Topic

Study of morphology of *Trypanosoma gambiense*

Assignment done by -

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Morphology of *Trypanosoma gambiense*

- ***Introduction :-***

Trypanosoma gambiense ***is a haemo- flagellate parasite. Trypanosoma is a genus of kinetoplastids, a monophyletic group of unicellular parasitic flagellate Protozoa. This trypanosome was first discovered in human blood in 1901 by Forde, and Dutton proposed the name*** *Trypanosoma gambiense* ***in 1902.*** *Trypanosoma gambiense* ***is a subspecies of*** *Trypanosoma brucei****. It is distributed in western and central Africa which causes chronic disease. It resides in the blood plasma of man. The parasite exists in humans as a trypomastigote form. The disease caused by Trypanosoma in man is known as Trypanosomiasis or sleeping sickness.***

- ***Location in the host :-***

Trypanosoma gambiense ***is transmitted between mammal hosts by an insect vector belonging to different species of tsetse fly. This is a parasite of the blood and tissue fluids in humans.***

- ***MORPHOLOGY :-***

The parasites are microscopic, flattened and pointed at both ends. It is an elongated spindle shaped organism with blunt posterior end, and with finely pointed anterior end. It is an actively motile flagellate. *Trypanosoma gambiense* ***is a typical eukaryotic cell and measures about 10µm to 40µm in length and 2.5µm to 10µm in width.*** *Trypanosoma gambiense* ***is morphologically indistinguishable from*** *Trypanosoma brucei.*

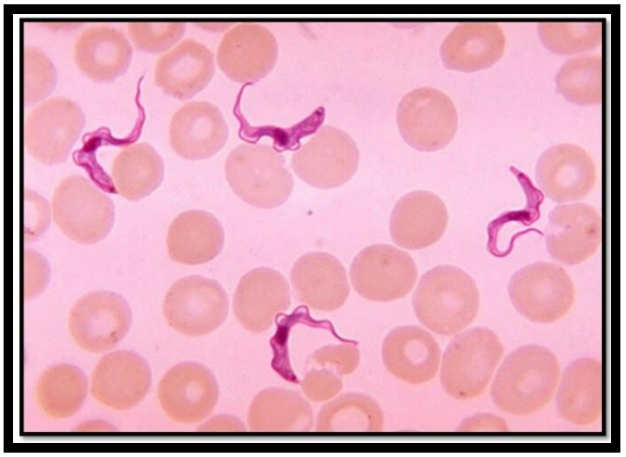


Figure 1 :-Trypanosomes in human blood smear

The body of Trypanosoma gambiense consists of following characteristics :-

- ***PELLICLE :-***

  The body is covered by a thin, elastic and firm membranous pellicle which maintains the form of body. It is also called the cell membrane which encloses the cell organelles, including the nucleus, mitochondria, endoplasmic reticulum, golgi apparatus and ribosomes. The pellicular part to which the flagellum is attached draws out as undulating membrane during flagellar movement.

- ***FLAGELLUM :-***

  A single flagellum arises from a basal body situated near the posterior end extremely near the kinetoplast. The flagellum skirts the whole body and projects out of the anterior end. The whip like long flagellum is called blepharoplast or centriole. Only the tip of the flagellum is free at the anterior end.

- ***UNDULATING MEMBRANE :-***

  The flagellum curves in a spiral form round the body forming an undulating membrane and then continues beyond the anterior end as a free flagellum. The undulating membrane is thrown into 3 or 4 folds depending upon the length of the parasite. The undulating membrane is believed to be an adaptation for locomotion in the blood.

- ***NUCLEUS:-***

  The nucleus of the parasite lies almost in the centre of the cell body as a large, oval, vesicular body. The nucleolus is large.

- ***CYTOPLASM :-***

  The cytoplasm contains numerous greenish refractile granules called volutin granules. These granules store food particles mainly glycogen and phosphate. At the base of the flagellum is located the basal granule or blepharoplast close to which is another granule, the parabasal body. Some vacuoles are also present in the cytoplasm.

