



***Trypanosoma
and
Trypanosomiasis***

Kingdom: **Protista.**

Subkingdom: Protozoa.

Phylum: Sarcomastigophora

Subphylum: Mastigophora

Class: Zoomastigophora.

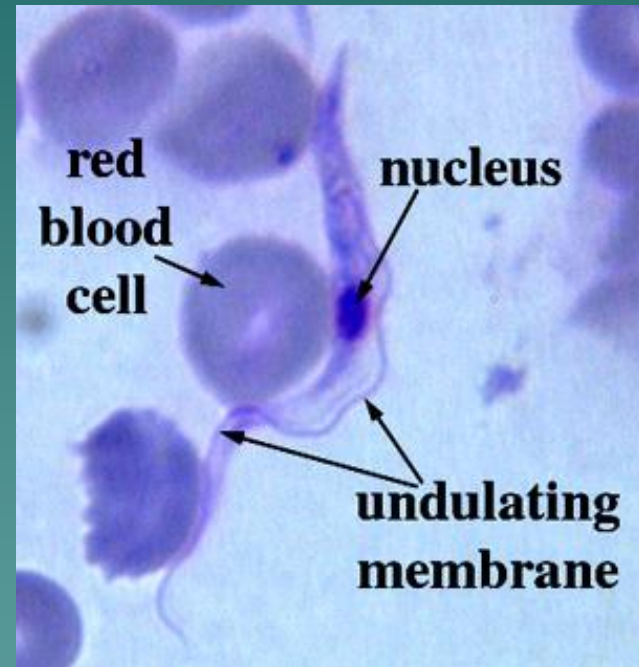
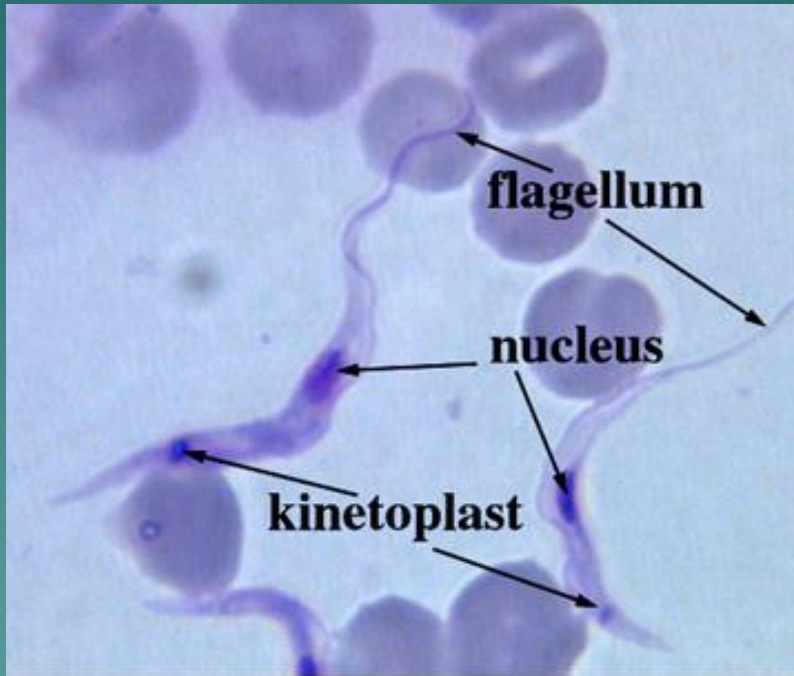
Order: Kinetoplastida

Family: Trypanosomatidae

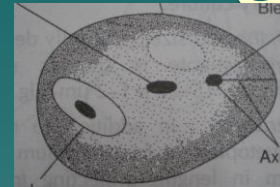
Trypanosoma – infecting human

No.	Parasite	Vector	Disease
1	T.brucei (gambiense); (rhodesiense)	Tsetse fly	African trypanosomiasis (sleeping sickness)
2	T.cruzi	Reduvid bug	South american trypanosomiasis (Chagas' disease)
3	T.rangeli	Reduvid bug	Non pathogenic – South America

