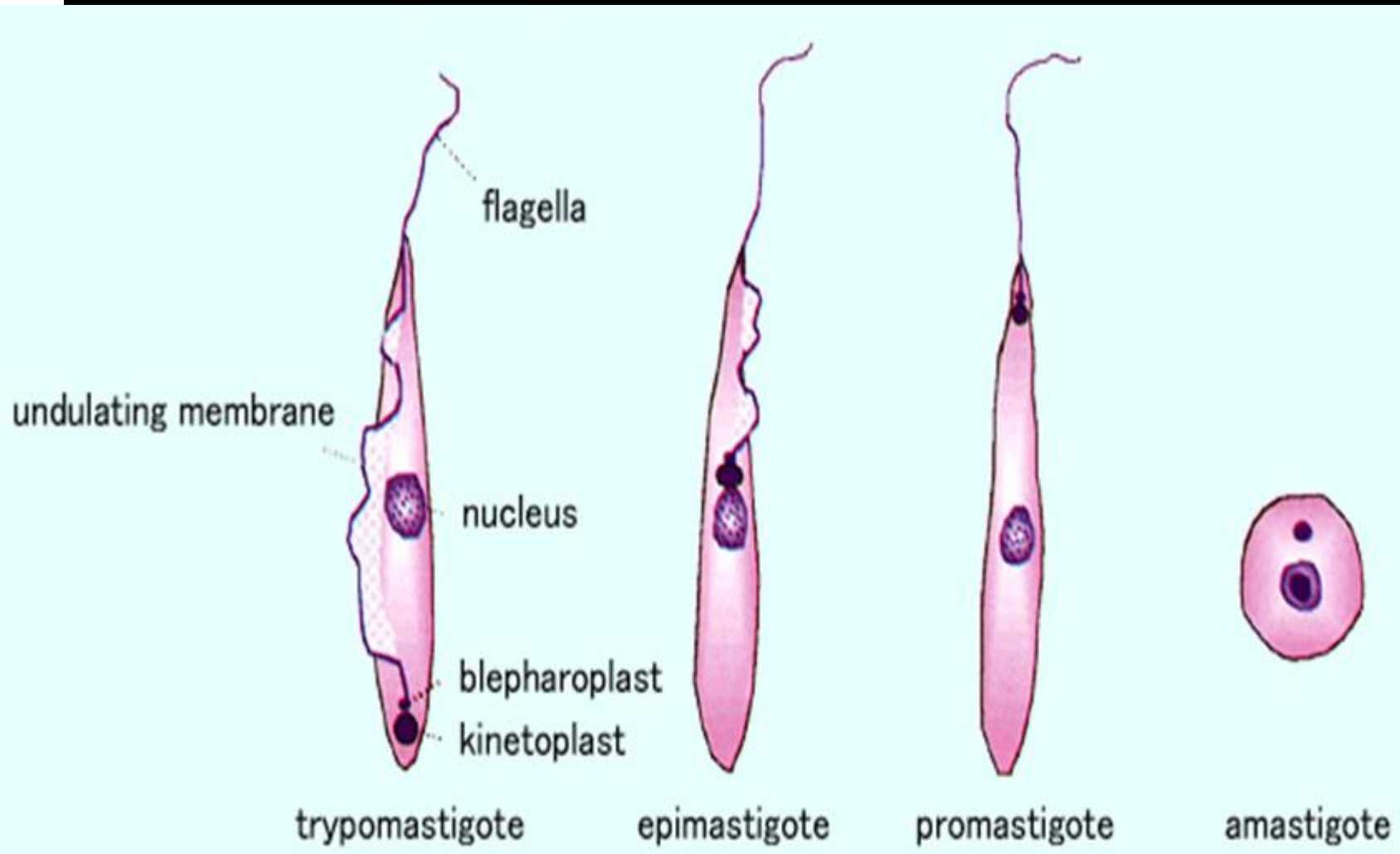
# Haemoflagellates

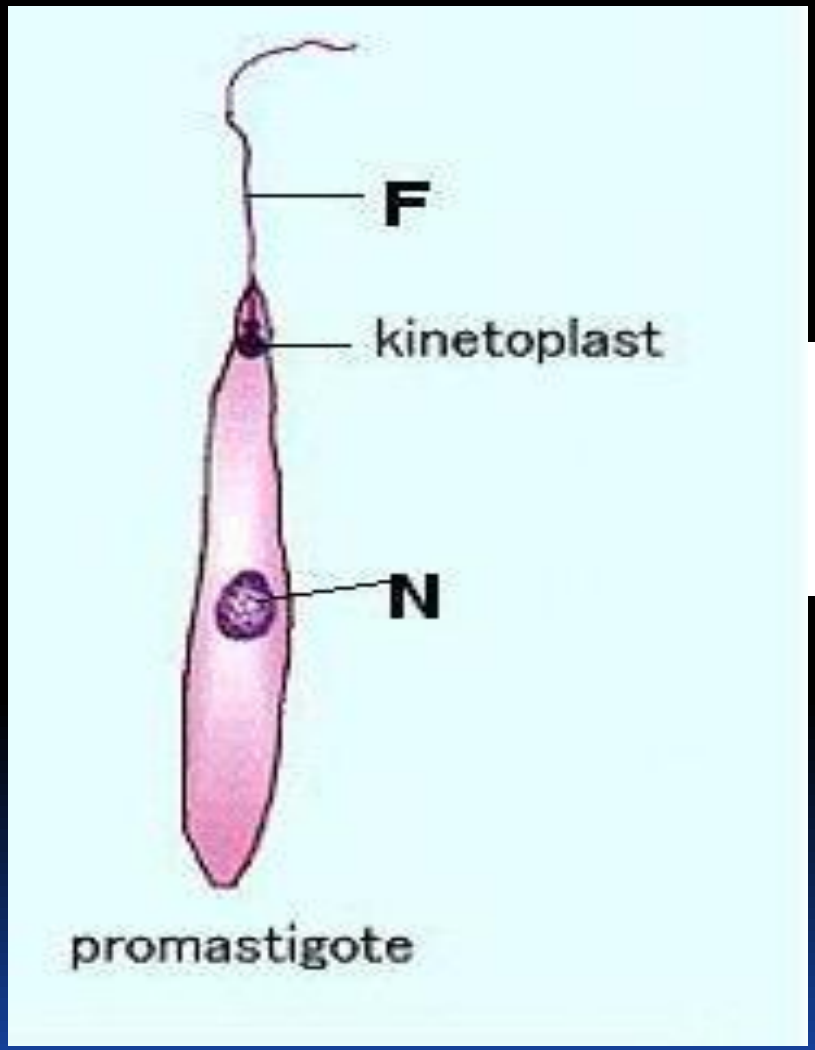
Leishmania & Trypanosomes

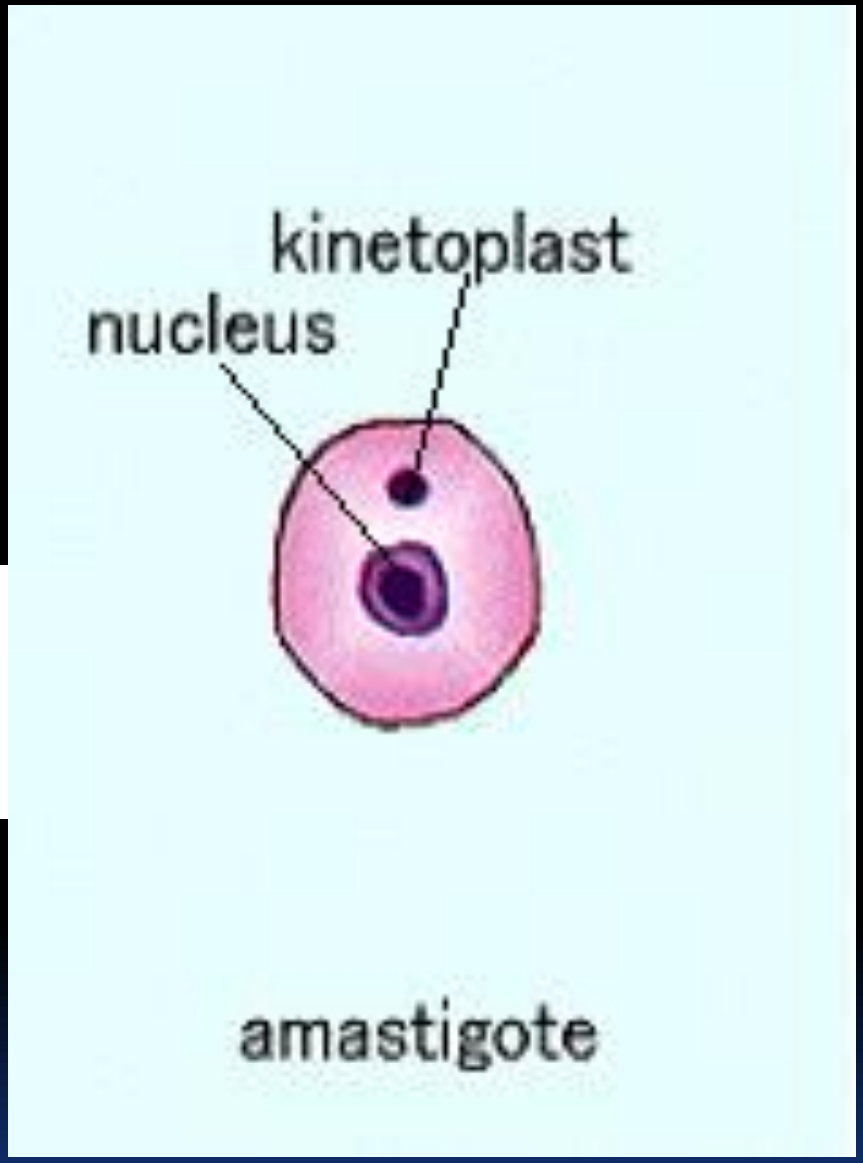
