Diagnostic Parasitology

Medically Important Cestodes (tapeworms)

Disclaimer

- This presentation was meant to provide students with both didactic and laboratory skills as they apply to clinical parasitology. It is meant for educational purposes only and does not represent Cleveland Clinic views or practices.
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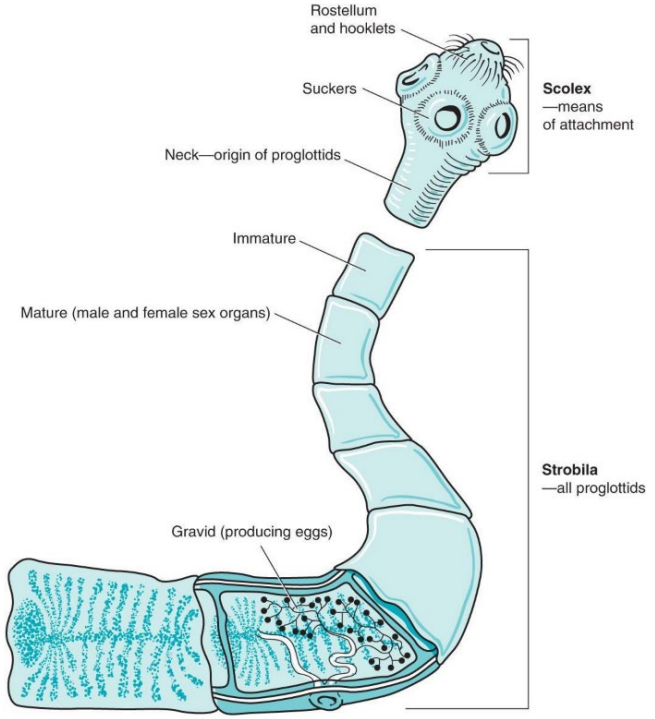
- Most of the information was adopted from the Textbook of Diagnostic Microbiology by Mahon & Lehman (see citation) but condensed for bite sized learning.

Helminths



- Multicellular parasites
- Classified based on structure
  - Trematodes (flukes)
  - Cestodes (tapeworms)
  - Nematodes (roundworms)

  flatworms
- Complex life cycles where humans can serve as
  - Definitive hosts: Individual in which a parasite has its adult and or sexual reproductive stage.
  - Intermediate hosts: Individual in which a parasite has its larval and or asexual reproductive stage
  - Accidental hosts

The Cestodes (Tapeworms)

Intestinal

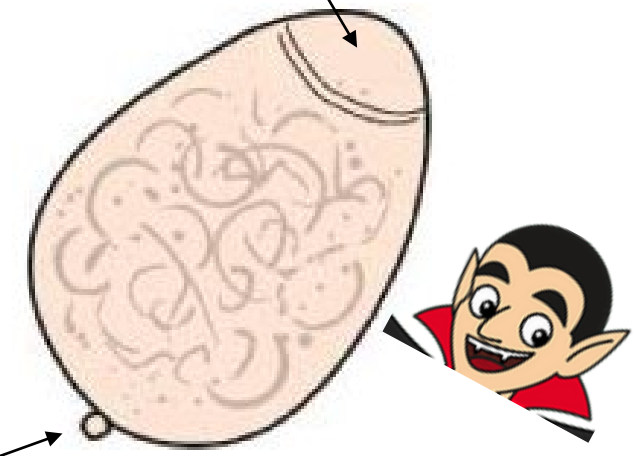
- Six medically important members
  - *Diphyllobothrium latum*
  - *Taenia solium*
  - *Taenia saginata*
  - *Hymenolepis nana*
  - *Hymenolepis diminuta*
  - *Dipylidium caninum*

Tissue

- Two medically important members
  - *Taenia solium (cysticercosis)*
  - *Echinococcus granulosus*

Organism	Intermediate host	Infective stage (humans)
Diphyllobothrium latum	Copepod (1st), Fish(2nd)	Plerocercoid
Taenia solium	Pig	Cysticerci
Taenia saginata	Cow	Cysticerci
Hymenolepis nana	Insect (eg. beetle)	Cysticercoid
Hymenolepis diminuta	Insect (eg. rat flea)	
Dipylidium caninum	Dog and cat flea	

Intestinal Cestodes: *Diphyllobothrium latum* (broad fish tapeworm)



