthropod (vector) borne



# Example of a simple, direct life



# Example of a complex, indirect life cycle



# 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



# Survival strategies

- [Permanent parasites](#)
- Temporary parasites
  - [Morphological adaptations](#)
  - Physiological adaptations
    - [Hypobiosis](#)
    - [Critical hatching conditions](#)
    - [Peripatruant rise](#)

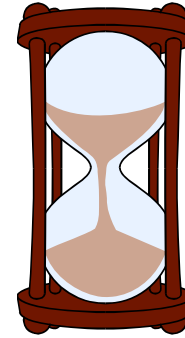


# Ascarid egg

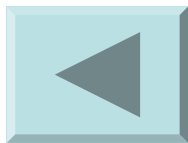




# Hypobiosis



- **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



# 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.



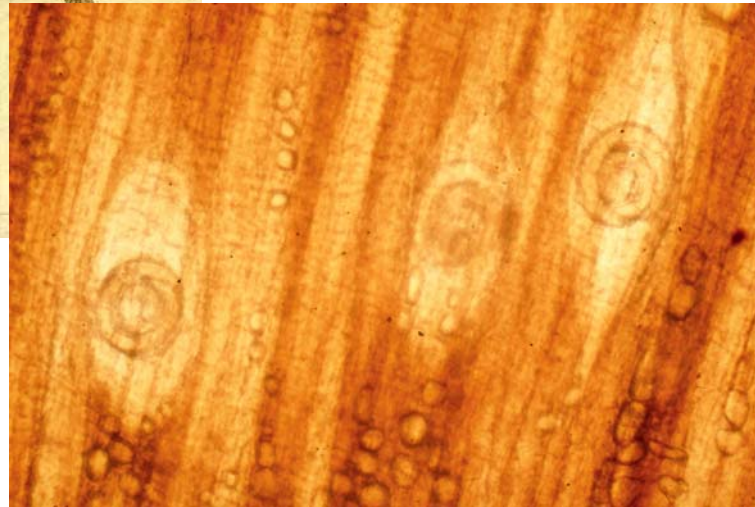
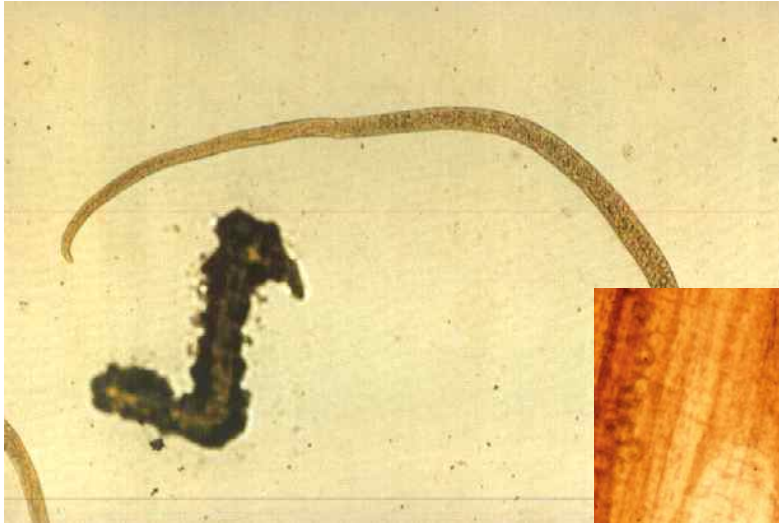
# Periparturient (Spring) Rise



