

Mustansiriyah University

College of science

Biology Dept.

Zoology

4th class

Zoonoses lab. (7)

Cryptosporidium

- **Cryptosporidium** is a spore producing parasite found in the intestine of infected people and animals.
- **Cryptosporidium** spp. Is the most common cause of **Cryptosporidiosis**.



Cryptosporidium

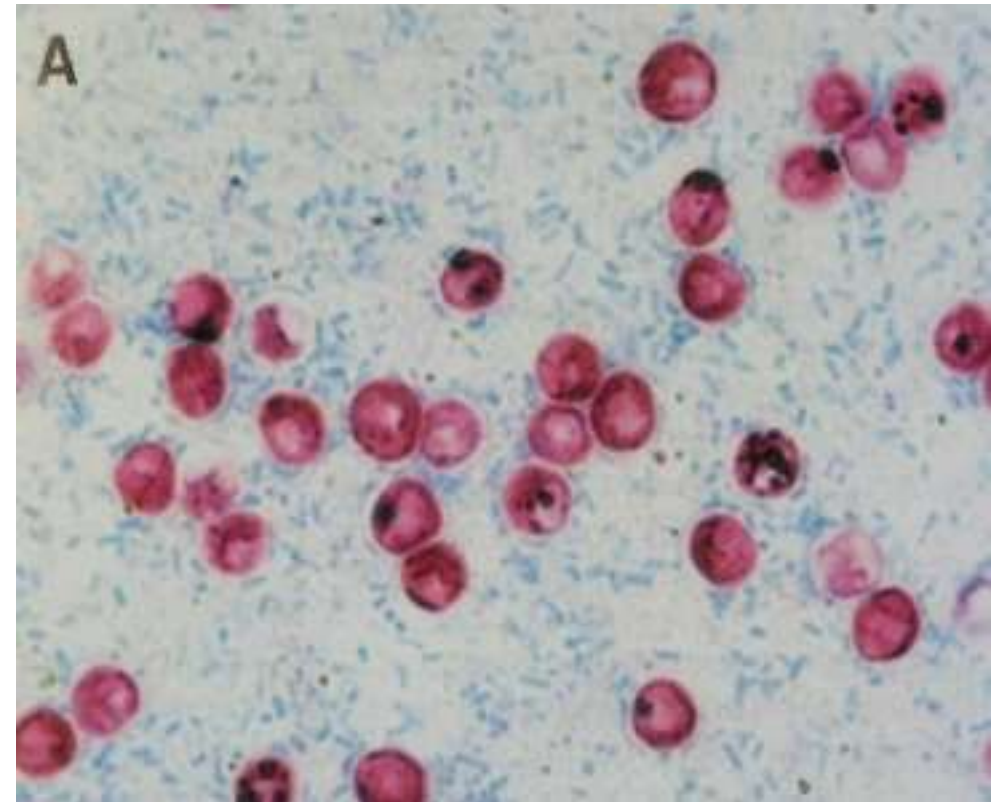
History and Distribution

- First observed in the gastric mucosal crypts of laboratory mice Tyzzer in 1907.
- Causes diarrhea in humans and animals
- Worldwide distribution
- **C.parvum** and **C.hominis** causes human infections
- One of the three most common diarrhea causing pathogens in the world.
- One of the most common causes of waterborne illness in the world.

- ❑ Definitive Host: Human
- ❑ Reservoir Hosts: kittens, puppies, goats, calves, mice, Etc.
- ❑ Disease: Cryptosporidiosis.
- ❑ Habitat: Epithelial cells of the gastrointestinal tract, mainly jejunum
- ❑ Transmission: Fecal-oral route.

Morphology

- Infective form- oocyst
- Spherical, oval, 5 μ m in diameter
- Does not stain with iodine and is acid fast
- Thick walled
- Very hard and resistant.
Temperature-60°C

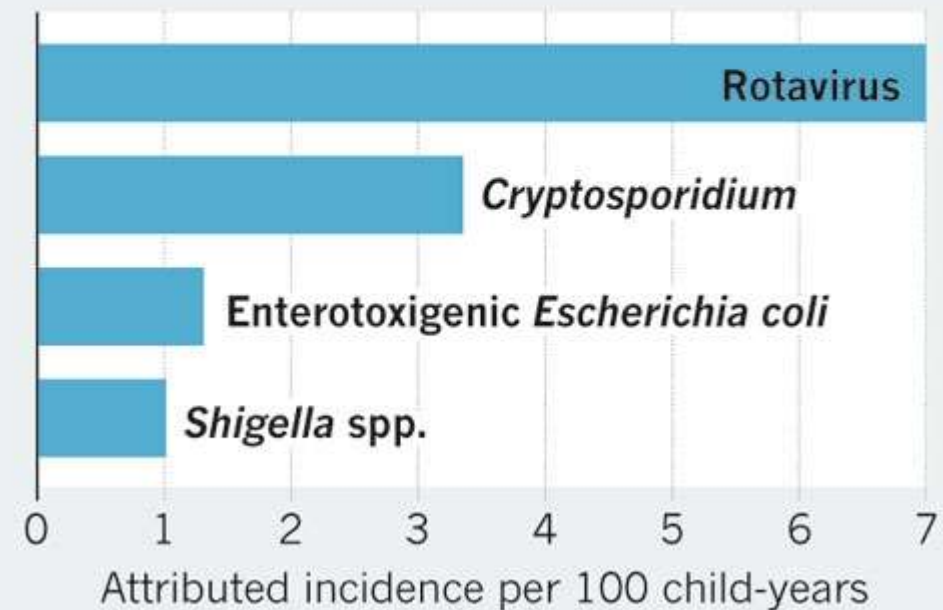


Transmission

- Food and water
 - contamination of drinking water
 - Swimming pools
 - untreated groundwater or well water
 - an infected person or an asymptomatic carrier contaminates a food supply
- Animal-person transmission
- Person-person transmission
 - Incubation period 2-14 days

