PLATYHELMINTHES
(FLATWORMS)

CLASS CESTODA
(TAPEWORMS)

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READINGS

The readings for this unit of study include:
Leventhal, R. and Cheadle, R. Medical Parasitology: A
Self-Instructional Text

OBJECTIVES

- Upon completion of the unit of study and the self-study text,
each student should be able, with a minimum of 70%
competency, to do the following:
  1. State the general characteristics of the Platyhelminthes.
  2. Define the terminology related to the Cestoda.
  3. Describe the unique morphology of each adult cestode.
  4. State the method of diagnosis for each medical significant
  cestode.
  5. State the common and scientific names for the medically
  significant cestodes.
  6. State the geographic distribution, epidemiology and life
  cycles of the medically significant cestodes.
  7. Given illustrations or samples be able to identify the
diagnostic stages of the Cestoda.
**Phylum Nemathelminthes**
- Class Nematoda
  - The “Roundworms”

**Phylum Platyhelminthes**
- Known as the “Flatworms”
- Class Cestoda
  - The “Tapeworms”
- Class Digenea (Trematodes)
  - The Trematodes of “Flukes”

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**PLATYHELMINTHES**

- Phylum Nemathelminthes
  - Class Nematoda
    - The “Roundworms”

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**CESTODA TERMINOLOGY**

- Refer to glossary in the course text
- Hermaphroditic
  - Having both male and female reproductive organs within the same individual. All tapeworms have both sets of reproductive organs in each segment of the adult
- Proglottid
  - One segment of a tapeworm. Each proglottid contains male and female reproductive organs when mature

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**CESTODA TERMINOLOGY**

- Strobila
  - Body of the tapeworm
- Scolex
  - Anterior end of a tapeworm; attaches to the wall of the intestine of a host by means of suckers or hooks
- Rostellum
  - The fleshy, anterior protuberance of the scolex of some tapeworms...may have hooks
**Cestodes or “Tapeworms”**

- Segmented, flattened, tape-like bodies
- No mouth
- Absorb nutrients
- Hermaphroditic
- Eggs, larval stages, and adult worms
- Human infections by eating food contaminated with encysted larvae
- Tapeworms can live up to 20 years

**Platyhelminthes “Tapeworms”**

**Pathogenic Tapeworms**

- **Intestinal tapeworms** (Cestodes)
  - *Diphyllobothrium latum* (fish tapeworm)
  - *Taenia saginata* (beef tapeworm)
  - *Taenia solium* (pork tapeworm)
  - *Dipylidium caninum* (dog tapeworm)
  - *Hymenolepis nana* (dwarf tapeworm)

- **Tissue tapeworms** (Cestodes)
  - *Echinococcus sp.* (hydatid disease)
PATHOGENIC TAPEWORMS

- *Dipylidium caninum*
- *Taenia species*
- *Diphyllolobothrium latum*

PATHOGENIC TAPEWORMS CONTINUED

- *Echinococcus species*
- *Hymenolepis nana*

HYMENOLEPIS NANA
“DWARF TAPEWORM”

- Prevalence in Southeast U.S.
- Most common in U.S.
- Eggs in feces of infected mice and rats are accidentally ingested by human host
- Diagnostic form is eggs in feces
Hymenolepis nana
“Dwarf Tapeworm”
- Filaments emerge from polar thickenings
- 3 pair hooklets
- Hexacanth embryo

Taenia solium & Taenia saginata
- Worldwide distribution
  - T. saginata
    - beef tapeworm
  - T. solium
    - pork tapeworm
- Transmission
  - Ingestion of undercooked meat with encysted larvae
  - mature into adult worms that reside in small intestine
- Diagnosis
  - proglottids or eggs in feces, biopsy for cystercerosis, serology tests

Cystercerosis
- Symptoms
  - abdominal pain
  - Ingestion of T. solium embryonated eggs or gravid proglottids causes cystercerosis
  - larvae migrate to brain, eye, muscle, etc.
TAENIA EGGS

- Very UNIQUE
  - Radial striations
  - Three pairs of hooklets within the hexacanth embryo
  - 35 to 45 um in diameter

TAENIA WORM

TAENIA SOLIUM & TAENIA SAGINATA

Taenia saginata  Taenia solium
**TAENIA SOLIUM & TAENIA SAGINATA**

- **Taenia solium**
  - 7 to 12 lateral uterine branches

- **Taenia saginata**
  - 15 to 30 lateral uterine branches

**DIPHYLLOBOTHRIUM LATUM**

- "FISH TAPEWORM"

- Intestinal obstruction
- Abdominal pain, weight loss, weakness
- B12 deficiency
- Cultures and climates where raw fish are eaten
- Pleurocercoid ingested by humans in raw or undercooked fish
- Diagnostic stage is egg passed into the feces

**DIPHYLLOBOTHRIUM LATUM EGG**

- Operculated
- Approx 75um
- Terminal knob
**DIPHYLLOBOTHRIUM LATUM**

- **Scolex**
- **Rosette shaped uterus**

**Tapeworm Proglottids**

**ECHINOCOCCUS GRANULOSUS**

- **Human**
  - *accidental Intermediate host*
  - Ingests eggs (resemble Taenia eggs)
  - Via close contact with infected dog or sheep (sometimes goats)
- **Diagnostic stage**
  - *Hydatid cyst* in liver, lung or other organs
  - Complication is anaphylactic shock if cyst ruptures during biopsy or removal
ECHINOCOCCUS GRANULOSUS

DIPYLIDIMUM CANINUM

- Human accidental host
- Dog or cat

SUMMARY OF CESTODES

- Phylum Platyhelminthes
  - Known as the "Flatworms"
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  - The Trematodes of "Flukes"
- Tissue tapeworms (Cestodes)
  - Echinococcus sp.
    - hydatid disease
- Intestinal tapeworms (Cestodes)
  - Diphyllobothrium latum
  - fish tapeworm
  - Taenia saginata
  - beef tapeworm
  - Taenia solium
  - pork tapeworm
  - Diphylidium caninum
  - dog tapeworm
  - Hymenolepis nana
    - dwarf tapeworm