- 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

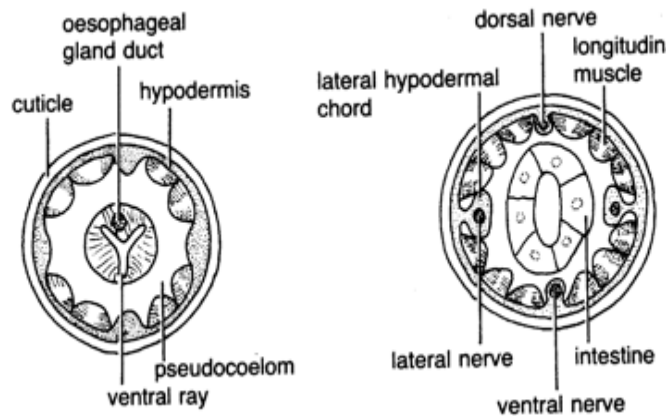
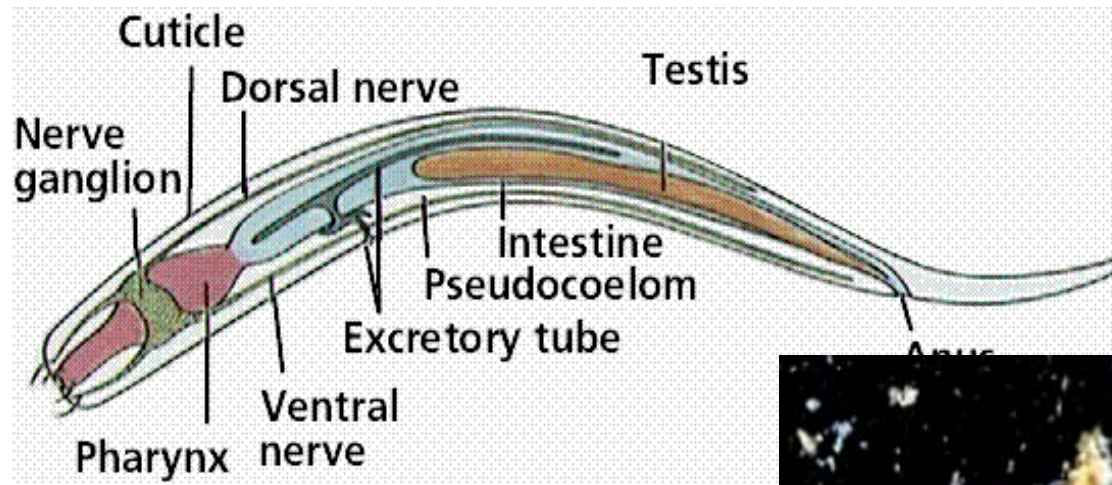


# Characteristics of helminths

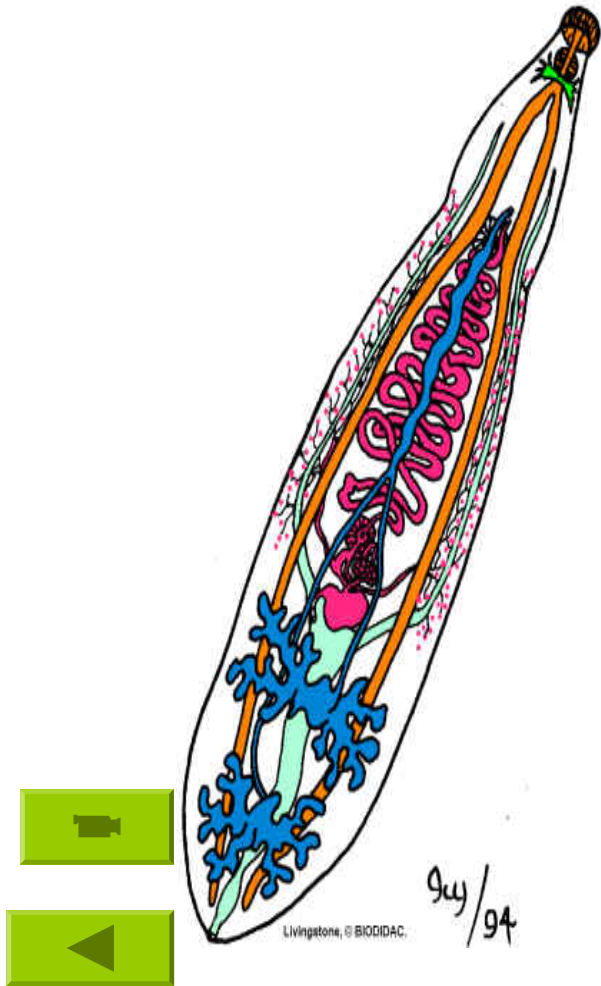
	<b>Trematode</b>	<b>Cestode</b>	<b>Nematode</b>
<b><i>Appearance</i></b>	<b>Leaf-like</b>	<b>Tape-like</b>	<b>Worm-like</b>
<b><i>Cross-section</i></b>	<b>Flattened</b>	<b>Flattened</b>	<b>Cylindrical</b>
<b><i>Body cavity</i></b>	<b>Absent</b>	<b>Absent</b>	<b>Fluid-filled</b>
<b><i>Gut</i></b>	<b>Blind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