Trypanosoma *parasite*



Developmental stages



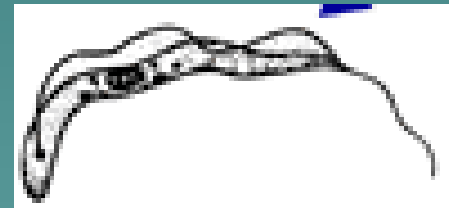
◆ Amastigote



◆ Promastigote



◆ Epimastigote



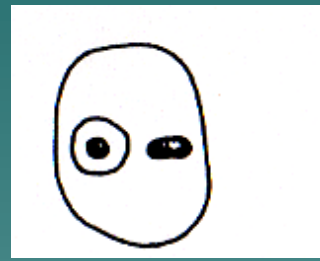
◆ Trypomastigote



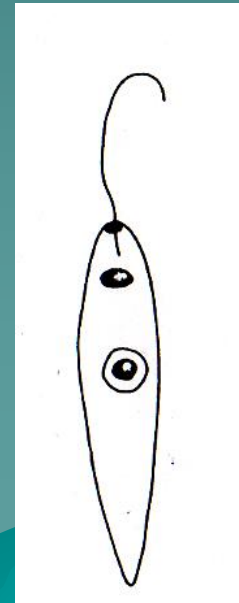
◆ Metacyclic form of Trypomastigote

Trypanosoma life stages are:

1- **Amastigote** - Basal body anterior of nucleus, with a short, essentially non-functional, flagellum.



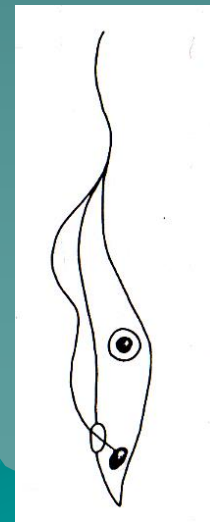
2- **Promastigote** - Basal body anterior of nucleus, with a long detached flagellum.



3- **Epimastigote** - Basal body anterior of nucleus, with a long flagellum attached along the cell body.



4- **Trypomastigote** - Basal body posterior of nucleus, with a long flagellum attached along the cell body.



General properties

- ◆ Exist in body as trypomastigote form, some (*T.cruzi*) can exist in tissues as amastigote form
- ◆ Life cycle : 2 hosts
- ◆ 2 morphological forms of trypomastigote
 - Short stumpy
 - Long slender
- ◆ 2 types of development seen
 - Anterior station
 - Posterior station

Trypanosoma brucei

- ◆ Habitat :
 - Parasite of connective tissue
 - Regional lymph-node, brain
- ◆ Geographical distribution:
 - African countries –zambia, rhodesia

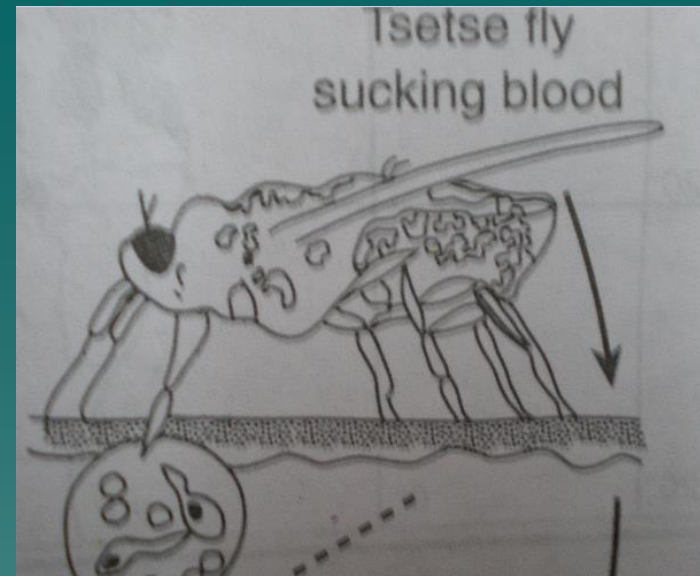
Morphology : trypomastigote

- ◆ Elongated, spindle shaped organism
- ◆ Posterior end – blunt
- ◆ Anterior end – sharp pointed
- ◆ Nucleus – large, oval & central
- ◆ Kinetoplast- small at posterior end, gives rise to flagella
- ◆ Flagella curves round body forming undulating membrane
- ◆ Size : short – $10 \mu \times 5 \mu$
long - $20 \mu \times 3 \mu$



