Flagellates Protozoa

Sub-phylum: Mastigiphora

INTRODUCTION

Flagellates are unicellular microorganisms. Their locomotion is by lashing a tail-like appendage called a flagellum or flagella and reproduction is by simple binary fission. **There are three groups of flagellates:**

a-**Flagellates of digestive tract:**

-*Giardia lamblia* ,

-*Chilomastix mesnili* ,

b-**Flagellates of genital organs:**

-*Trichomonas vaginalis.*

c-Hemoflagellates(Flagellates of blood and tissue.**)**

-Trypanosoma species.

-Leishmania species.

- -The flagellates protozoa are distinguished by having in their trophozoite stage one to several thread-like extensions of the ectoplasm(flagella) ; arising from a complex system of axonemes extending along the midline which arising from a basal body .

Giardia lamblia

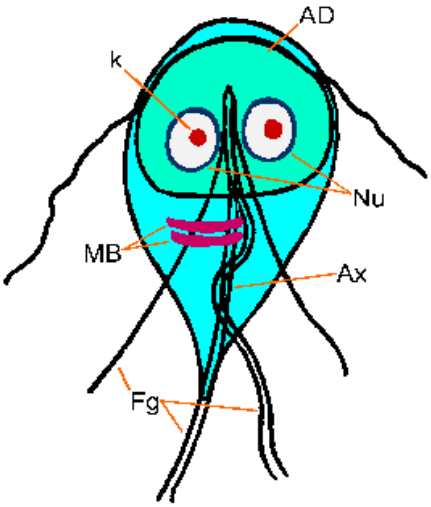
Giardia lamblia is a flagellate of world-wide distribution. It is more common in warm climates than temporal climates . It is the most common

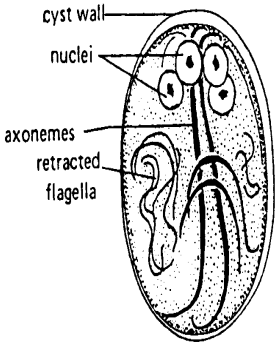
flagellate of the intestinal tract, causing Giardiasis. Humans are the only important reservoir of the infection.. *Giardia* inhabits the crypts of the duodenum and upper jejunum. Giardiasis is an infection of the upper small bowel, which may cause diarrhea.

Disease: Giardiasis, Lambliasis, steatorrhea.

Morphology

The parasite has both a trophic and cystic stage. The trophozoites of *G. lamblia* is pear shaped, with a broad anterior and much attenuated posterior . It is 10 -12μm long and 5-7 μm wide, bilaterally symmetrical, and has two nuclei with central karyosomes . It is also relatively flattened with a large sucking disck on the anterior ventral side, which serves as the parasites method attachment to the mucosa of the host.The trophozoite also has two median bodies the function of the median bodies is not known, but most believe they are somehow involved with the adhesive disk and its formation, and four pairs of flagella .The fibrils are called axonemes (Ax) or (axostyles). They attach themselves to the surface of the jejunal or duodenal mucosa by their disc-like suckers which are found on their ventral surface. They multiply in the gut by binary fission.





Trophozoite of *G. lamblia* cyst of G. *lamblia*

Morphology of Cysts

It is ovoid in shape; 8-12 µm long x 7-10 µm wide and have thin cyst wall Four nuclei present, often concentrated at on end. Flagella shorten and are retracted within cyst, axonemes provide internal support and parabasal bodies may also seen.

Clinical Disease

The main symptoms are abdominal pain, flatulence, and chronic diarrhea, lose of weight . It has been suggested that the coating of large surface areas of upper small bowel by giardia may act as a barrier to fat absorption and thus cause the steatorrhea (fatty or oil diarrhea). stool containing a large amount of mucus and fat and no blood. However 50% of *G. lamblia* infections are symptomless, although severe infections may develop in immunocompromised hosts.. After swallowing cysts for the first time, symptoms commonly develop 2-6 weeks later.