# Internal structure - *Nematodes*

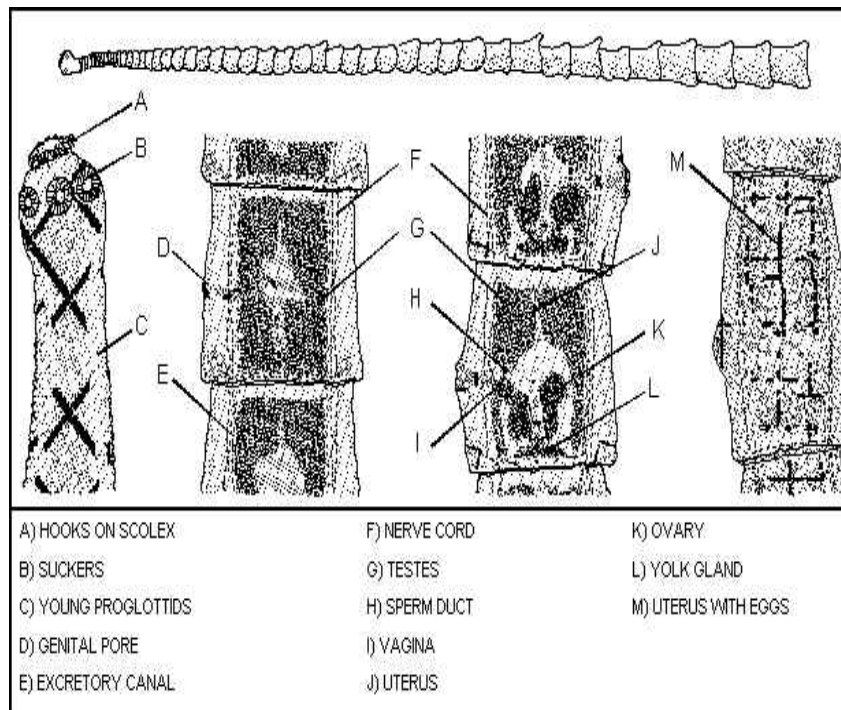


# Internal structure - *Trematodes*





# Internal structure - *Cestodes*

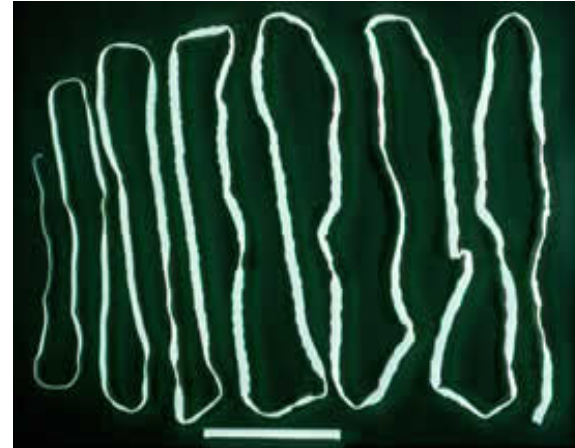