CHILD KILLER

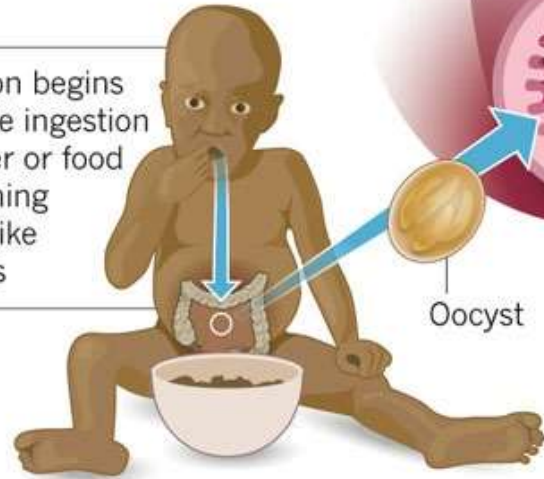
Cryptosporidiosis is the second biggest cause of diarrhoeal disease and death in infants.



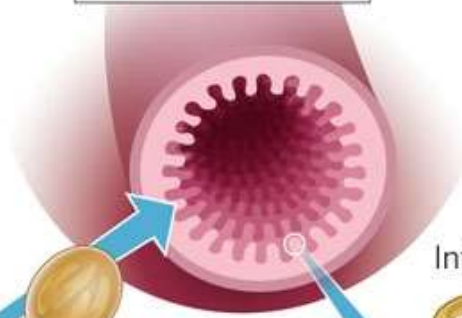
EASY TARGETS

The parasite *Cryptosporidium* causes severe infections in young children and people with weak immune systems.

Infection begins with the ingestion of water or food containing spore-like oocysts



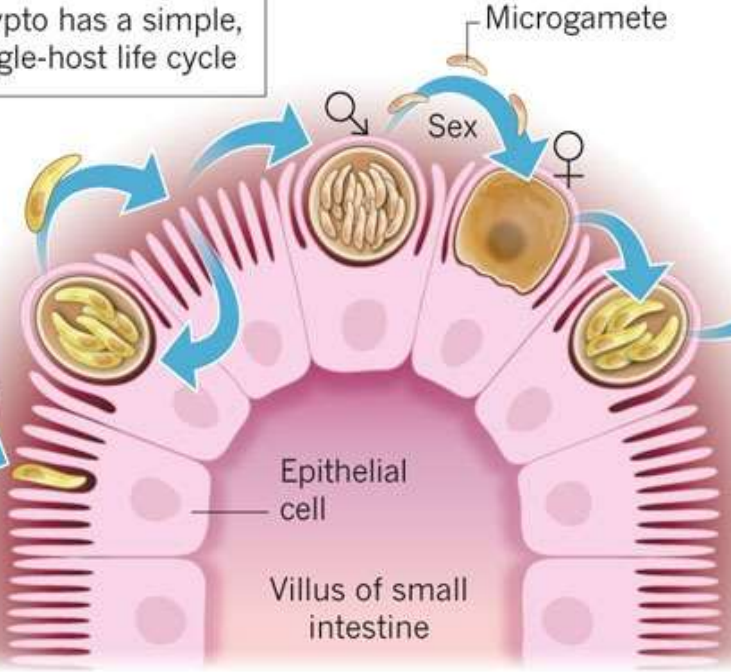
Cryptosporidium enters the cells of the small intestine



Infection



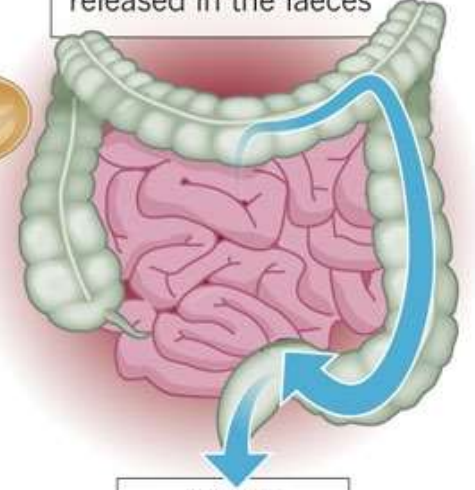
Crypto has a simple, single-host life cycle