Vector

Life cycle :T.brucei



- ◆ Two hosts :
 - Definite host – man or animal
 - Intermediate host – Tsetse fly – Glossina palpalis, pallidipes, tachinoides

- ◆ Two forms:
 - Trypomastigote – In Human / animal & tsetse fly
 - Epimastigote – Tsetse fly

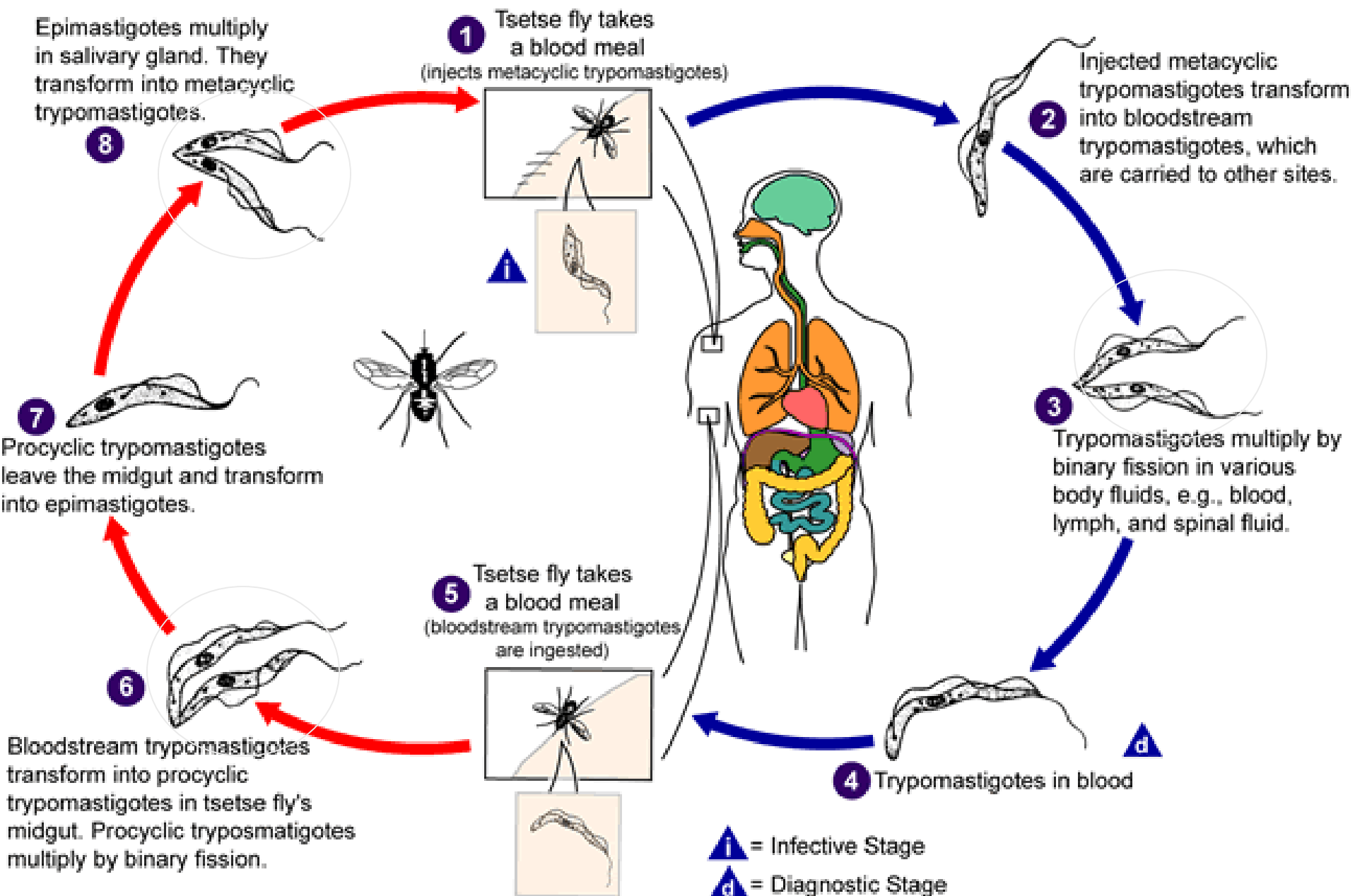
- ⇒ T.b.gambiense – only man is reservoir
- ⇒ T.b.rhodesiense – wild animals and domestic cattle