**Dr MONA BADR**

# Different stages of Haemoflagellates



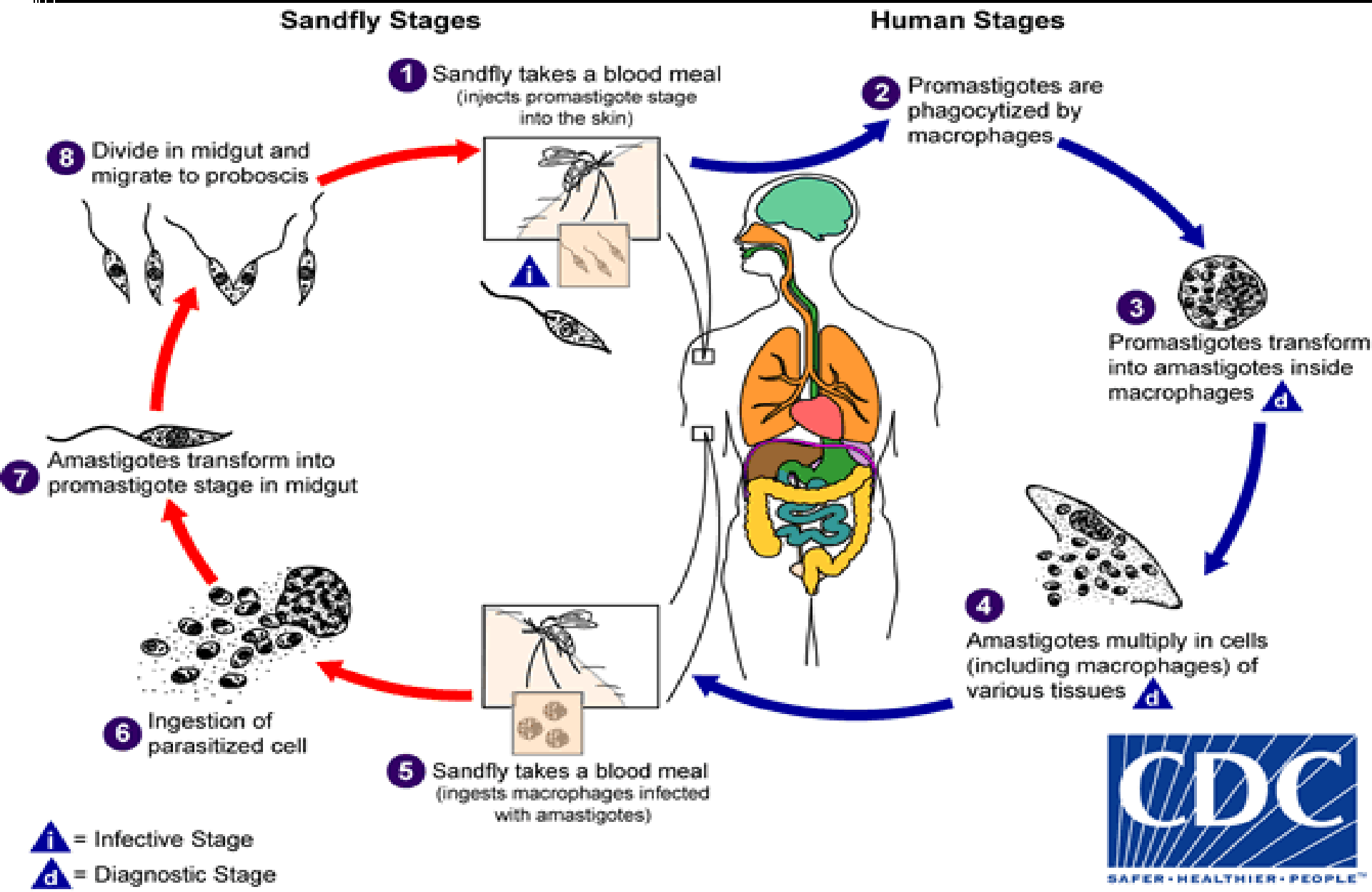
# Promastigotes of Leishmania




Amastigote of Leishmania

# The life cycle of *Leishmania*