Laboratory Diagnosis and treatment

Cysts can be found by examination of the semi formed stool preparation. Trophozoites are found by examination of saline wet preparations of fresh, diarrheic stool, duodenal or jejunal aspirate. Serological methods of diagnosis are proving to be useful as means of diagnosis.

- The infection may disappear spontaneously but usually eradicated following therapy with metronidazole & Furazolidone

Chilomastix mesnili

It is thought to be non-pathogenic although the trophozoite has been associated with diarrheic stool. This is the largest flagellate found in man. The natural habitat of *Chilomastix mesnili* is the colon.

Morphology of trophozoite:

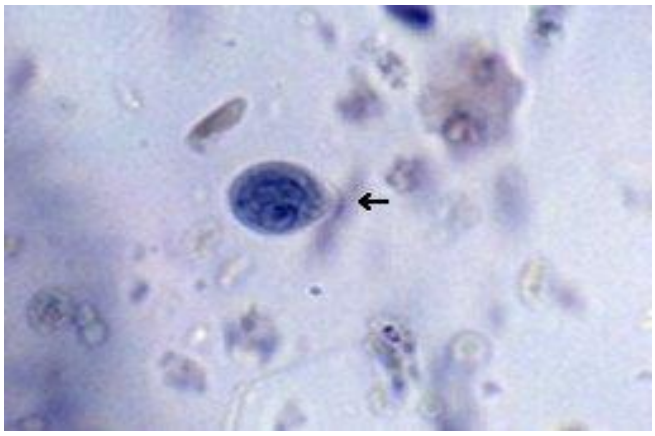
The parasite has both a trophic and cystic stage. The trophozoite of *C. mesnili* is pear shaped and measure 6-20μm in length. It is unsymmetrical rounded anteriorly and spirally twisted posteriorly. It has one large nucleus

with a small karyosome and three flagella that extend from the nucleus at the anterior end of the parasite. A distinct oral groove or cytosome can be seen near the nucleus with its sides being supported by two filaments. They are known to move in a directional manner.

Trophozoite of *C. mesnili*

Morphology of cysts

The cyst is 6-9μm; it has a large single nucleus with a large karyosome. is lemon shaped , it has a thick hyaline wall and having the characteristic internal features of the trophozoite.



The cyst of *C. mesnili*

Laboratory Diagnosis

The characteristic lemon shaped cysts can be seen in a formol-ether concentrate. Motile organisms can be seen in a wet preparation of a fresh stool .

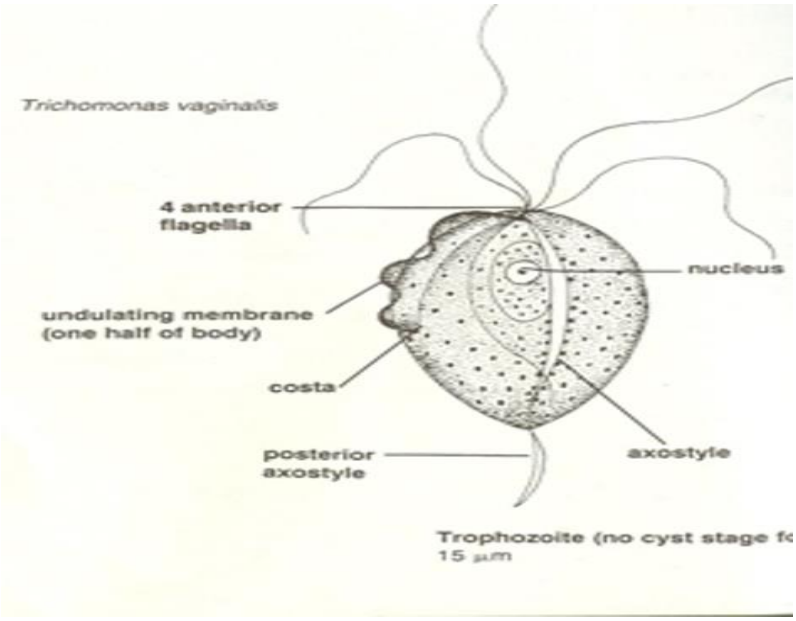
Trichomonas vaginalis

This protozoan parsitizes in the vagina, urethra and prostate and causes trichomonas vaginitis, urethritis and prostatitis. Trichomoniasis vaginalis is prevalent all over the world.