- ◆ Infective stage for vertebrate is metacyclic trypomastigote.
- ◆ Infective stage for the invertebrate is trypomastigote



Tsetse fly Stages

Human Stages



T.brucei - pathogenesis

- ◆ First invade lymph nodes and then passes through lymphatic into blood stream and finally may involve CNS
- ◆ Incubation period : one to several weeks
- ◆ At site of bite – nodule / chancre after few days last for 1 to 2 weeks
- ◆ Followed by symptoms free parasitaemia – one month. May followed by cure or CNS involvement. - meningoencephalitis

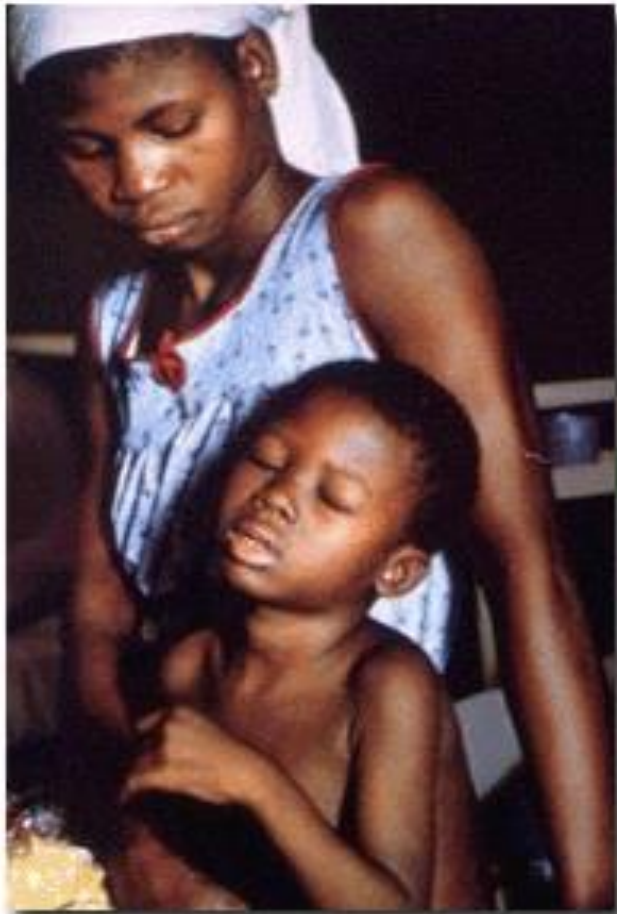
T.brucei – clinical features

- ◆ Chancre
- ◆ Febrile paroxysms
- ◆ Lymphadenopathy
- ◆ CNS – Confused status of mind (Sleeping sickness), fatigue, insomnia, lethargy
- ◆ Rare – Edema, Myocarditis