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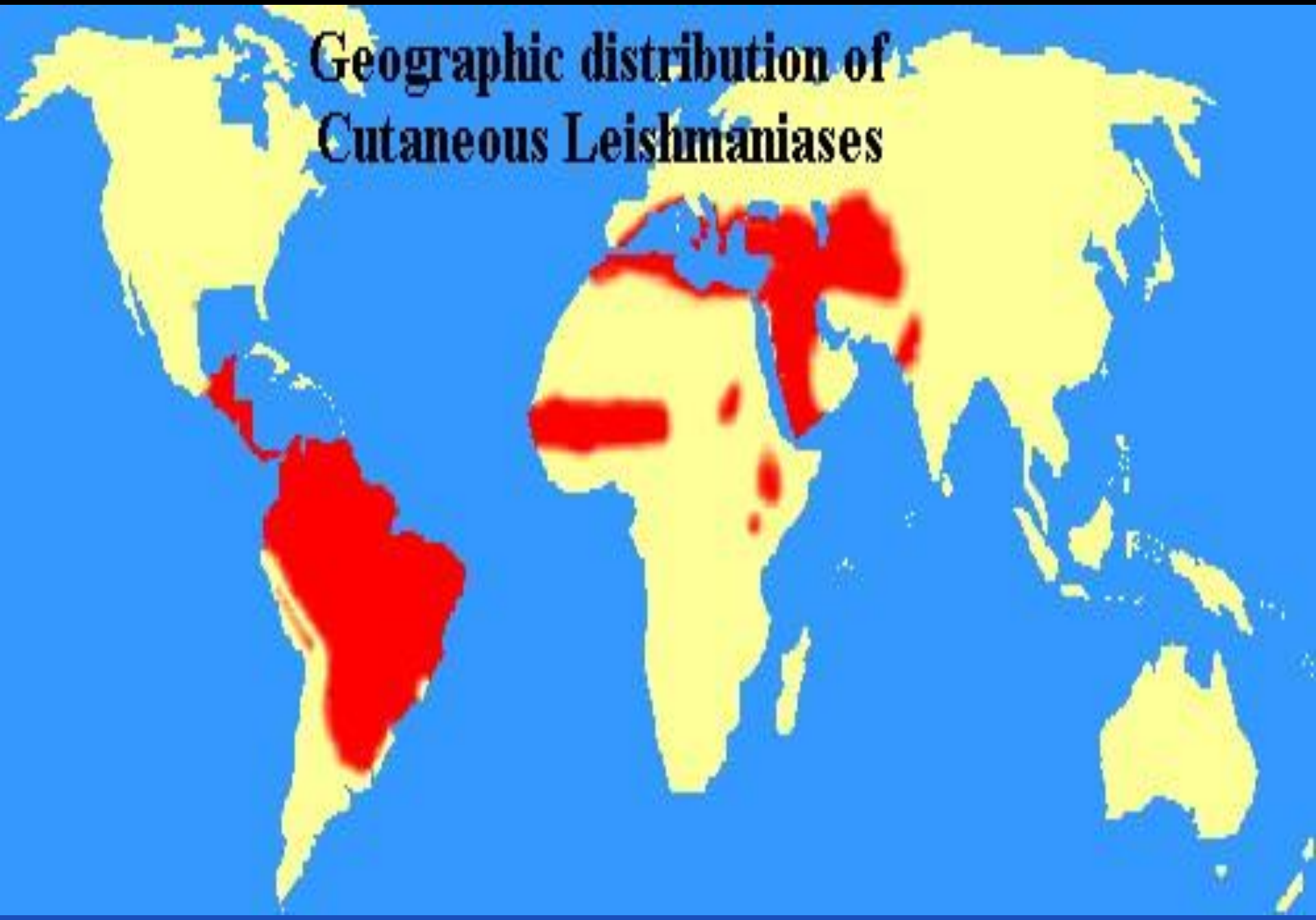
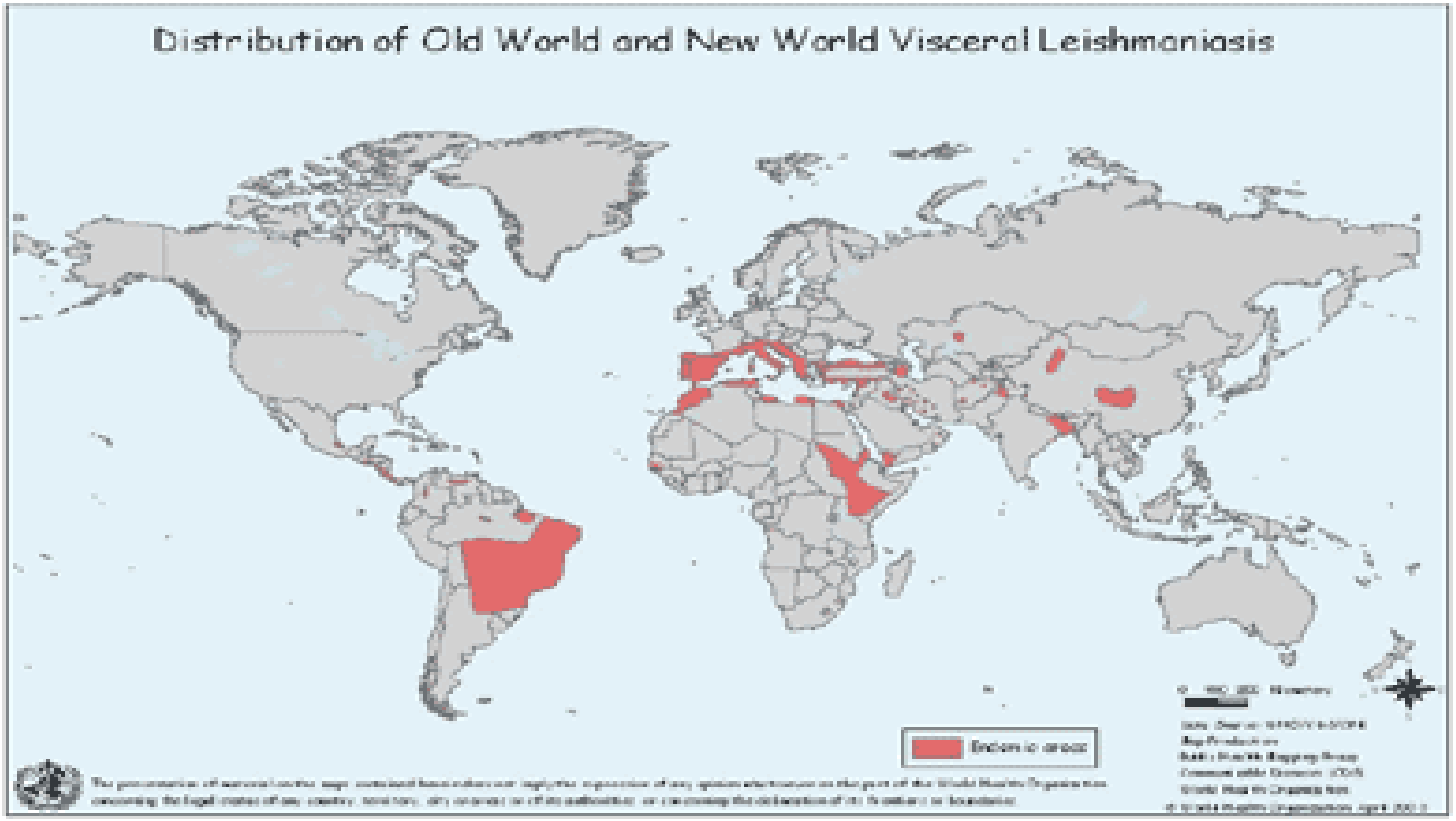
# *Leishmania* Parasites and Diseases