- ***KINETOPLAST :-***

A small, spherical or disc- shaped kinetoplast is situated just posterior to the basal body. The kinetoplast of the parasite is subterminal and is the largest of any trypanosome, it sometimes causes the body to bulge around it. Kinetoplast is made up of numerous circular mitochondrial DNA and functions as a single large mitochondrion. It lies near the basal body with which it is indistinguishable under microscope.

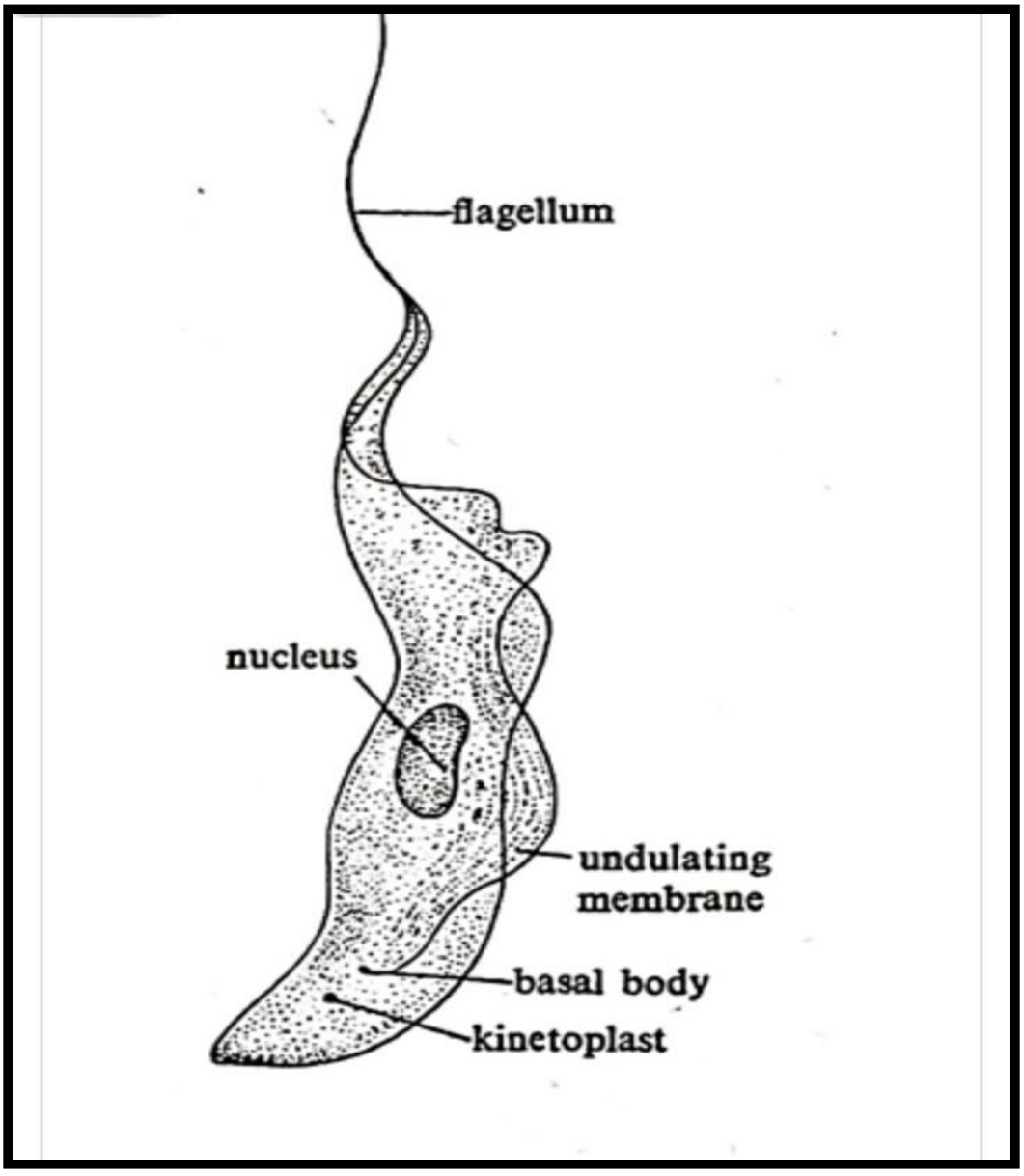


Figure 2* :- Morphology of *Trypanosoma gambiense

- ***POLYMORPHISM :-***

The trypanosomes show polymorphism presenting different morphological forms under different conditions in different hosts. Individual parasites vary in size and shape in the different