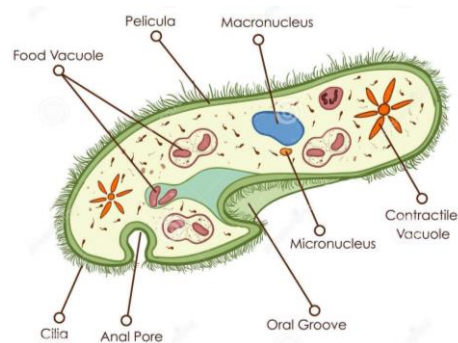


Completion of the lecture
of December 9 - Insects Lice and Fleas
(material – Moodle, 12. Lecture)

CILIOPHORA **MICROSPORIDA**

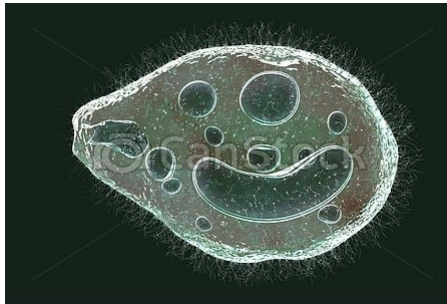
Phylum: CILIOPHORA

Most ciliates are free-living; however, a few groups are commensals or parasitic



Family: Balantidiidae

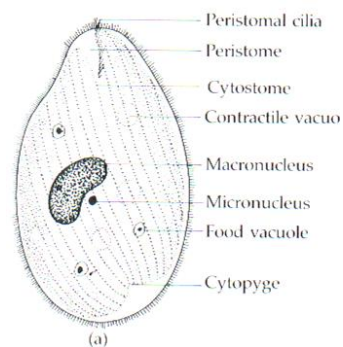
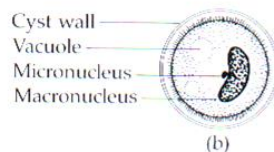
- Family Balantidiidae, which includes only one genus
- and species *Balantidium coli* are found in the intestinal tract of arthropods and some vertebrates, including mammals
- Pathogens of **humans, pigs** and monkeys

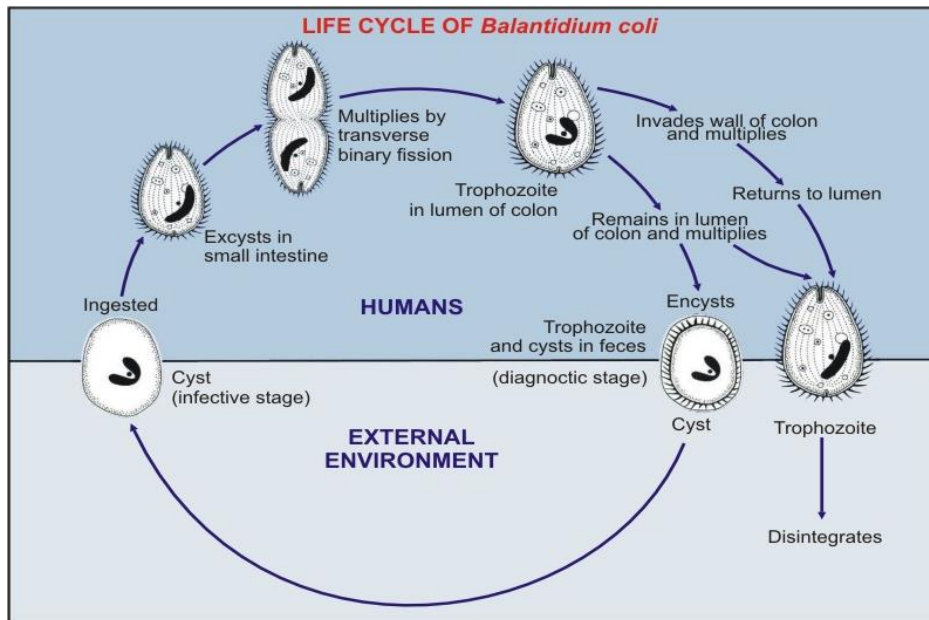


Morphology

- defining characteristic is nuclear dimorphism
 - micronucleus (genetic)
 - macronucleus (somatic)
- Macronucleus is typically elongate and kidney-shaped; micronucleus is spherical
- 2 prominent contractile vacuoles, indicating osmoregulation
- Food vacuoles in the cytoplasm contain debris, bacteria, RBCs, and fragments of host epithelium