| SPECIES | Disease |
|---|---|
| *Leishmania tropica** <br> *Leishmania major** <br> *Leishmania aethiopica* <br> *Leishmania mexicana* | Cutaneous leishmaniasis |
| *Leishmania braziliensis* | Mucocutaneous leishmaniasis |
| *Leishmania donovani** <br> *Leishmania infantum** <br> *Leishmania chagasi* | Visceral leishmaniasis |

* Endemic in Saudi Arabia

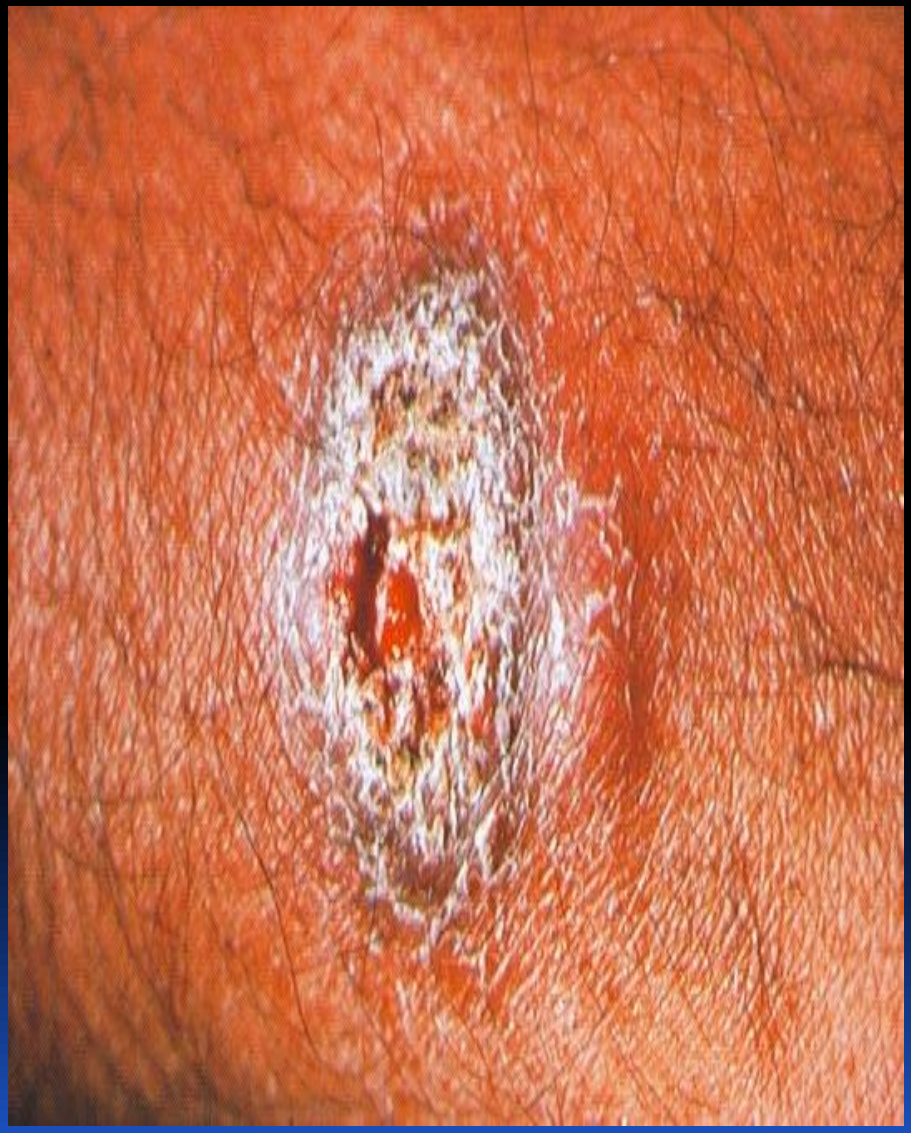

Geographic distribution of
Cutaneous Leishmaniases

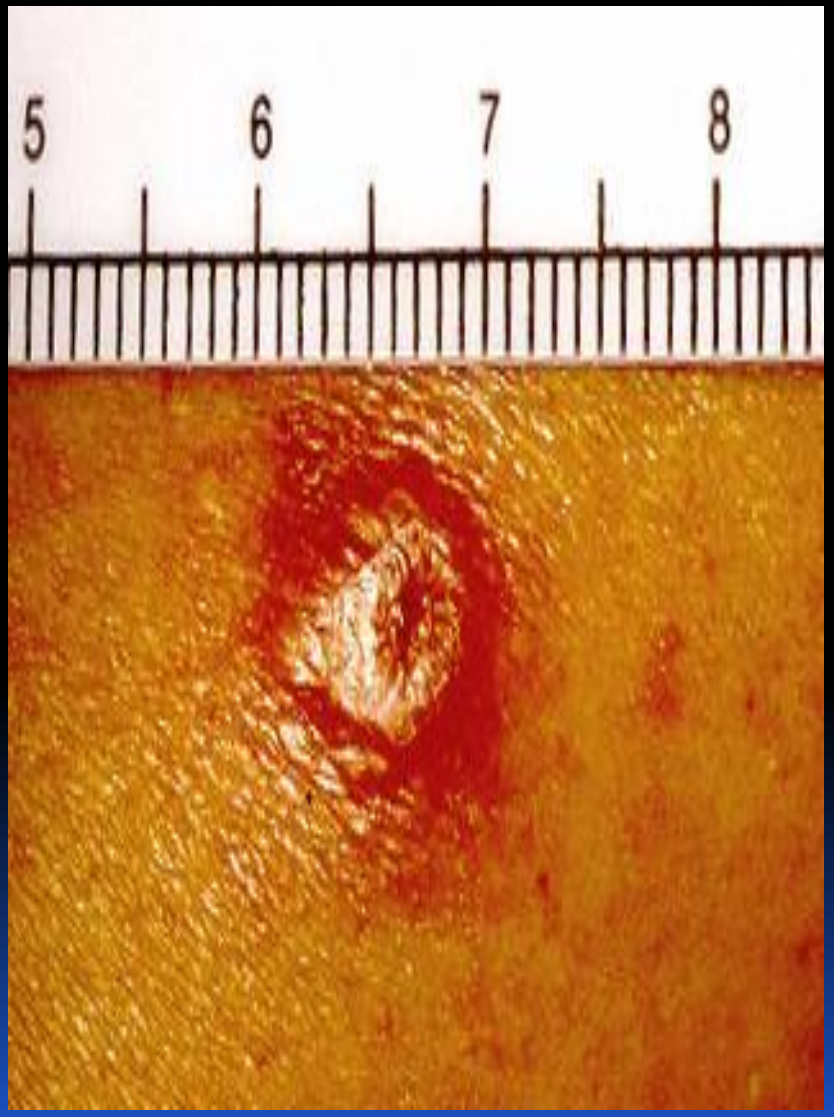