Morphology

Only the trophozoite stage is found in its life cycle. The trophozoite is ovoid or pear-shaped, 10~30×5~15μm in size. It has 4 anterior flagella and one posterior flagellum which turns back and is attached to the to the body by an undulating membrane. The undulating membrane of *T. vaginalis* is very short,

only one-half of its body length. There is nucleus and the axostyle project posteriorly out of the body. The motility is jerky and non-directional.



Trophozoite of *Trichomonas vaginalis*

Diagnosis

The specimen should be obtained from vaginal discharge, prostatic fluid or urine. Normal saline direct smear may be used for examination of the trophozoites.

The Ciliates

The ciliates belong to the family Ciliophora. They possess simple cilia or compound ciliary organelles, two types of nuclei and a large contractile vacuole. The only member of the ciliate family to cause human disease is *Balantidium coli*

Balantidium coli

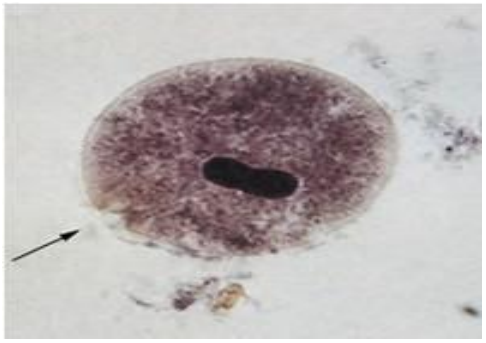
The organisms inhabit the large intestine, cecum and terminal ileum where they feed on bacteria. The most common hosts being humans, pigs and rodents. Human infection is usually from pigs and is rare.

Disease: Balantidiasis

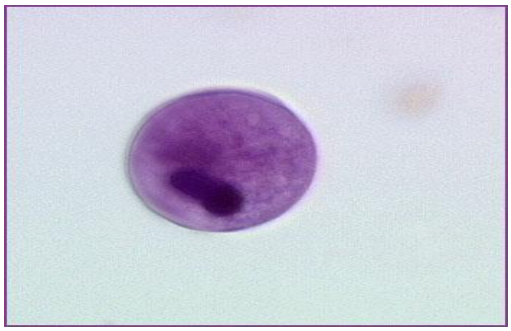
Morphology of the Trophozoite

Trophozoites of *B. coli* measure approximately 30-150µm in length x 25-120µm in width but have been known to attain lengths of up to 200µm. They are oval in shape and covered in short cilia. A funnel shaped cytosome can be seen near the anterior end. the two nuclei are visible. The macronucleus is

long and sausage-shaped, and the spherical micronucleus is nested next to it, often hidden by the macronucleus .Multiplication is by binary fission in the trophozoite stage.



Cyst of *B. coli*



Trophozoite *B. coli*

Morphology of the Cyst

The cyst is spherical or ellipsoid and measures from 30-200µm by 20-120µm. It contains 1 macro and 1 micronucleus. The cilia are present in young cysts and may be seen slowly rotating, but after prolonged encystment, the cilia disappear. The cyst, ingested by a fresh host, excysts to liberate the trophozoite.

Clinical Disease

Severe *B. coli* infections may resemble amebiasis. Symptoms include diarrhea, nausea, vomiting, and anorexia. The diarrhea may persist for long periods of time resulting in acute fluid loss. *Balantidium coli* also has the potential to penetrate the mucosa resulting in ulceration just as those of E Entamoeba histolytica.

Laboratory Diagnosis

Wet preparations of fresh and concentrated stool samples reveal the characteristic cysts and motile trophozoites. They are easier to identify in direct-smear saline preparations than permanently stained fecal smears.