stages of their existence. Two main forms are recognized - the one, short, thick, stumpy form with no free flagellum or having only a very small one;
the other, long, slender form, having a conspicuously long free flagellum. The parasite forms trypomastigotes in vertebrate hosts and epimastigotes in insect vector or tsetse fly. Between these two forms , intermediate forms are occasionally observed. The first form to appear is a long, slender one and later when the infection is established the short, stumpy form together with the intermediate one appear. In human blood plasma it looks like a thin, flattened and leaf like body tapering at both ends.

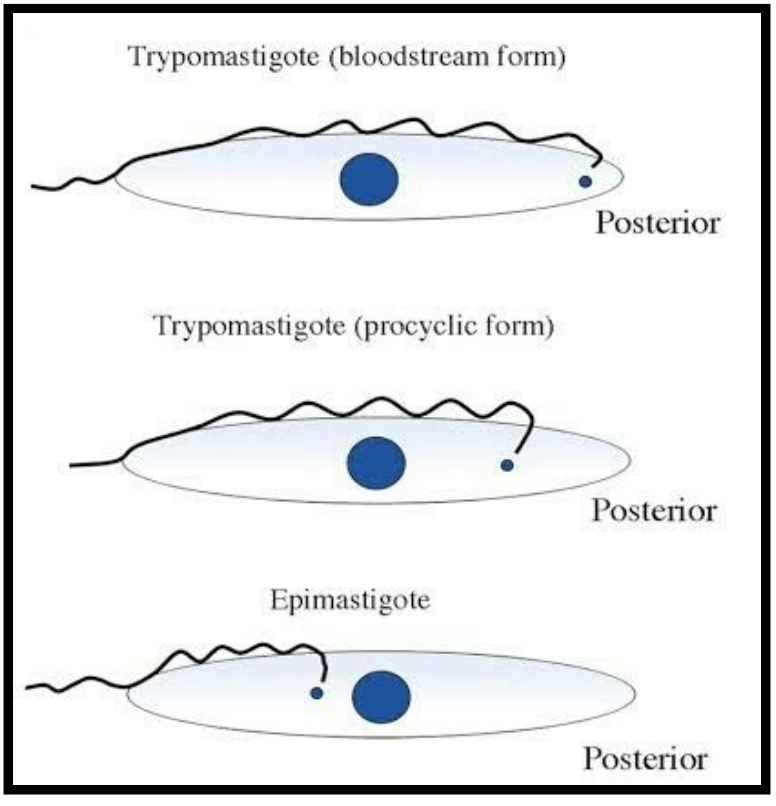
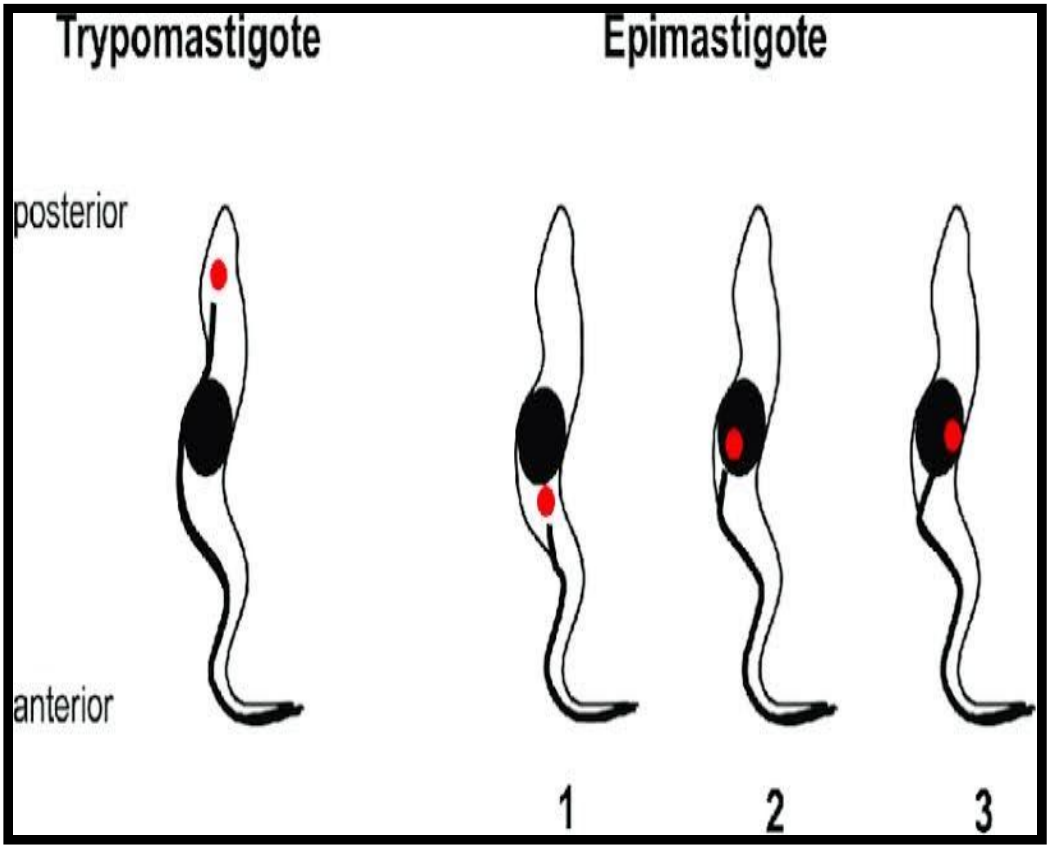