# World distribution of Visceral Leishmaniasis



# Sand fly

# lesion of cutaneous lishmaniasis





# Clinical types of cutaneous leishmaniasis

- ***Leishmania major*:** Zoonotic cutaneous leishmaniasis: wet lesions with severe reaction

- ***Leishmania tropica*:** cutaneous leishmaniasis: Dry lesions with minimal ulceration

**Oriental sore** (most common) classical self-limited ulcer

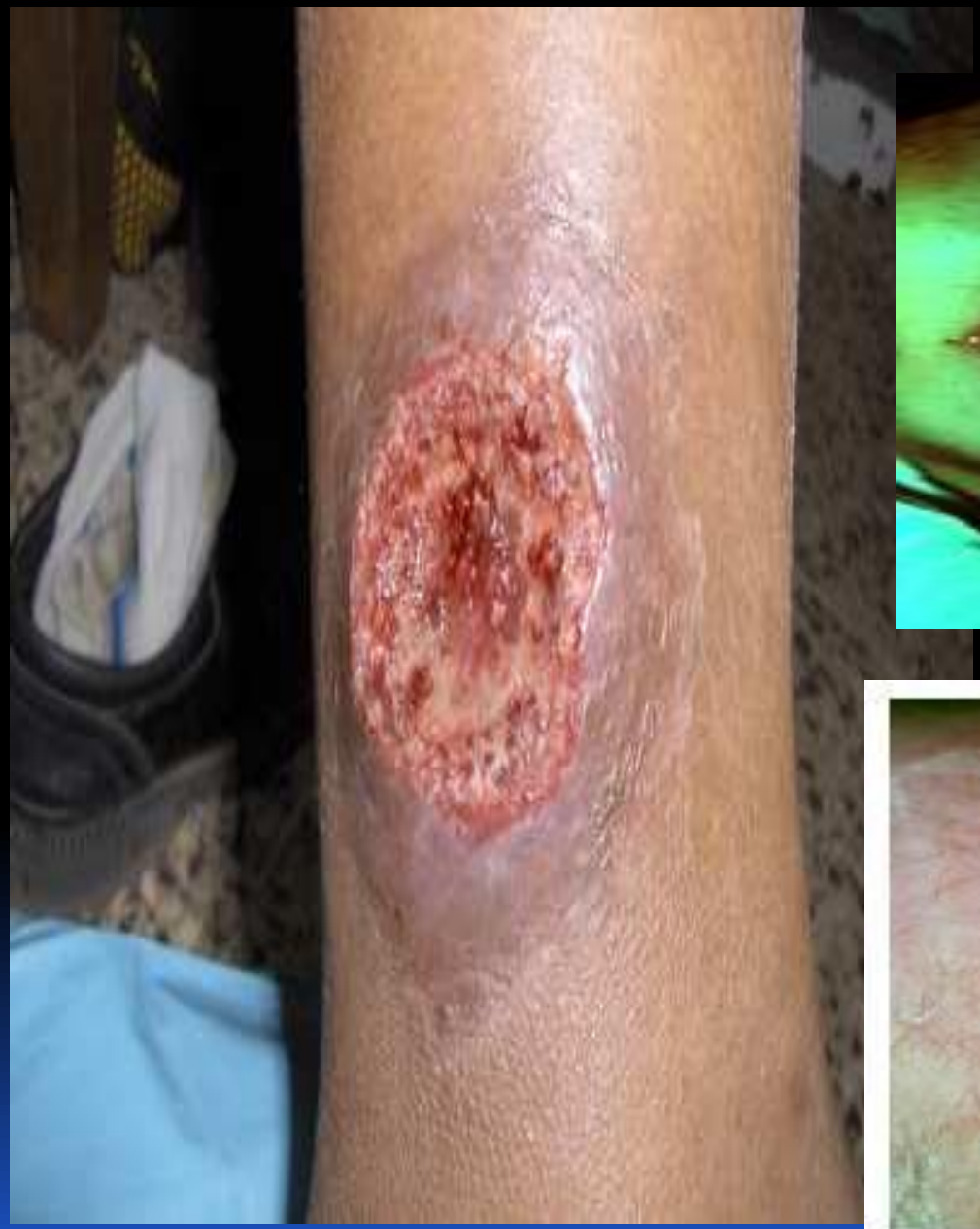
# CUTANEOUS LISHMANIASIS THE COMMON TYPE