## Adult stages of the helminths (not to scale)

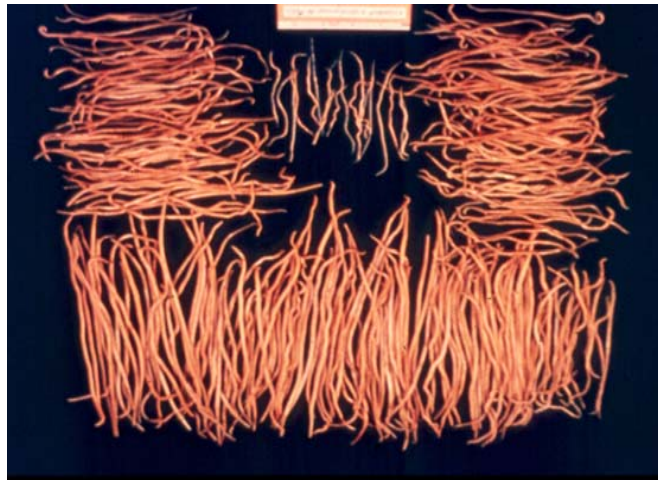
Trematodes



Cestodes

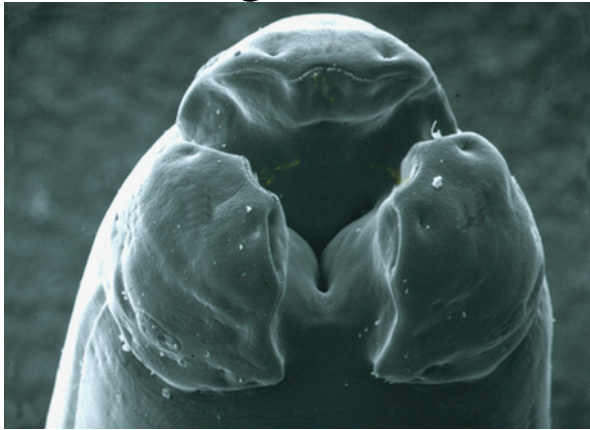


Nematodes

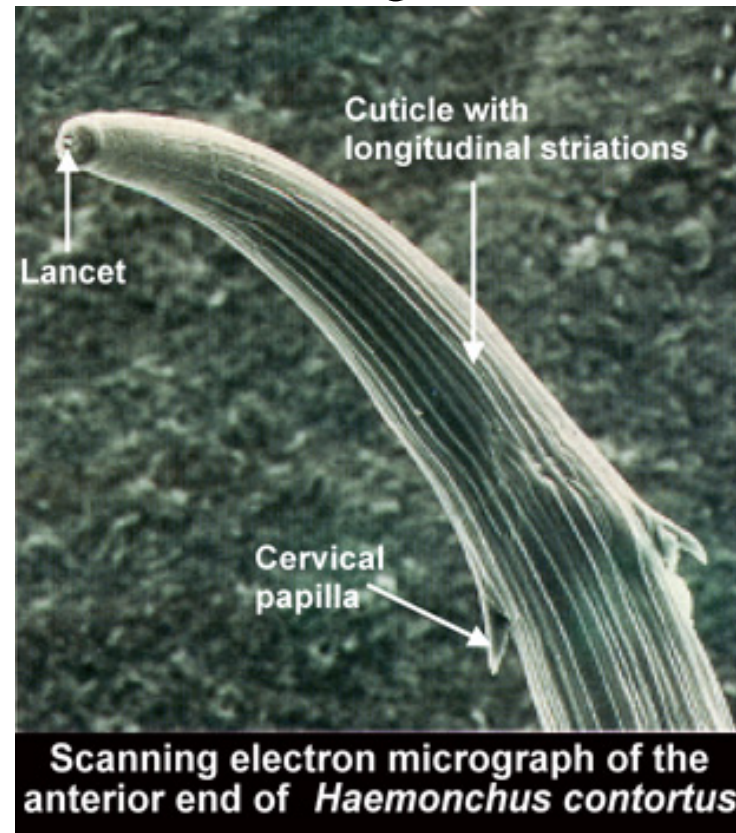