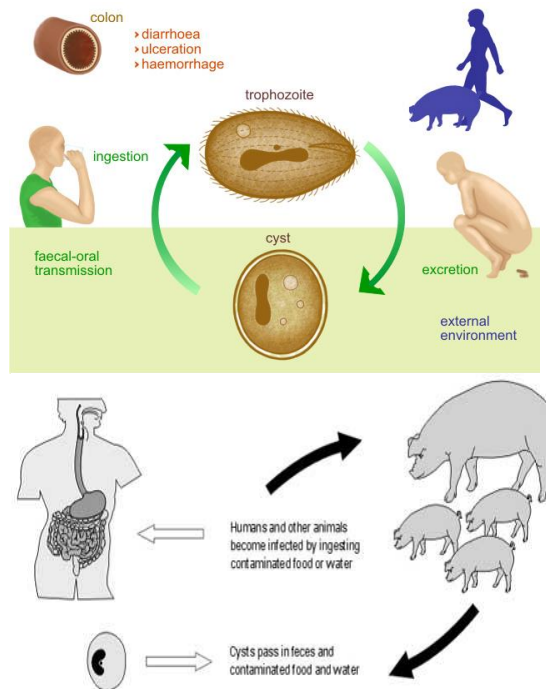
Balantidium coli





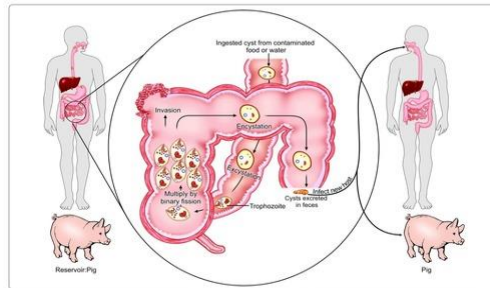
Epidemiology

- Balantidiosis (**zoonosis !**) is most often found in tropical regions throughout the world
- It is not a common human disease; the infection rate is less than 1%
- The parasite is **nonpathogenic in pigs** and is much more prevalent (20-100%) among these hosts
- **Pigs are a good source of infection for humans** in areas where they share habitation



Symptomatology

- Trophozoites primarily resides in the caecal area and throughout the large intestine;



Parasitic invasion of the mucosal lining is followed by hemorrhaging and ulceration - **balantidine dysentery**

Diagnosis

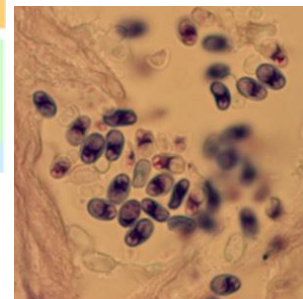
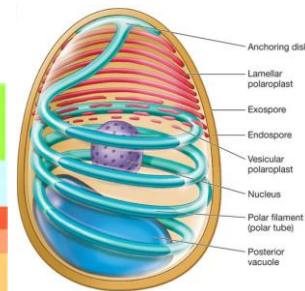
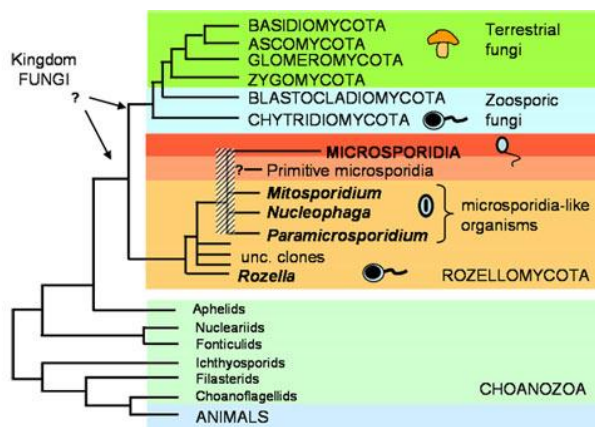
- Coprological examination, looking for trophozoites (in case of diarrhea) and cysts
- Trophozoites are readily identified because of their large size and the fact that *B. coli* is the only ciliate that parasitizes humans and pigs
- The infection may disappear spontaneously or the host may become asymptomatic, with the host remaining as a carrier

Therapy

- metronidazol
- paromomycín
- diodoquine /doxycycline / ampiciline

Phylum: Microsporidia

- The obligate intracellular protozoan parasites
- More than 1,200 species belonging to 143 genera have been described as parasites infecting a wide range of vertebrate and invertebrate hosts.
- Microsporidia, are characterized by the production of resistant spores that vary in size, depending on the species.
- They possess a unique organelle, the polar tubule or polar filament, which is coiled inside the spore as demonstrated by its ultrastructure.