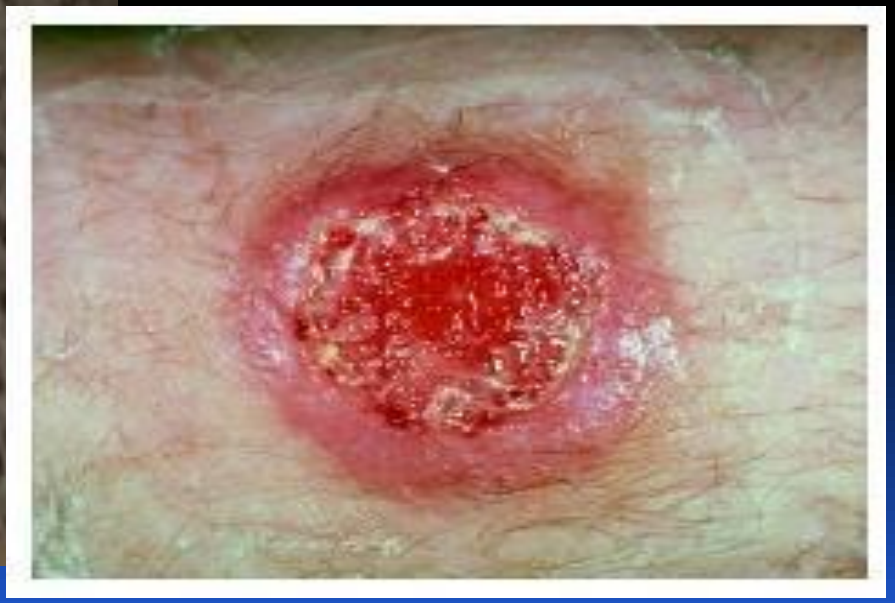
This starts as a **painless papule** on exposed parts of the body ,generally the face.

The lesion ulcerates after a few months producing an ulcer with an indurate margin.

In some cases the ulcer remains dry and heals readily (**dry-type-lesion)** .

In some other cases the ulcer may spread with an inflammatory zone around , these known as (**wet-type-lesion**) which heal slowly.





# UNCOMMON TYPES OF CUTANEUS LISHMANIASIS

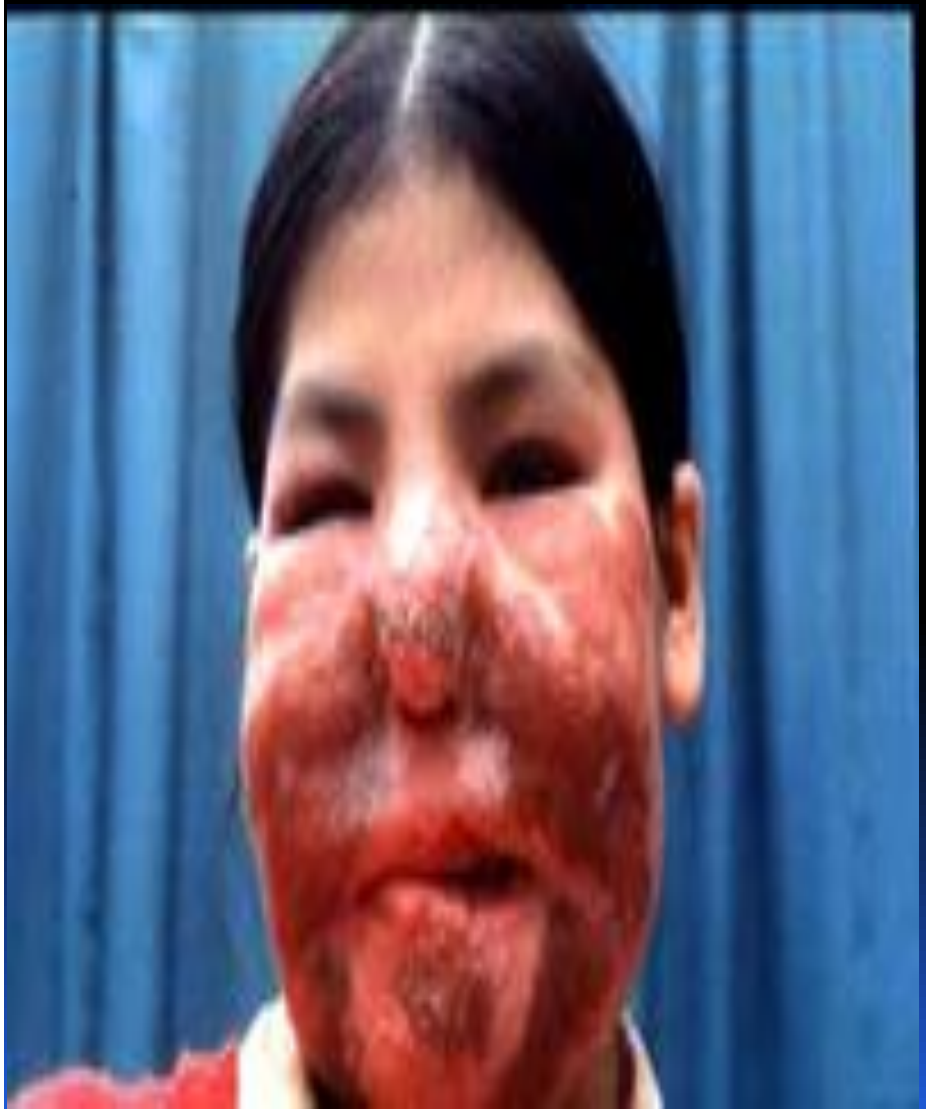
- **Diffuse cutaneous leishmaniasis** (DCL):

