



## UNIT-5 (PROTOZOA OF VETERINARY IMPORTANCE)



### Topic

Morphology, epidemiology, pathogenesis, clinical signs, diagnosis and control measures of protozoan parasites belonging to the families: Balantiididae



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## *Buxtonella sulcata*

- ❖ Found in colon of bovines

## *Balantidium coli*

*Balantidium coli* is the **largest protozoan** and the only ciliate known to parasitize humans

### **Common Name/Synonyms**

- ❖ Balantidiosis is also known as balantidiosis or ciliary dysentery

**Distribution:** Worldwide

### **Definitive hosts :**

Pigs and rat are important sources of infection for human beings (**Pigs** main animal reservoir) and is also reported in dogs, cows, horses, rodents and nonhuman primates

- ❖ Man-to-man transmission is rare but possible

**Intermediate hosts :** No intermediate hosts or vectors

### **Mode of transmission:**

- ❖ Cysts (**Infective stage**) are responsible for transmission of balantidiosis through ingestion of contaminated food or water through the oral-fecal route. Water is the vehicle for most cases of Balantidiosis

### **Site of Infection:**

- ❖ Caecum and colon

### **Virulence factor:**

- ❖ Hyaluronidase- help to penetrate intestinal mucosa

### **Excystation:**

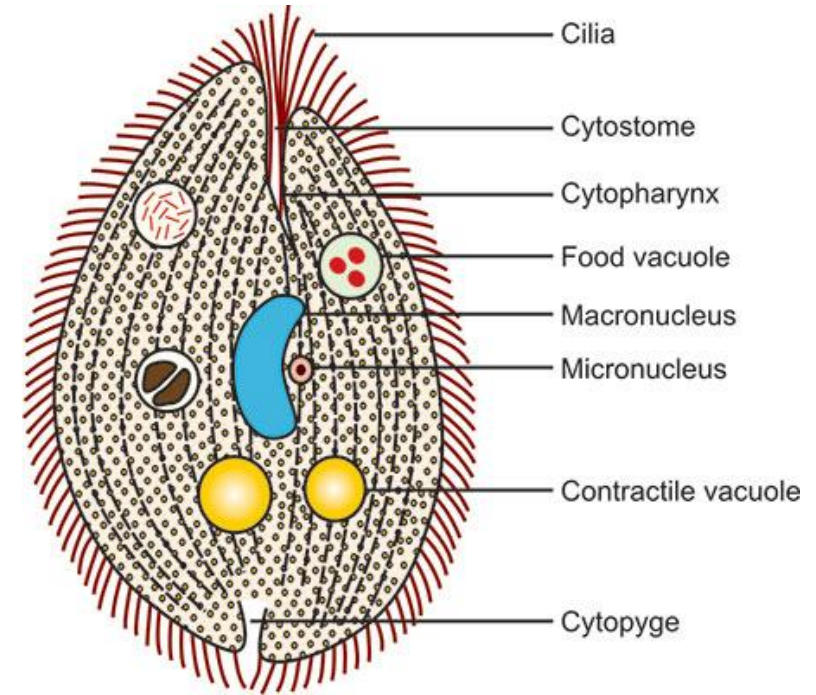
- ❖ occurs in small intestine

### **Reproduction:**

- ❖ Trophozoites multiply by asexual (**transverse binary fission**) or sexual (**conjugation**) occurs in large intestine