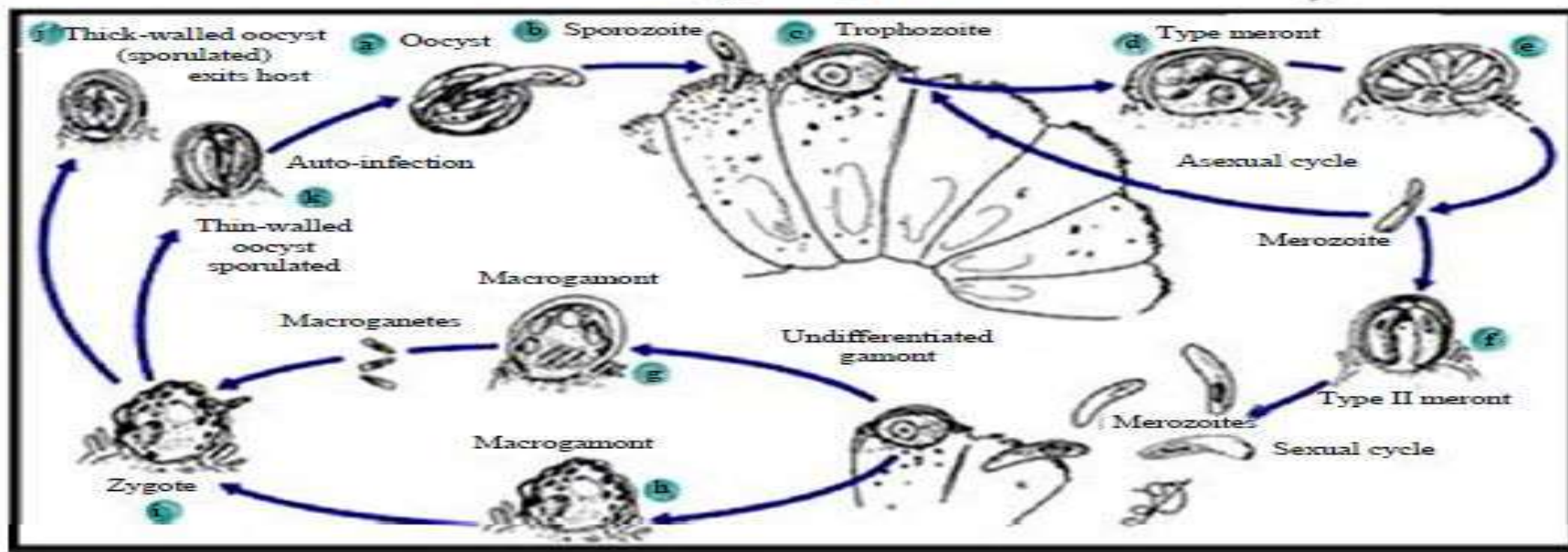
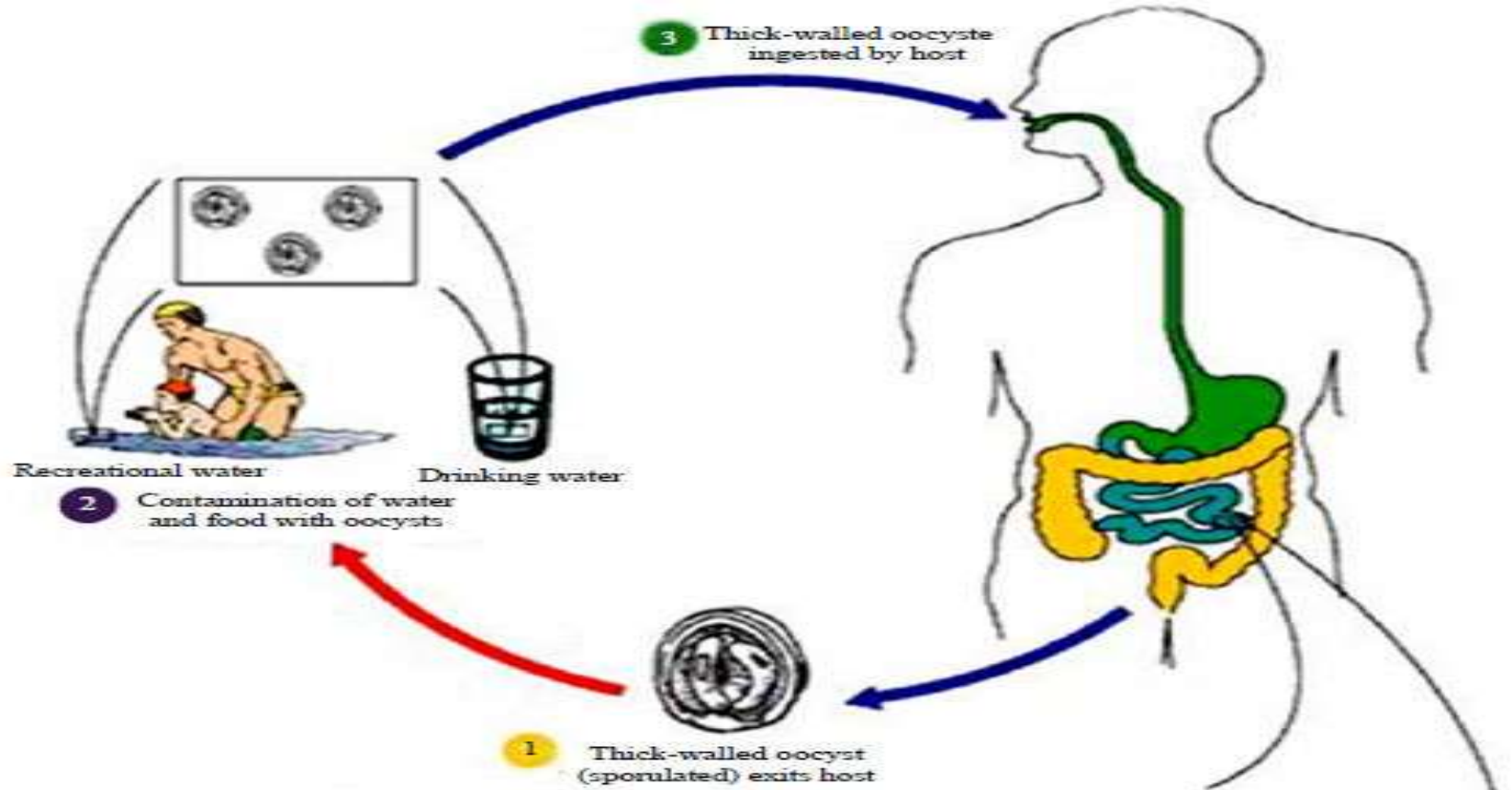
Released oocysts