# Feeding adaptations

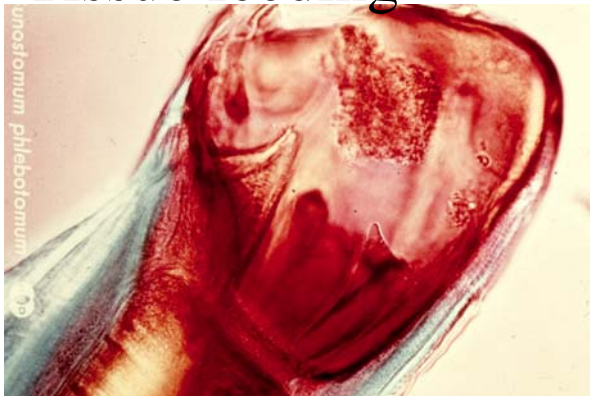
Browsing



Blood feeding

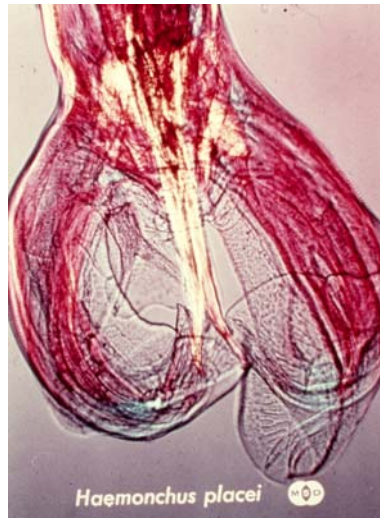


Tissue feeding

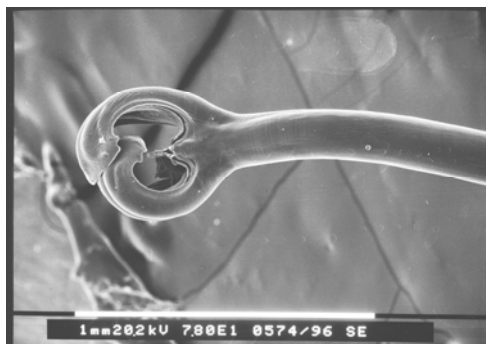
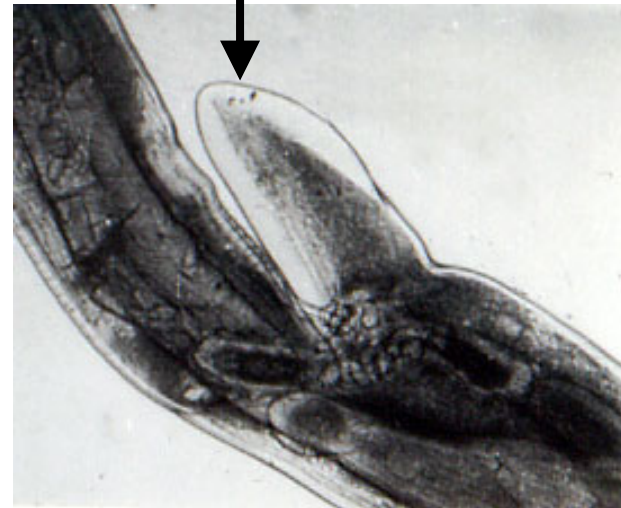