## TROPHOZOITE

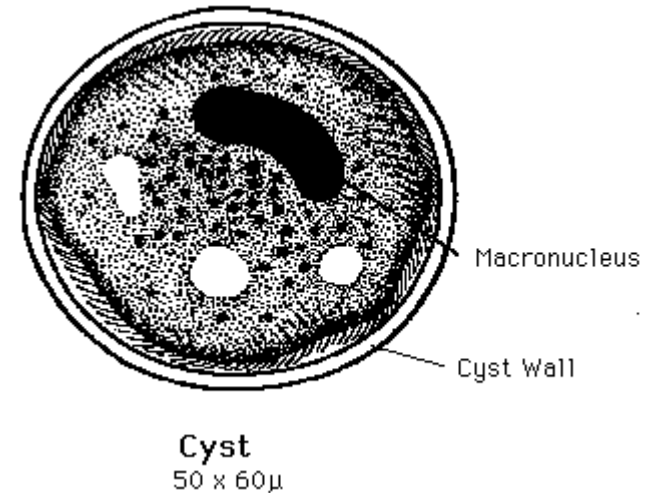
- ❖ Found in active stage of disease (dysenteric stool), invasive form shape: oval
- ❖ Size: 30-300  $\mu\text{m}$  long x 30-100  $\mu\text{m}$  breadth
- ❖ Whole body covered with a row of tiny delicate cilia – organ of locomotion
- ❖ Cilia present near the mouth part – longer called “adoral cilia”
- ❖ Anterior end- narrow - Bears a groove (peristome) that leads to a mouth (cytostome) - followed by a short funnel shaped gullet (cytopharynx) extending up to one-third of the body.
- ❖ Posterior end- broad, round - Bears an excretory opening (Cytopyge)
- ❖ No anus
- ❖ Cytoplasm- outer clear ectoplasm and inner granular endoplasm



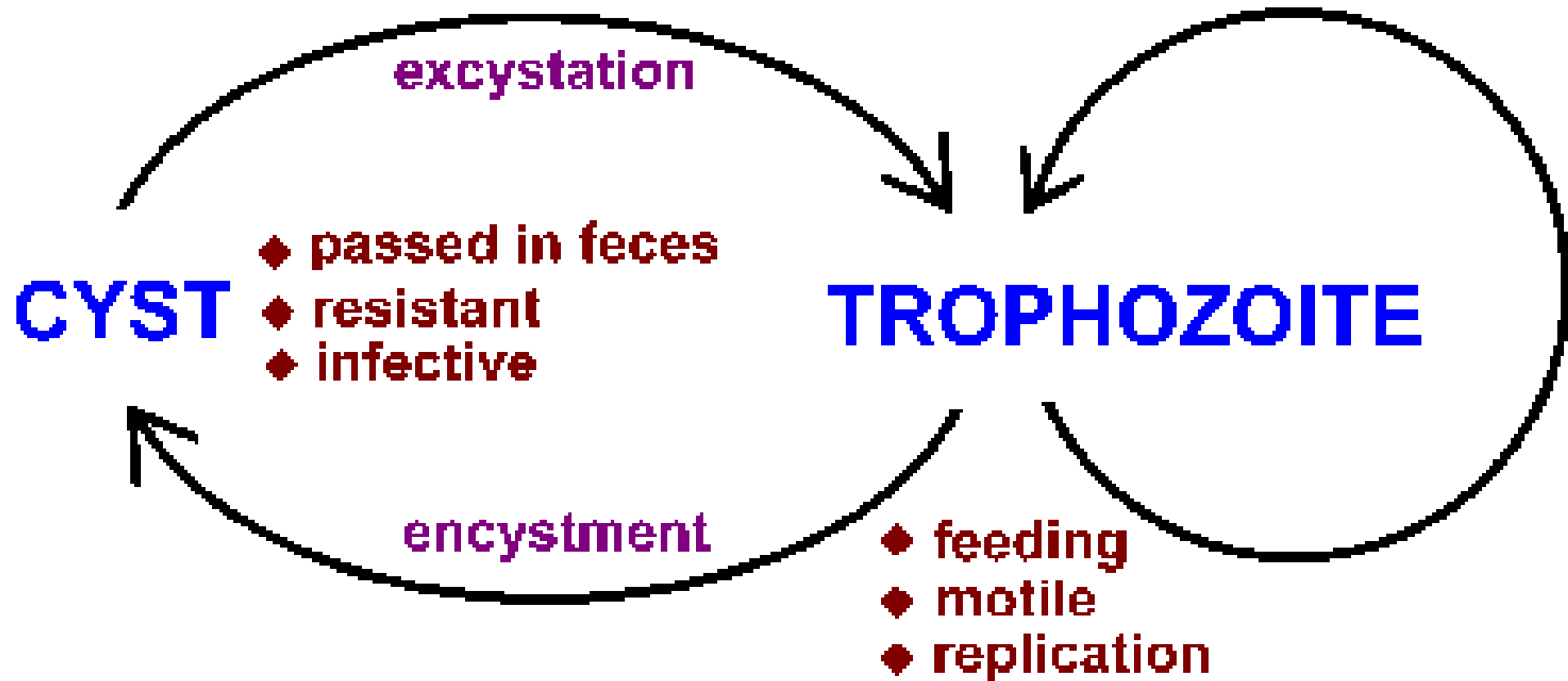
- ❖ Endoplasm contains two nuclei 1. **Macronucleus**: large kidney shaped macronucleus in centre and responsible for the **cytoplasmic** activities 2. **Micronucleus** : small vesicular nucleus, lie in the notch of macronucleus and responsible for **reproductive** process
- ❖ One or two contractile vacuoles: lie side by side or one above the other maintain the proper osmotic pressure inside cell
- ❖ Numerous food vacuole: contains food particles like debris from host gut, bacteria, starch grains, fat droplets and occasional RBCs, etc. Where digestion of food particles takes place