The oocysts pass into the colon and are released in the faeces



Crypto infects others

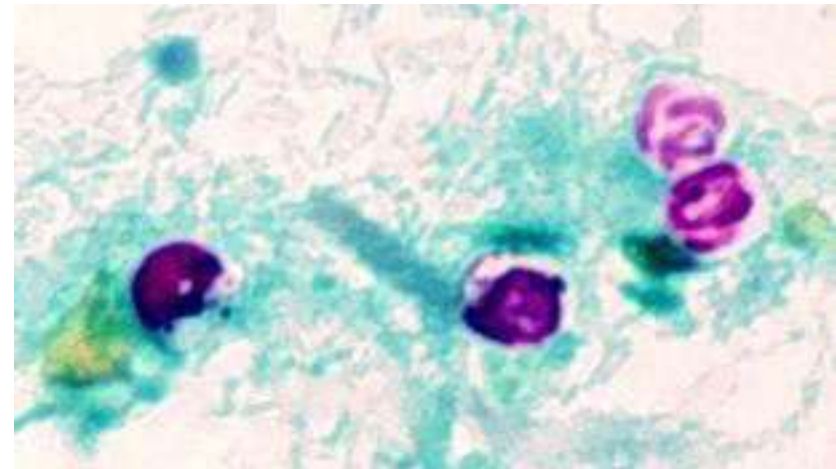


Diagnosis

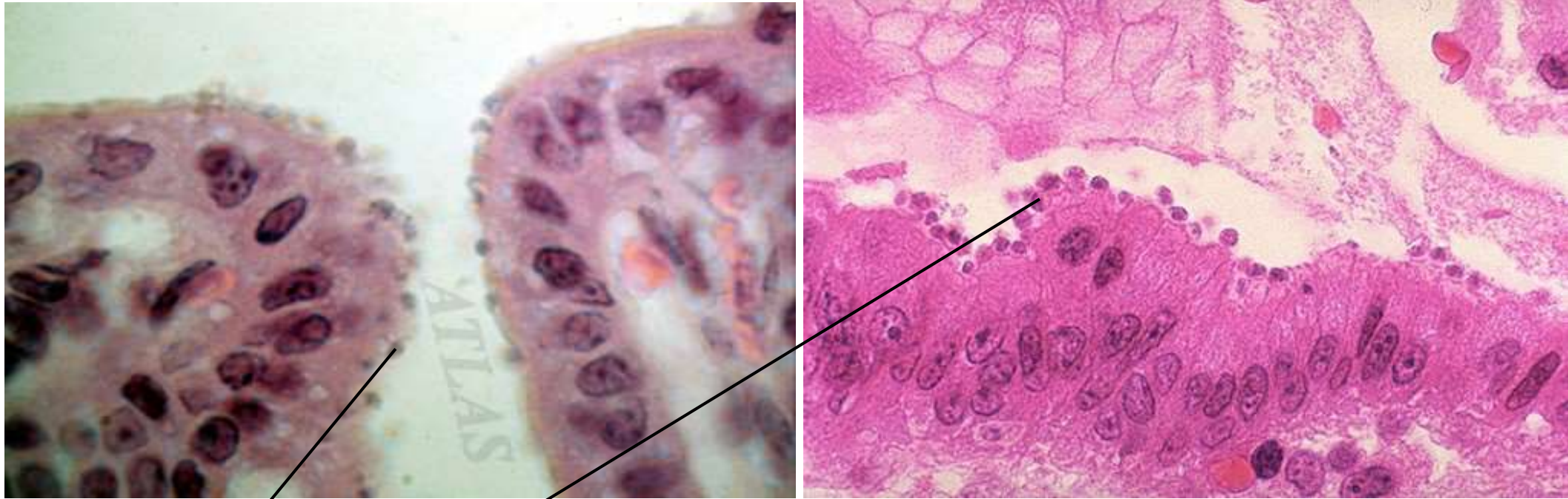
- ❑ Microscopy with an acid fast stained stool smear, which will stain the oocysts bright red.
- ❑ Another form of microscopy is fluorescent microscopy using monoclonal antibody to oocyst wall