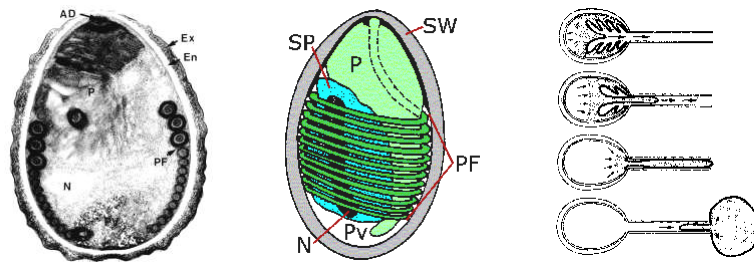


Genus: *Encephalitozoon*

- *Encephalitozoon cuniculi*
- *E. intestinalis*
- *Encephalitozoon hellem*
- *E. lacertae*

Genus: *Enterocytozoon*

- *Enterocytozoon bieneusi*
- *Vittaforma corneae*



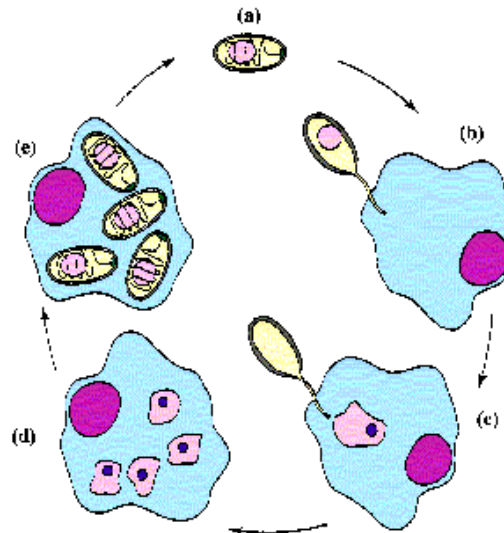
Electron microphotograph: polar filament (PF).

Adhesive disc (AD),

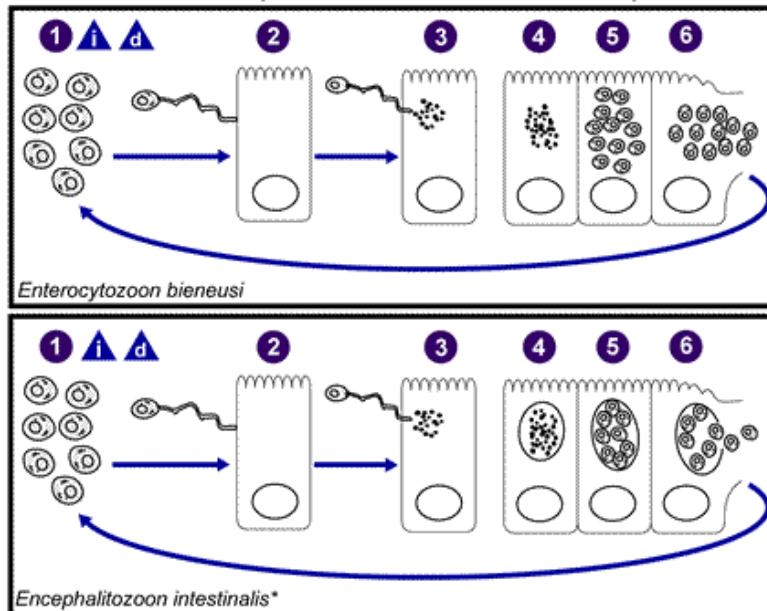
polaroplast (P), exospore (Ex), endospore (En), nucleus (N), posterior vacuole (Pv).

sporoplasm (SP), nucleus (N), polaroplast (P), polar filament (PF), posterior vacuole (Pv)
spore wall (SW).

Life cycle



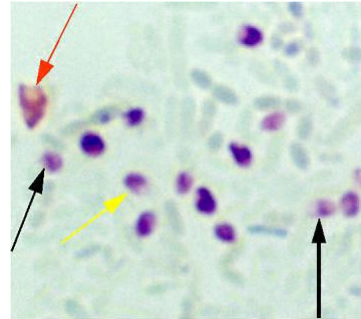
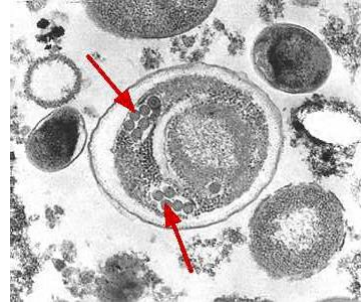
Intracellular development of *E. bienersi* and *E. intestinalis* spores.