# CYST

- ❖ Shape: round
- ❖ Size: 40-60  $\mu\text{m}$
- ❖ Immobile and dominant
- ❖ Surrounded by a thick transparent cyst wall allows the cysts to resist degradation in the acidic environment of the stomach and the basic environment of the small intestine
- ❖ Contains two nuclei- macronucleus and micronucleus and vacuoles
- ❖ Cilia- seen in younger cyst but is absorbed on maturity movement ceases
- ❖ Infective stage of Animals
- ❖ Non-reproductive stage



# Typical Fecal-Oral Life Cycle





## Life cycle

The cyst is the infective stage of *Balantidium coli*



Once the cyst is ingested via feces-contaminated food or water, it passes through the host digestive system



There, excystation takes place in small intestine



Excystation produces a trophozoite from the cyst stage



Single trophozoite forms from each cyst



The motile trophozoite is the feeding stage of the parasite multiply either in gut lumen or enter the submucosa of large intestine



Trophozoites multiply by asexual binary fission or sexual conjugation

## **Asexual reproduction**

Division by binary fission



Micronucleus divide first followed by macronucleus



A transverse septum forms – separates the cytoplasm into halves



## **Sexual reproduction**

Replicate sexually (Syngamy) by conjugation



Two trophozoites come in contact with each other at their anterior ends



Exchange the nuclear material for few moments then they detach



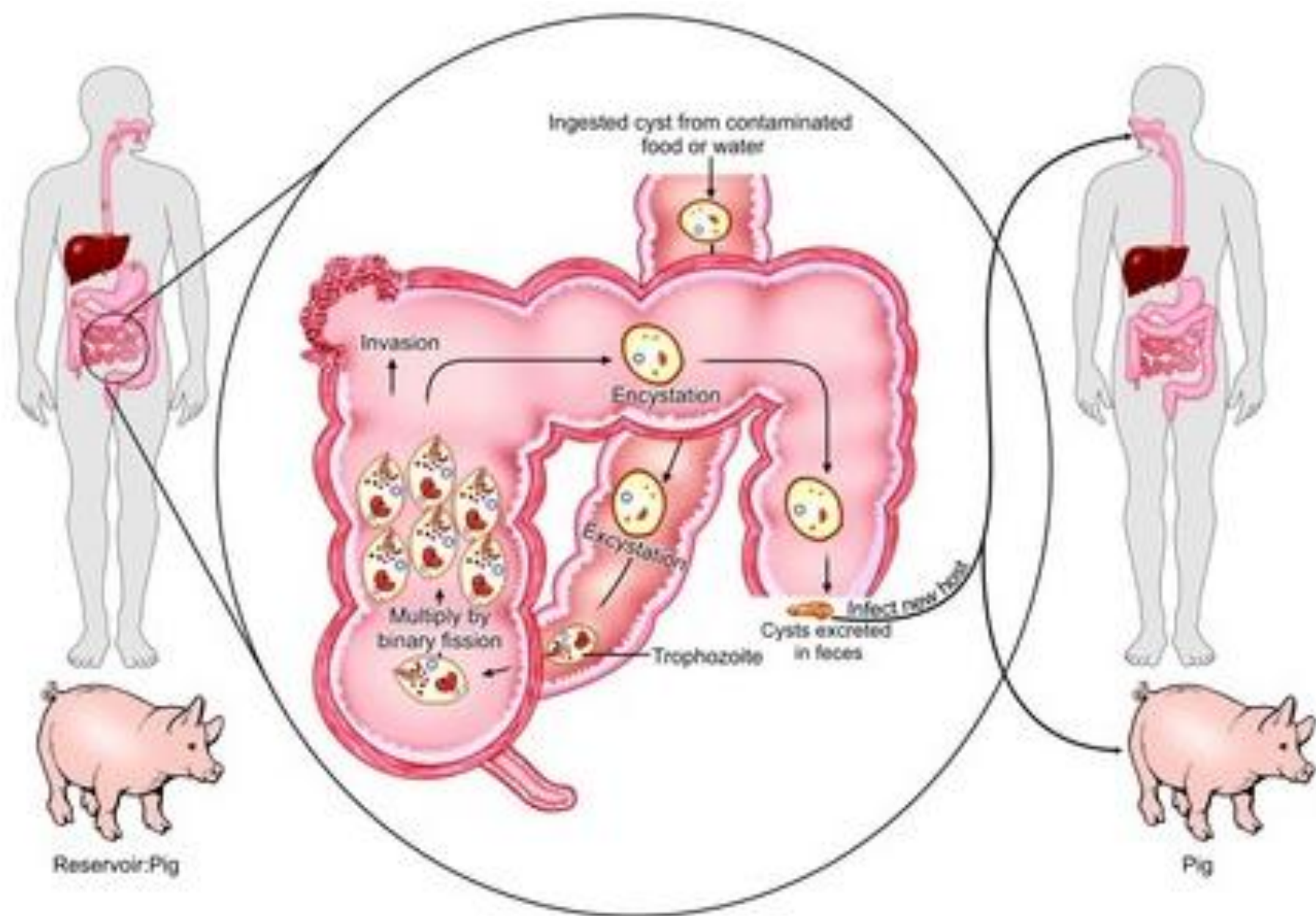
No increase in number of trophozoites



Both trophozoite and cyst are excreted in faeces



Trophozoites disintegrates, cysts are resistant and are infective to man and pig



## Pathogenesis and Sign and Symptoms

- ❖ Most cases are asymptomatic
- ❖ If symptomatic, *B. coli* infections may cause severe infection that resembles acute amoebiasis