Direct immunofluorescence
antibody stain



acid-fast oocyst stain



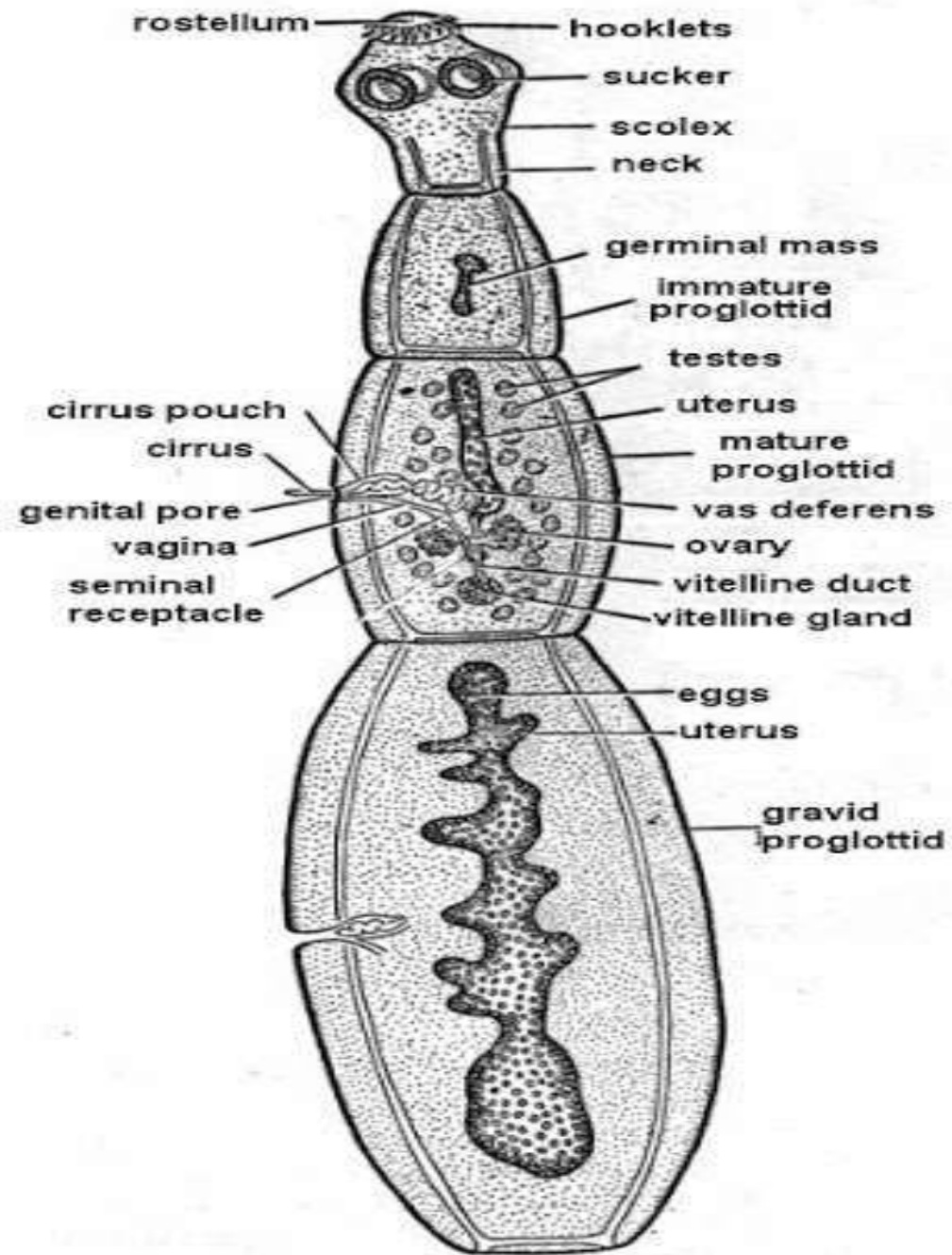
Mouse small intestine infected with *Cryptosporidium*. Small bodies seem to be on the surface of epithelial cells are various developmental stages of *C. parvum* enveloped by host cell membrane. H & E stain.

Echinococcus granulosus

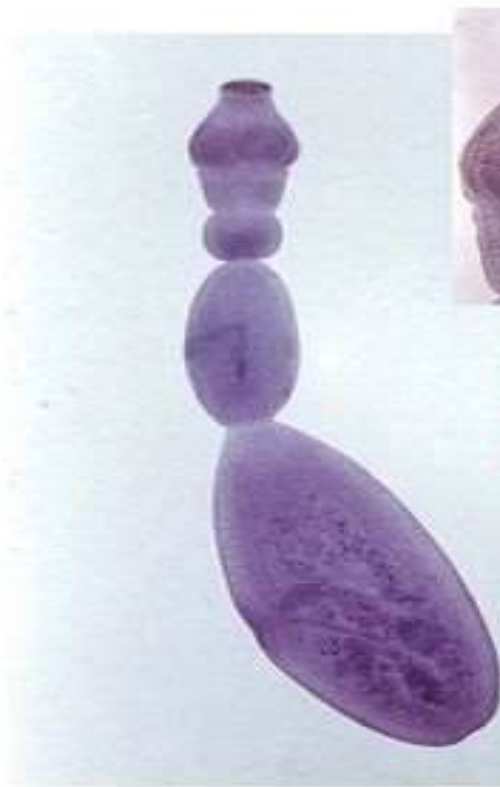
- ❑ Echinococcus granulosus, also called **hydatid worm** belongs to class Cestoda
- ❑ It causes cystic echinococcosis in livestock and humans **being intermediate hosts** and parasitize the small intestines of adult canids
- ❑ It is a zoonotic disease
- ❑ Definitive hosts are carnivorous predators like dogs, wolves, foxes and lions. **While sheep, goat, cattle, pigs and rodents are intermediate hosts.** **Birds and arthropods act as mechanical vectors**

Morphology

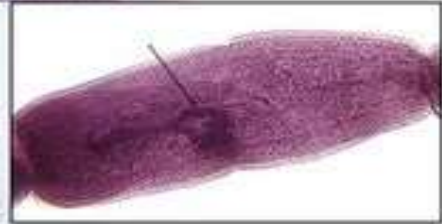
- ❑ The adult **tapeworm** ranges in length from 2 mm to 7 mm and has three proglottids when intact — an immature proglottid, mature proglottid and a gravid proglottid.
- ❑ It has scolex with four suckers and also has a rostellum with hooks.
- ❑ Echinococcus is triploblastic, anus is absent and it has no digestive system.