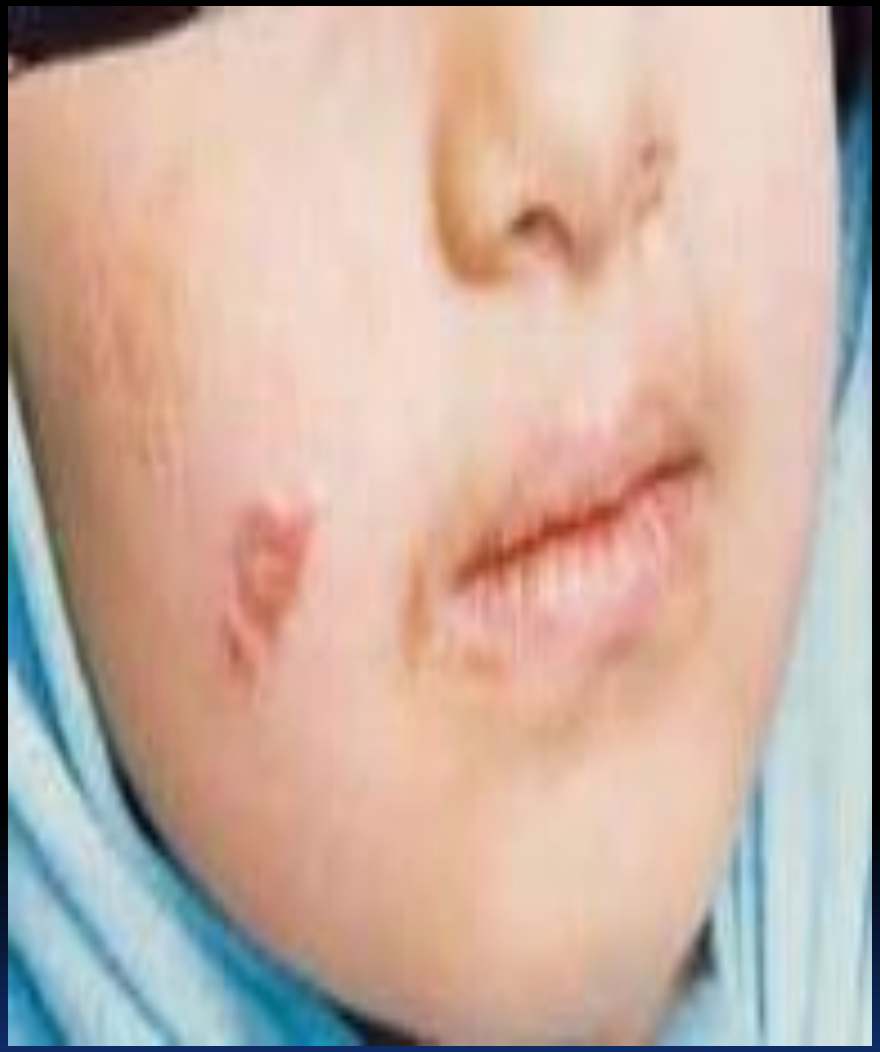
Caused by *L. aethiopica*, diffuse nodular non-ulcerating lesions, seen in a part of Africa, people with low immunity to *Leishmania* antigens. Diffuse cutaneous **(DCL)** , and consists of nodules and a thickening of the skin, generally without any ulceration ,it needs numerous parasite.

- **Leishmaniasis recidiva** (lupoid leishmaniasis):

Severe immunological reaction to *leishmania* antigen leading to persistent dry skin lesions .

# Diffuse cutaneous leishmaniasis(DCL)



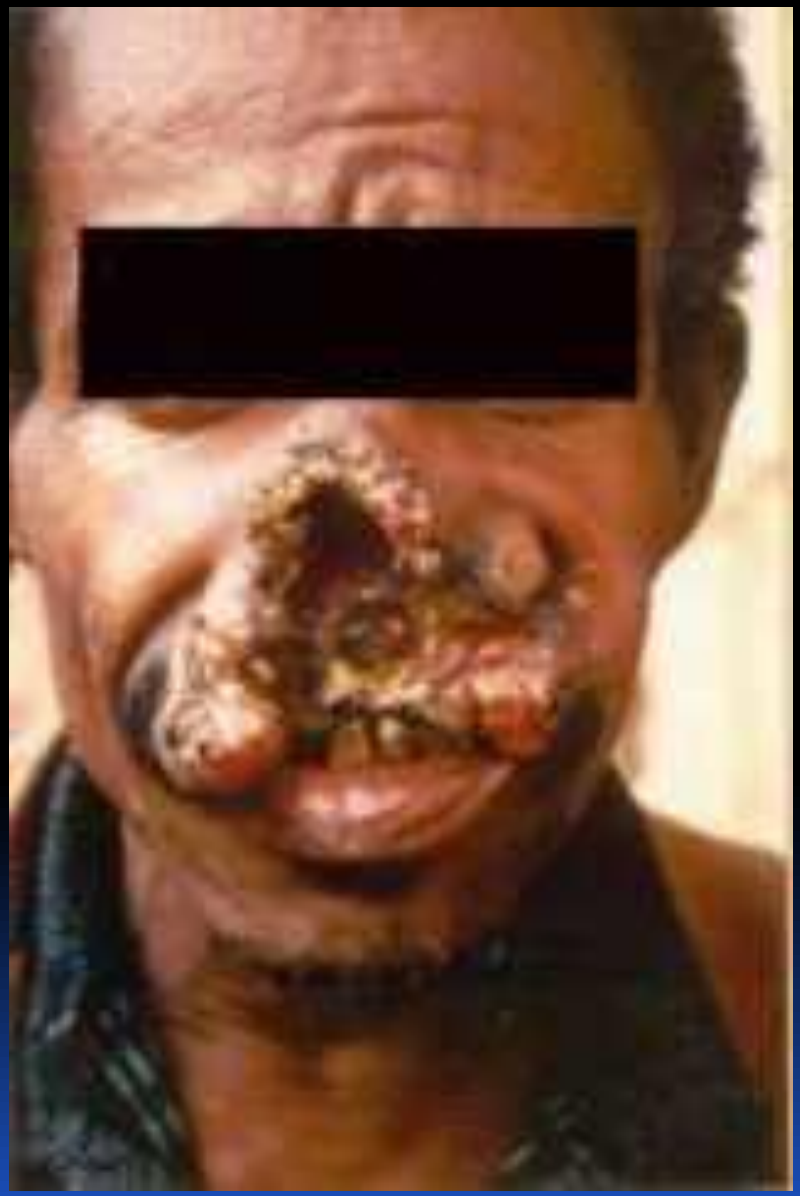


Leishmaniasis recidiva

# Mucocutaneous leishmaniasis

The lesion starts as a pustular swelling in the mouth or on the nostrils. The lesion may become ulcerative after many months and then extend into the naso- pharyngeal mucous membrane.