- ❖ Trophozoites invade gut sub mucosa- form multiple tiny superficial ulcers - Ulcers with necrotic base and undermined edge just as those of *Entamoeba histolytica*
- ❖ Microscopically- cluster of trophozoites are found in sub mucosa with inflammatory cells (lymphocytic)
- ❖ Symptoms include diarrhea with profuse mucus and blood, fever, nausea, vomiting, Abdominal pain, anorexia (loss of appetite) and even dysentery
- ❖ The diarrhea may persist for long periods of time resulting in acute fluid loss and weight loss
- ❖ Metastatic and extraintestinal diseases, liver, lung and brain abscesses, usually are very rare

## LABORATORY DIAGNOSIS



### STOOL MICROSCOPY

Trophozoites- detected in acute disease (dysenteric stool) -easy to identify by its rotatory motility, large kidney shaped macronucleus and presence of cilia

Cysts- seen in chronic cases or carriers - round, 40-60 μm in size, surrounded by a cyst wall and presence of two nuclei

### HISTOPATHOLOGY

Scrapings of colonic and ceacal mucosa can be stained with H&E

Histopathological staining of biopsy tissue or scrapping of the ulcers taken by sigmoidoscopy -reveals clusters of trophozoites, cysts and lymphocytic infiltration found in sub mucosa

### CULTURE

Media used: Boeck and Drbohlav egg serum media and Balamuth's media

Culture rarely necessary as parasites are easily detected by stool microscopy or histopathology

## **PREVENTION**

- ❖ Treatment of carriers shedding the cysts
- ❖ Hygienic rearing of pigs and prevention of pig to human contact
- ❖ Prevention of contamination of food or water with pig and human faeces

## **TREATMENT**

- ❖ Tetracycline- 500 mg four times a day for 10 days
- ❖ Alternatively Metronidazole- 750 mg three times a day for 5-7 days
- ❖ Treatment of carriers- preventing spread of the disease
- ❖ No relapse or drug resistance reported