ECHINOCOCCUS GRANULOSUS



**FORMA ADULTA
(2-3 mm)**



**QUISTE
HIDATÍDICO**



Transmission

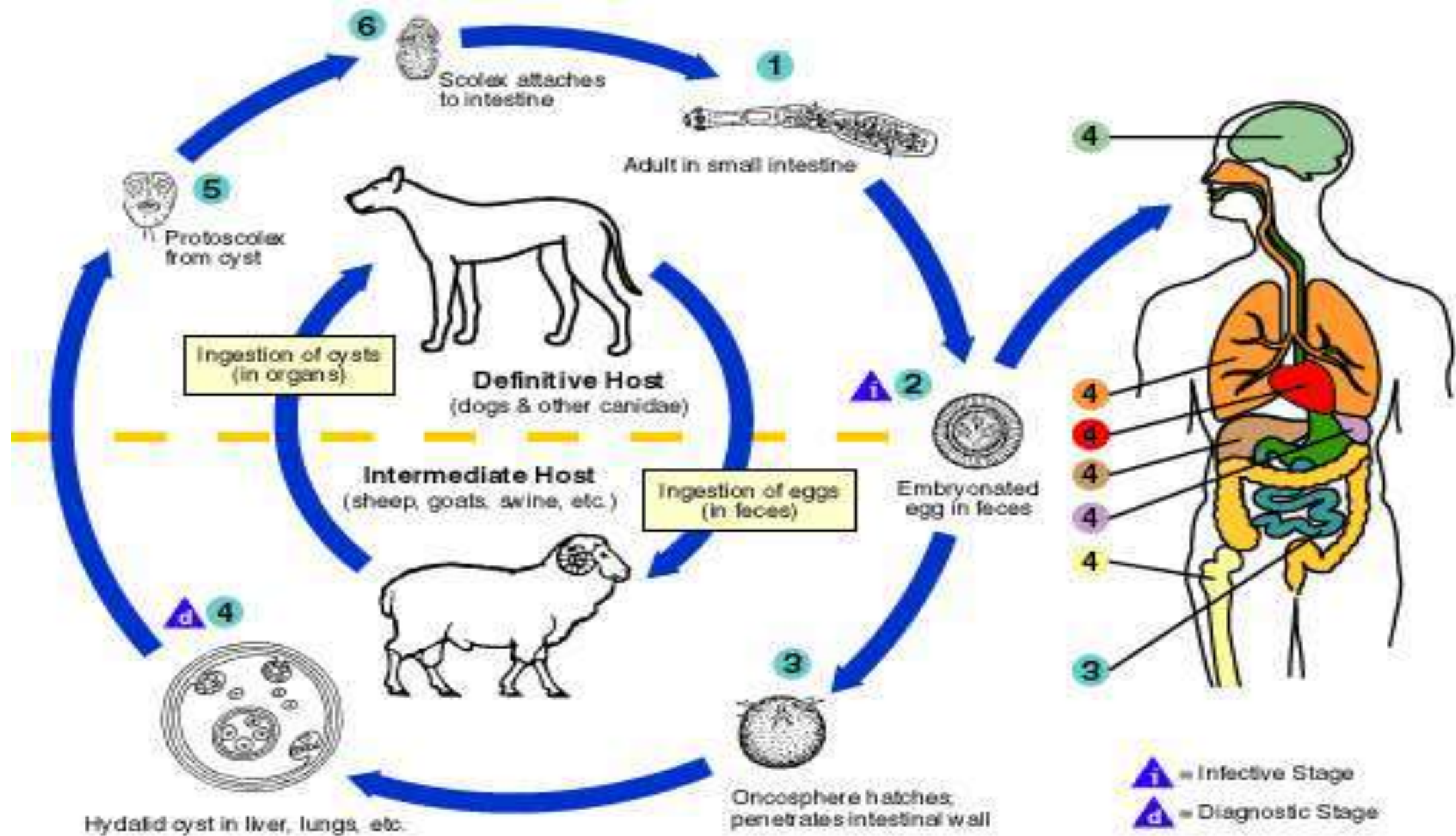
- Adult *E. granulosus* release eggs within the intestine which will be transported out of the body via **feces**
- When contaminated waste is excreted into the environment, intermediate host has the potential to contract the parasite by grazing in contaminated pasture
- It is transmitted from the intermediate host (**sheep**) to the definitive host (**dogs**) by frequent feeding of offal. Consuming offal containing *Echinococcus granulosus* can lead to infection

LIFE CYCLE

- ❑ The adult is in the small intestines of the definitive host(dogs)
- ❑ Gravid proglottids release eggs that are passed in the feces
- ❑ The intermediate hosts are infected by ingesting eggs, the egg hatches in the small bowel and releases an oncosphere
- ❑ The oncosphere penetrates the intestinal wall and moves through the circulatory system to various organs
- ❑ In the organs they develop into cysts and enlarge gradually

LIFE CYCLE

- ❑ The cysts produce protoscolices and daughter cysts
- ❑ Definitive host eats the infected organs and becomes infected
- ❑ After ingestion, the protoscolices evaginate, attach to the intestinal mucosa and develop into adult stages In 32-80 days, cycle starts over



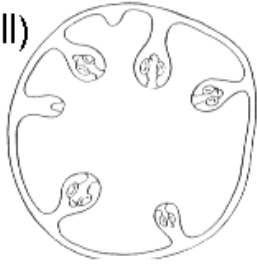
Taeniidae (mammals swallow eggs)

Four types of larval stages. Produce scoleces asexually.

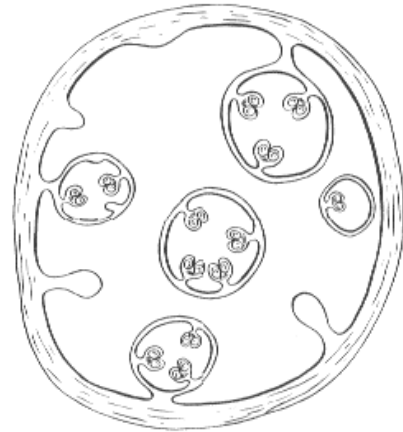
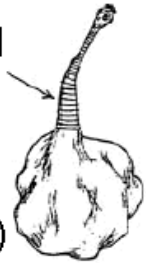


cysticercus
(large bladder
with single
invaginated
scolex)