Egg

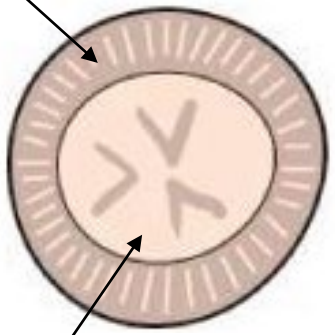
58-76 x 40-50 µm

Adult

10 m

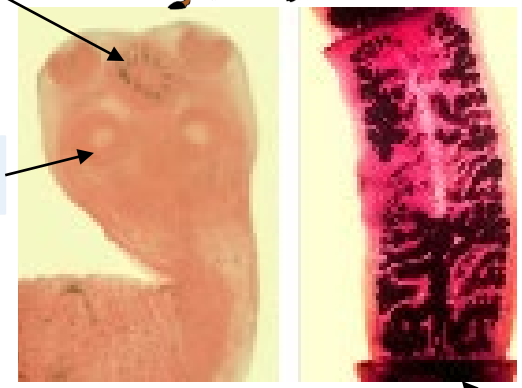
Can cause a Vitamin B12 deficiency

Intestinal Cestodes: *Taenia* species



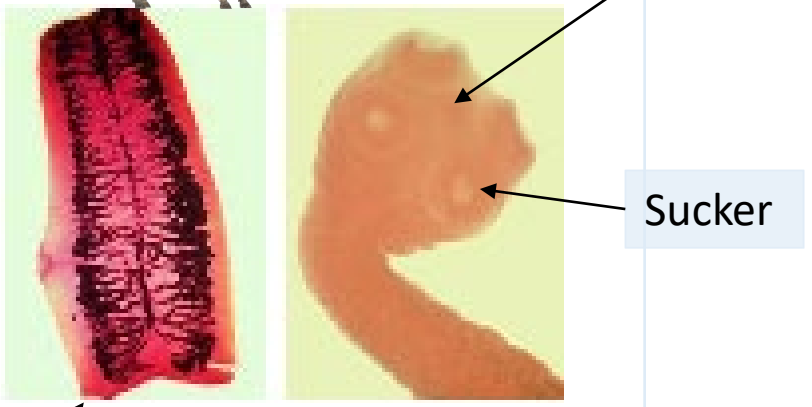
Egg

30-35 µm in diameter

Adult (*Taenia solium)*

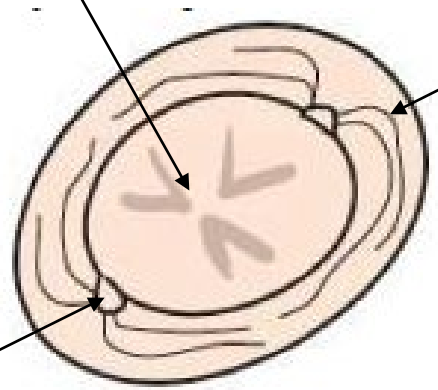
7 m

Adult (*Taenia saginata)*

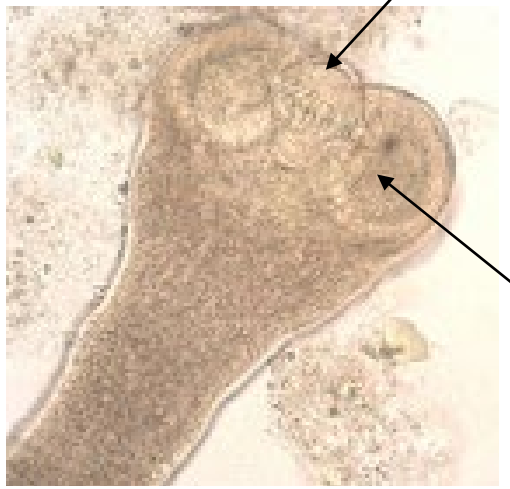
10 m

Intestinal Cestode: *Hymenolepsis nana* (dwarf tapeworm)