*Development inside parasitophorous vacuole also occurs in *E. hellem* and *E. cuniculi*.

Life cycle

- Microsporidia develop by sporogony to mature spores.
- During sporogony, a thick wall is formed around the spore, which provides resistance to adverse environmental conditions.
- When the spores increase in number and completely fill the host cell cytoplasm, the cell membrane is disrupted and releases the spores to the surroundings.
- These free mature spores can infect new cells thus continuing the cycle

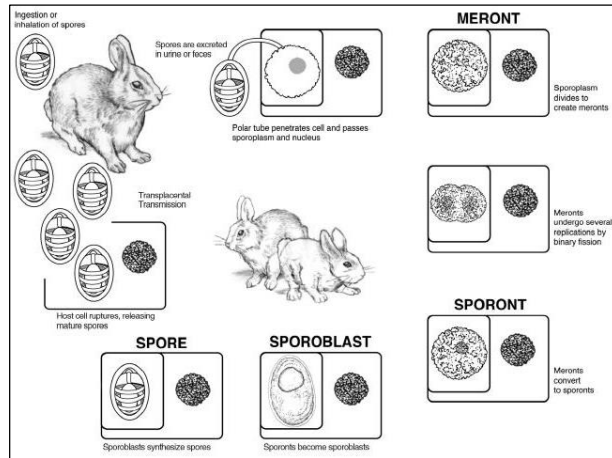


Clinical Features

- Human microsporidiosis represents an important and rapidly emerging opportunistic disease, occurring mainly, but not exclusively, in severely immunocompromised patients with AIDS.
- Additionally, cases of microsporidiosis in immunocompromised persons not infected with HIV as well as in immunocompetent persons also have been reported.
- The clinical manifestations of microsporidiosis are very diverse: Keratoconjunctivitis, infection of respiratory and genitourinary tract, disseminated infection (*Encephalitozoon cuniculi*, *Encephalitozoon hellem*)

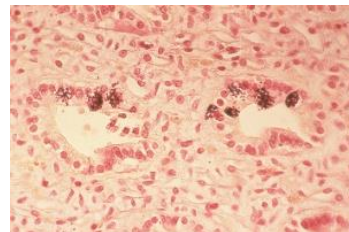
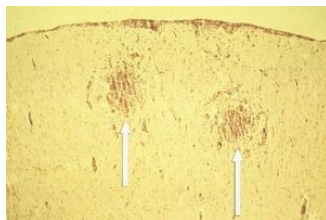
➤ *Encephalitozoon cuniculi* – Encephalitozoonosis of rabbit

- Nonspecific neurol. symp.
- Transmission
 - Horizontal – urine
 - Vertical – blood across placenta
- Diagnosis
 - Serologic and histologic



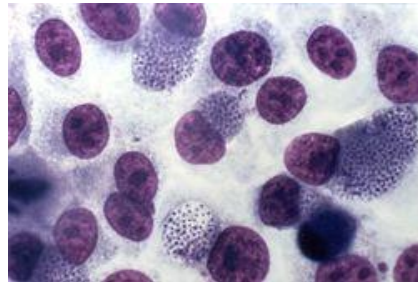
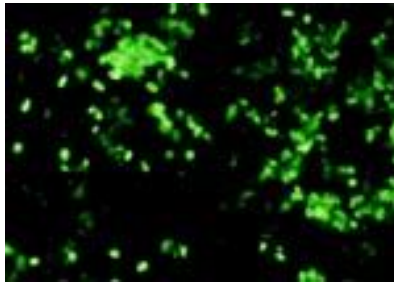
Encephalitozoonosis

- Spread via blood to kidneys and brain
- Multifocal depressions
 - Granulomatous inflammation
 - Scarring of renal interstitium
- Organisms in pseudocysts
 - Renal tubule epithelium
 - Ruptures cause inflammation
- Focal granulomas – brain
- Tx: none



Laboratory Diagnosis

- [Light microscopic examination](#) of the stained clinical smears (especially the fecal samples,) identification of spores in fecal smears. The spores measure from 0.8 to 4 μm .
- [Transmission electron microscopy](#) (TEM) is still the gold standard and is necessary for the identification of the microsporidian species.
- [Immunofluorescence assays](#) (IFA) using monoclonal and/or polyclonal antibodies are being developed for the identification of microsporidia in clinical samples.
- [Molecular methods](#) (mainly Polymerase Chain Reaction, PCR) is an alternative method for the laboratory diagnosis of microsporidiosis.



Therapy

- albendazole
- fumagiline
- nitazoxanide