African sleeping sickness

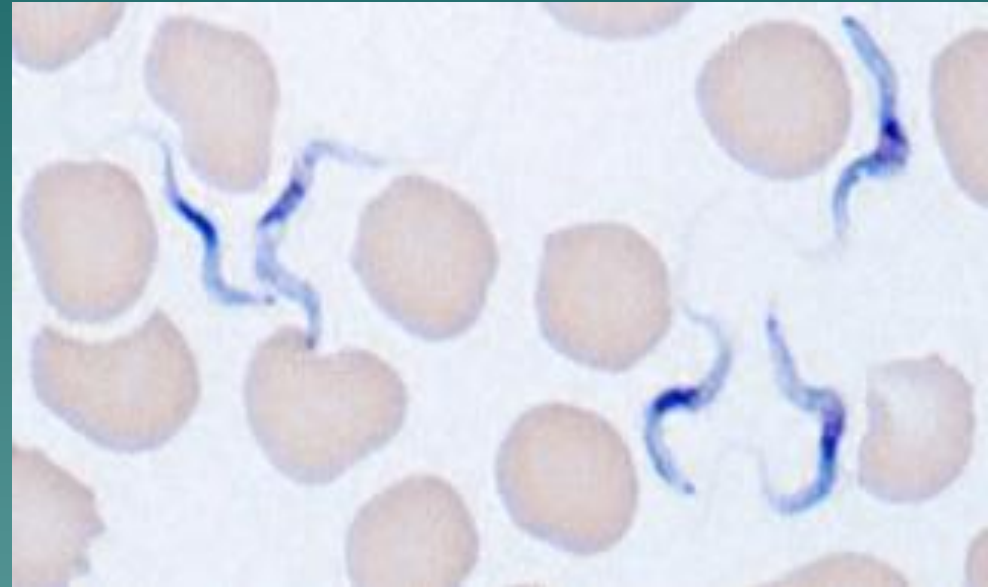


African Sleeping Sickness (Trypanosoma brucei)



Laboratory diagnosis

- ◆ Demonstration of parasites in peripheral blood / lymphnode aspiration
- ◆ Smear stained by Giemsa / Field's stain
- ◆ Serology
- ◆ CSF examination



Trypanosoma cruzi
Chagas, 1909

T.cruzi

- ◆ Habitat
 - Muscular & nervous system
 - R-E cells or organs
- ◆ Geographical distribution
 - Central & south America

T. cruzi

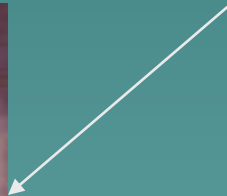
- ◆ South American Trypanosomiasis (Chagas' Disease)
- ◆ Reservoirs – Animals – dogs, cats, armadillos etc.
- ◆ Vector: Reduviid bugs



T.Cruzi – 3 morphological forms

- ◆ Amastigote form – in **tissue** of Human
- ◆ Epimastigote form – In gut of Reduviid bug
- ◆ Trypomastigote form –
 - Human – get transformed from amastigote form present in **blood**
 - Metacyclic trypomastigote form excreted from faeces of infective bug

Mode of transmission



Triatomine Bug Stages

Human Stages

- 1** Triatomine bug takes a blood meal (passes metacyclic trypomastigotes in feces, trypomastigotes enter bite wound or mucosal membranes, such as the conjunctiva)

- 2** Metacyclic trypomastigotes penetrate various cells at bite wound site. Inside cells they transform into amastigotes.

Metacyclic trypomastigotes in hindgut

8

Multiplies in midgut

7

6 Epimastigote stage in midgut

- 5** Triatomine bug takes a blood meal (trypomastigotes ingested)