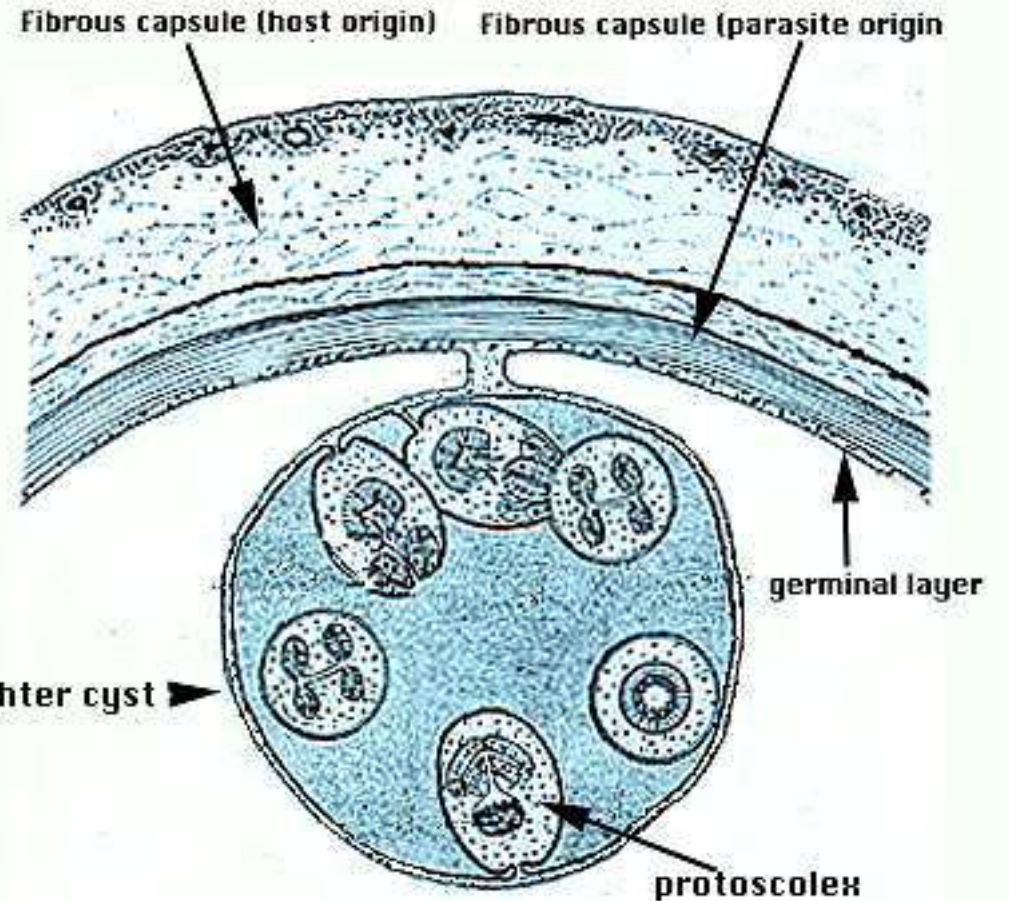
coenurus (single
bladder with
numerous scolices
attached to the
inside of the bladder
wall)



strobilocerus (small
bladder with long
everted strobilus
with an
invaginated scolex)



hydatid cyst (large capsule
containing many smaller ones
called brood capsules, each
being attached by a slender
stalk to the germinal layer of
the mother cyst)



Hydatid cyst

The growth rate of cysts is highly variable and may depend on strain differences and cyst location. Estimates of the average increase of cyst diameter vary