# Males & Females

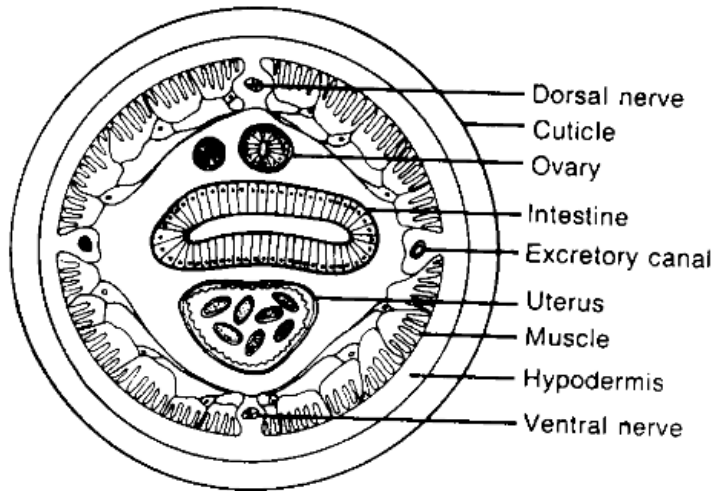
Bursa



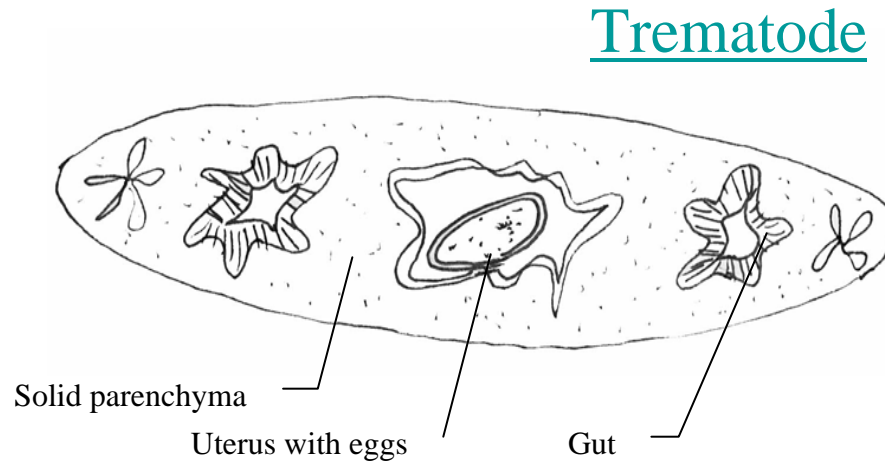
Vulval flap



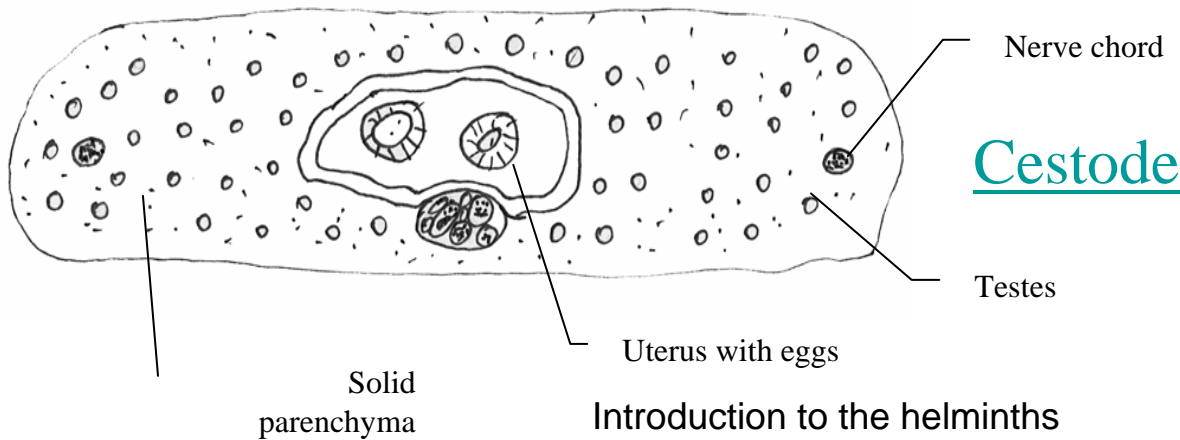
# Helminth Body Structure (TS)



Nematode



Trematode



Cestode



# Two forms of migration