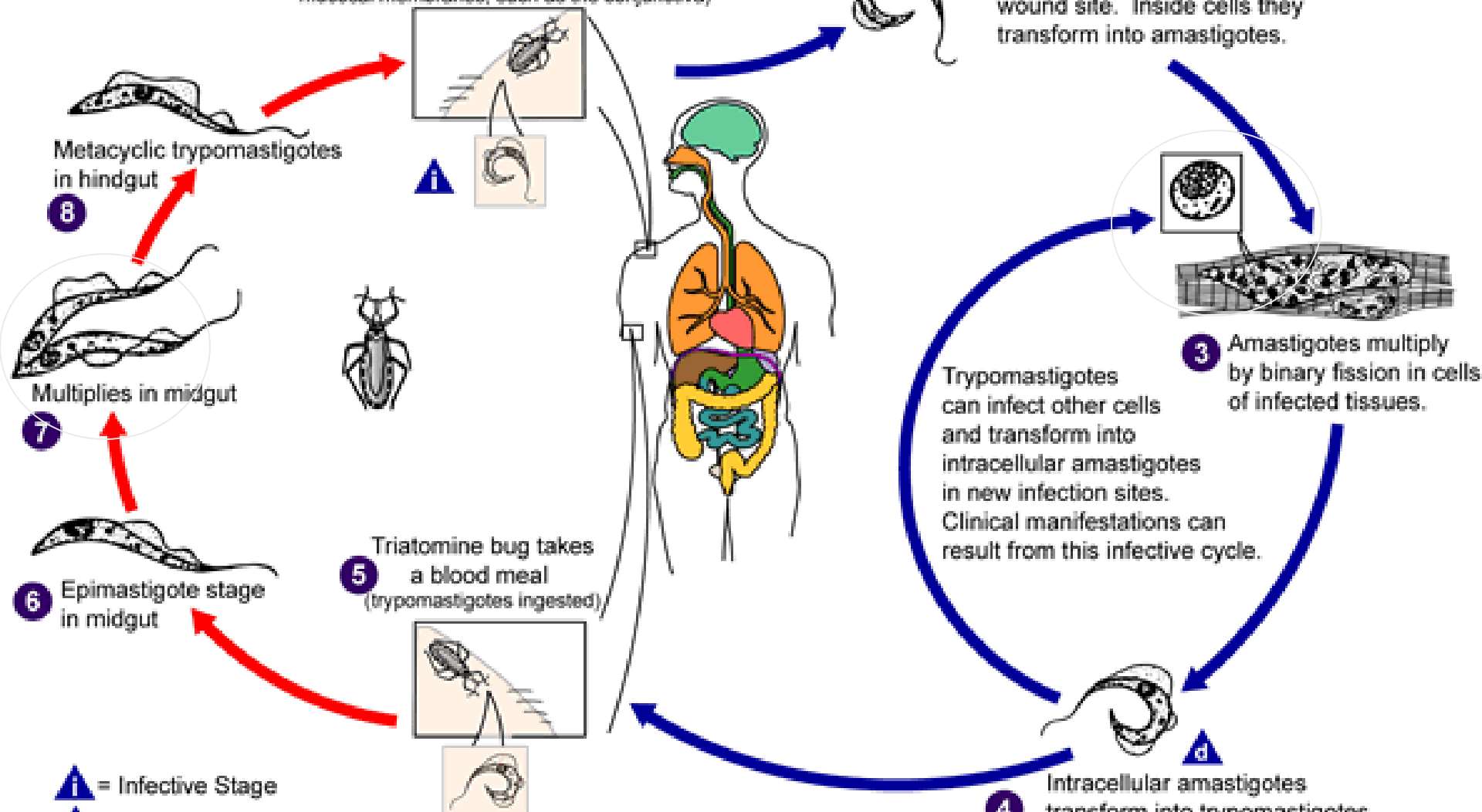
- 3** Amastigotes multiply by binary fission in cells of infected tissues.

Trypomastigotes can infect other cells and transform into intracellular amastigotes in new infection sites. Clinical manifestations can result from this infective cycle.

- 4** Intracellular amastigotes transform into trypomastigotes, then burst out of the cell and enter the bloodstream.