Egg

30-47µm



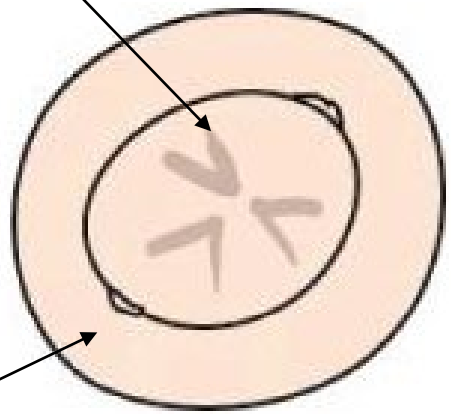
Adult

40 mm

Intestinal Cestode: *Hymenolepsis diminuta* *(flea tapeworm)*

Six-hooked oncosphere

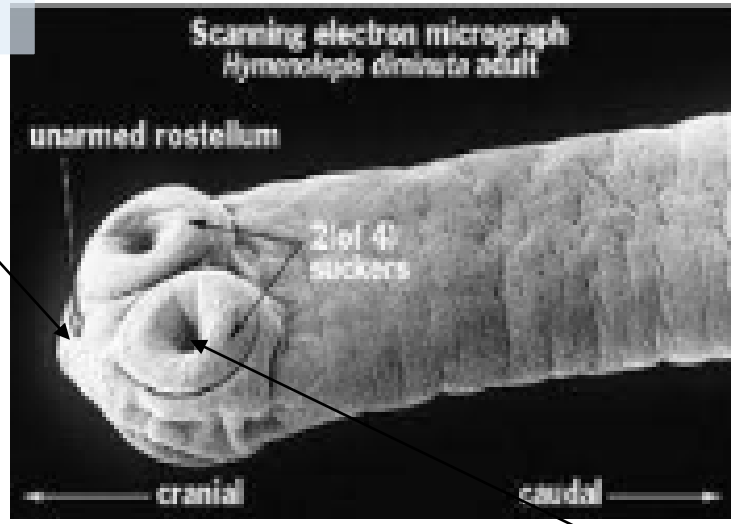
Polar thickenings



Egg

50-75µm

Unarmed rostellum



Sucker

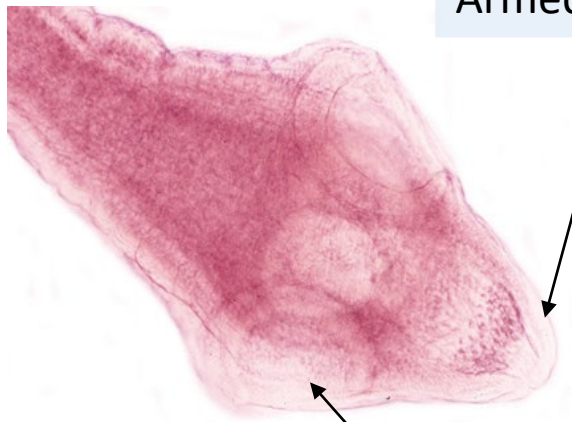
Adult

20-60 cm

Intestinal Cestode: *Dipylidium caninum* (dog tapeworm)

Egg

20-40 µm



Adult

Tissue Cestode: *Taenia solium (cysticercosis)*

- Humans ingests the infective eggs of *Taenia solium*
- Humans are now the intermediate host
  - Cysticerci travel to any tissue or organ
- Most common are the eyes and brain (neurocysticercosis)
- Diagnosed by imaging techniques and histologic staining of tissue

Figure A: Section of human brain tissue with a cysticercus (H&E stained). The scolex (arrow) and bladder wall (darts) are indicated.

Tissue Cestodes: *Echinococcus granulosus*

- Human accidently become the intermediate host when they ingest eggs
- Oncosphere usually migrates to the liver and other organs
  - Hydatid cyst disease
- Diagnosis can be made by imagining techniques

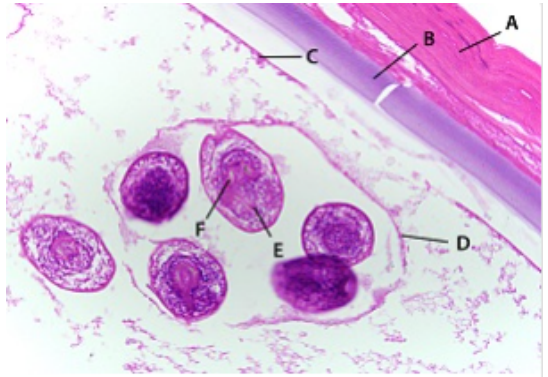


Figure A: Cross-section of an *E. granulosus* cyst, stained with H&E. Host tissue (A) encapsulates the hydatid cyst wall, which is composed of an acellular laminated layer (B) and a nucleate germinal layer (C) from which the brood capsule (D) arises. Inside the brood capsule are numerous protoscolices (E) with visible hooklets (F).

Cestodes: Ova and Parasite Examination (OVAP)

Iodine wet preparation

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Citations

- Mahon, C. R., & Lehman, D. C. (2023). *Textbook of Diagnostic Microbiology* (7th ed., pp. 639-707). Elsevier.
- Centers for Disease Control and Prevention (2019, November 20). DPDx-Laboratory Identification of Parasites of Public Health Concern. Retrieved November 13, 2023, from https://www.cdc.gov/dpdx/az.html