Figure 3 :- **Different morphological forms in *Trypanosoma gambiense***

- ***<u>The two morphological forms of Trypanosoma gambiense are described below :-</u>***

1. ***Trypomastigote form :-***
   Trypomastigotes are found in humans or mammalian hosts. The trypomastigotes are pleomorphic in size ranging from 16 - 42 µm in length by 1 - 3 µm in width. Their body consists of posterior kinetoplast and long undulating membrane. They occur as elongate slender dividing forms with long free flagellum or stumpy non - dividing infective metacyclic forms with no free flagellum.

2. ***Epimastigote form :-***
   Epimastigotes are found in insect vector or tsetse fly. The epimastigotes are also variable in size ranging from 10 - 35 µm in length by 1 - 3 µm in width. They have anterior kinetoplast and short undulating membrane. It's basal body and kinetoplast lie anterior to the nucleus, with a long flagellum attached along the cell body.



<u>Figure 4 :-</u> Trypomastigote form & Epimastigote forms of Trypanosoma

- ***Probable questions from morphology of Trypanosoma gambiense :-***

1. ***Describe the morphology of Trypanosoma gambiense with appropriate diagram.***
2. ***What is Undulating membrane? Mention it's function.***
3. ***Write a short note on Kinetoplast.***
4. ***Write different morphological forms of Trypanosoma gambiense with diagram.***
5. ***What are trypomastigotes?***
6. ***What are Epimastigotes?***
7. ***Write short notes on polymorphism of Trypanosoma gambiense.***
8. ***Describe the morphological form of T. gambiense developed in tsetse fly with diagram.***

- ***References :-***

1. ***FOUNDATIONS OF PARASITOLOGY***
   GERALD D. SCHMIDT & LARRY S. ROBERTS'

2. ***PARASITOLOGY (Protozoology and Helminthology) by K. D. CHATTERJEE***

3. ***www.google.co.in***

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