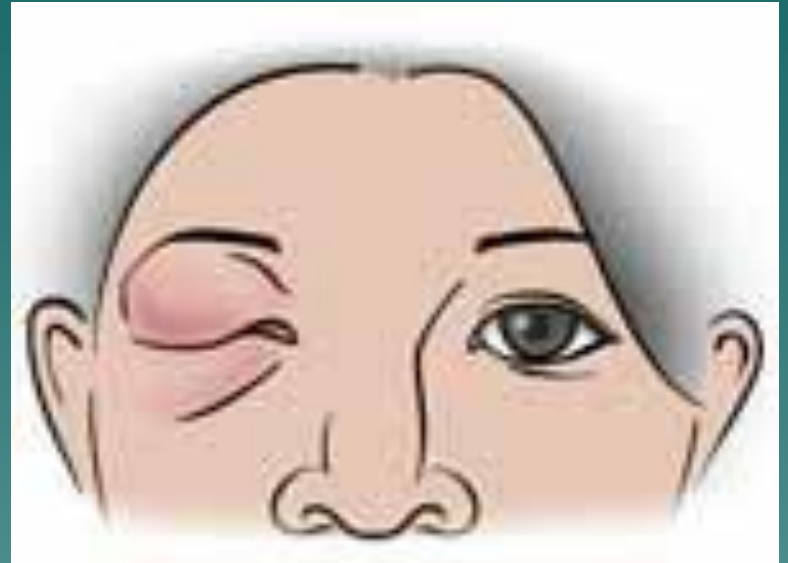
i = Infective Stage

d = Diagnostic Stage

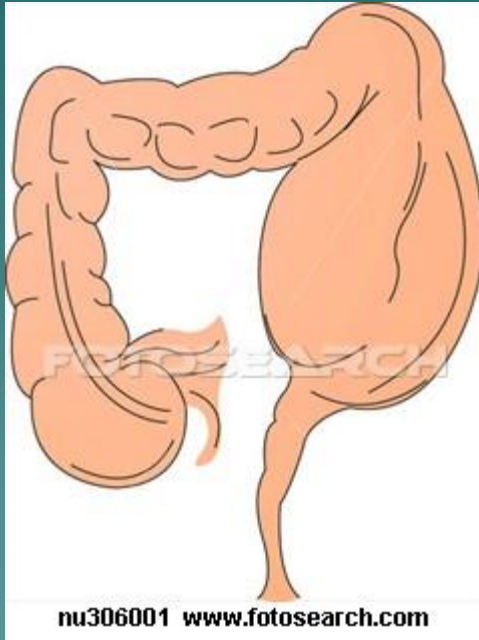


T.Cruzi - clinical

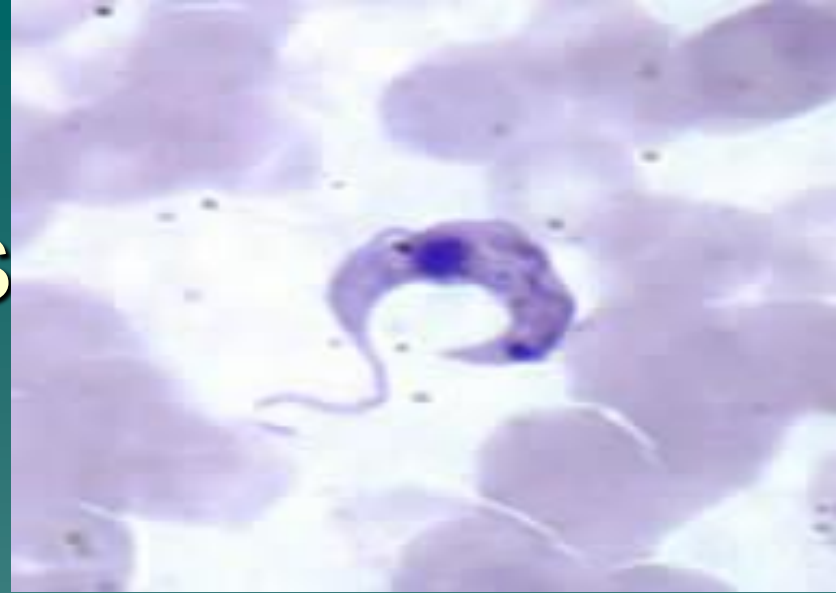
- ◆ Pathogenesis – due to multiplying amastigote form in RE / Tissue cells and parasitemia
- ◆ Acute stage: seen in children lasts 20-30 days
 - At site of entry produce – dusky red firm swelling called Chagoma, if enter through conjunctiva – unilateral edema of eyelid (Romana's sign)
 - Generalised lymphadenopathy, fever, conjunctivitis, Hepatosplenomegaly
 - Later on meningoencephalitis or myocardial failure
- ◆ Chronic stage: seen in adults
 - Dilatation of various parts of colon – megacolon
 - Dilatation of heart - cardiomyopathy



Megacolon



Laboratory diagnosis



- ◆ Thick or thin film of blood – Giemsa stain – Trypomastigote form – C or U shaped.
- ◆ Serological tests – detection of antibody by card agglutination test, ELISA, CFT
- ◆ Detection of parasite DNA by PCR
- ◆ Biopsy of lymph node or muscle

Trypanosomes of animals

- ◆ *T. brucei brucei* – “nagana” in cattles
- ◆ *T. evansi* – “surra” in horses
- ◆ *T. equiperdum* – “stallion’s disease” in horses