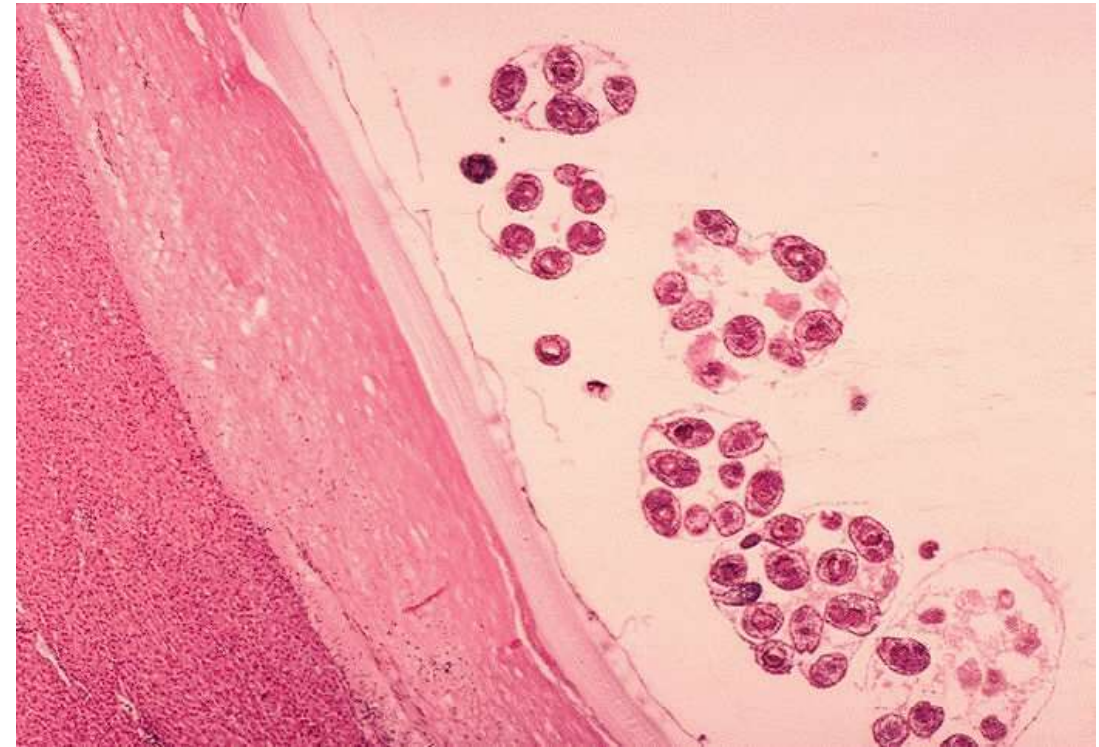
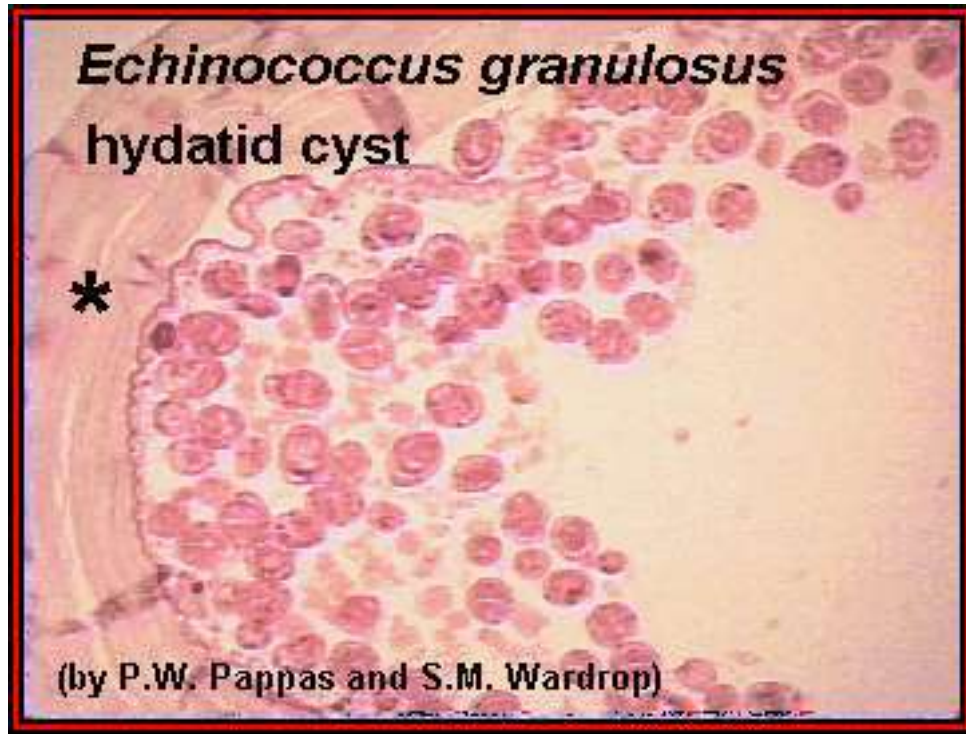




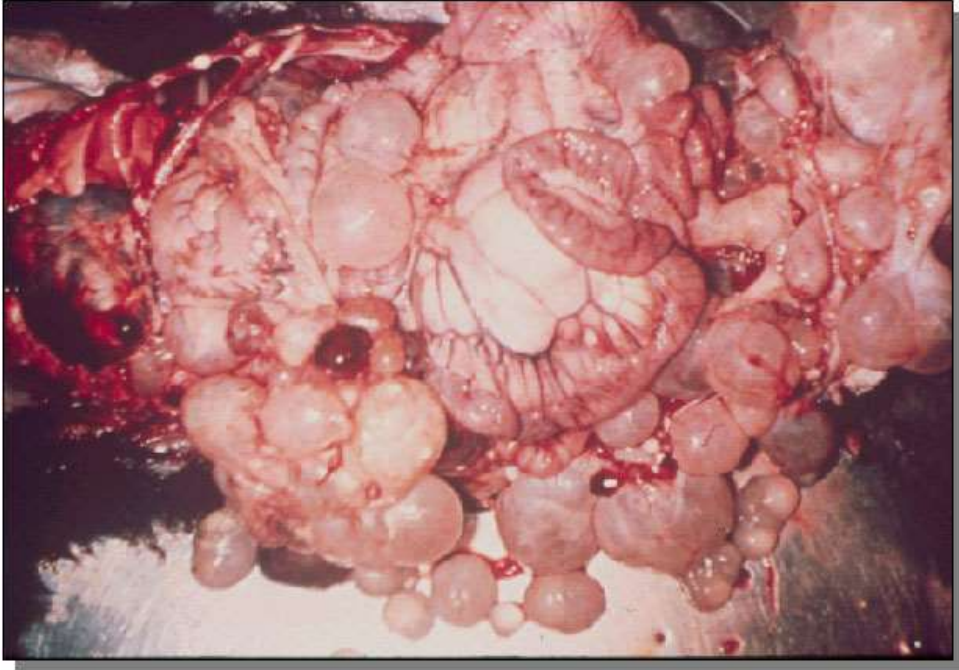
Gross pathology of membrane and hydatid daughter cysts from human lung



Pathologically hydatid liver cyst has three distinct layers:



Histopathology of *Echinococcus granulosus* hydatid cyst in a sheep. Thick fibrous pericyst, hyaline ectocyst, and brood capsules filled with protoscolices are visible.



Hydatid cysts

DIAGNOSIS

- ❑ Diagnosis in the definitive host, the dog, is difficult by ordinary microscopy as it cannot demarcate between *Taenia* and *Echinococcus* eggs
- ❑ Detection of antigens in feces by ELISA is currently the best available technique Other techniques are:
 - Imaging
 - Serologic testing
 - Examination of cyst fluid



Echinococcus eggs in feces