Secondary infection is very common with destruction of the nasal cartilage and the facial bone.



# cutaneous & muco-cutaneous leishmaniasis

## Diagnosis:

The parasite can be isolated from the margin of the ulcer.

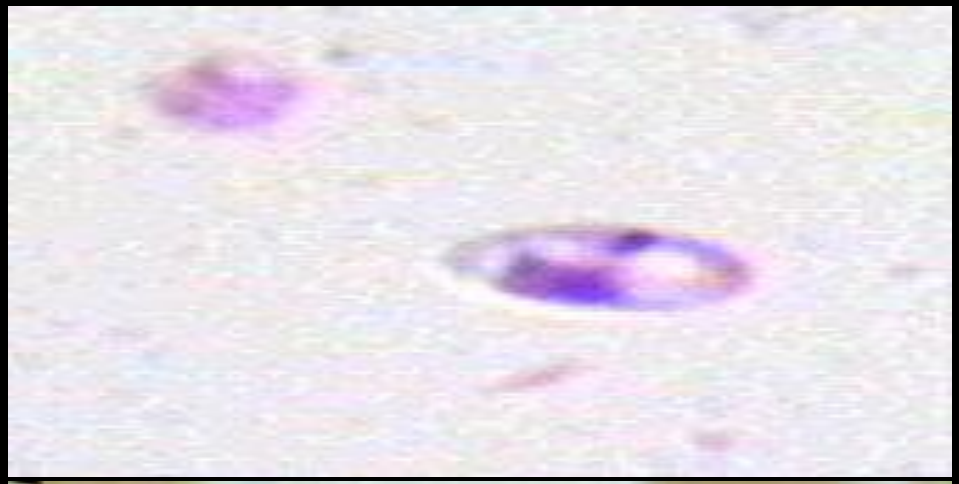
A diagnostic skin test ,known as

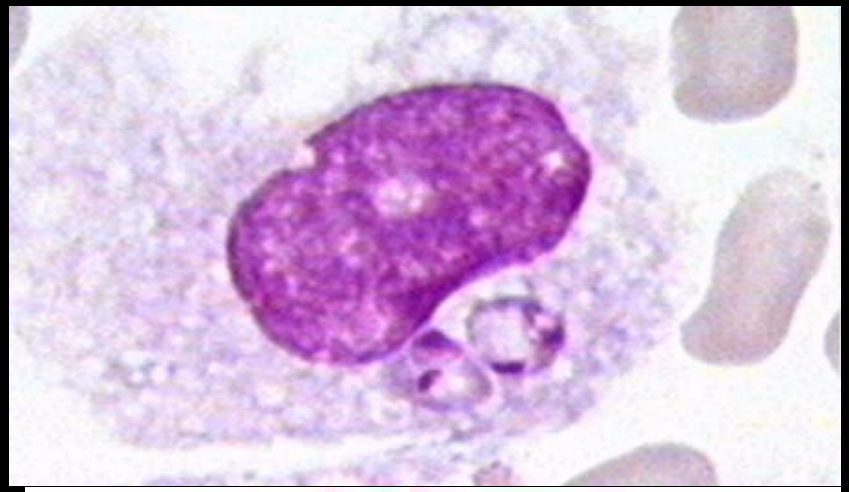
**Leishmanin test ( Montnego Test)**, is useful.

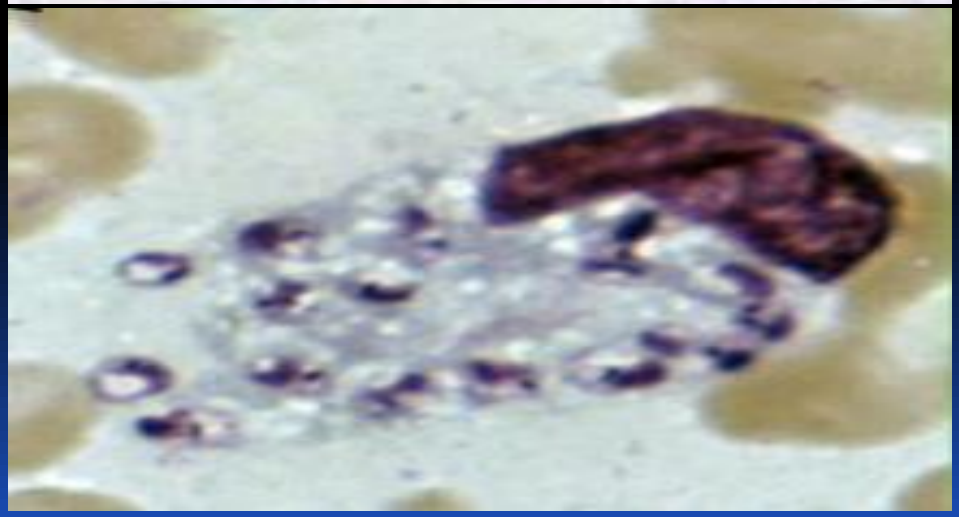
Smear: Giemsa stain – microscopy for LD bodies( (Leishman-Donovan bodies, amastigotes).

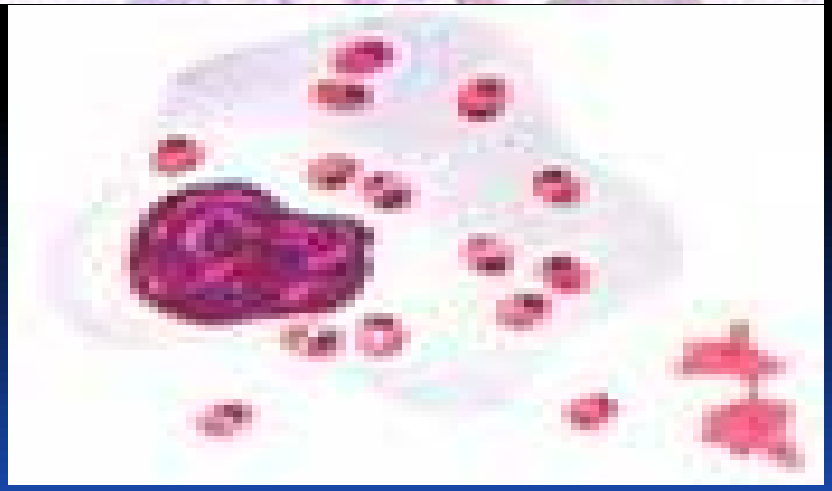
- Skin biopsy: microscopy for LD bodies or culture in **NNN** medium for → promastigotes.

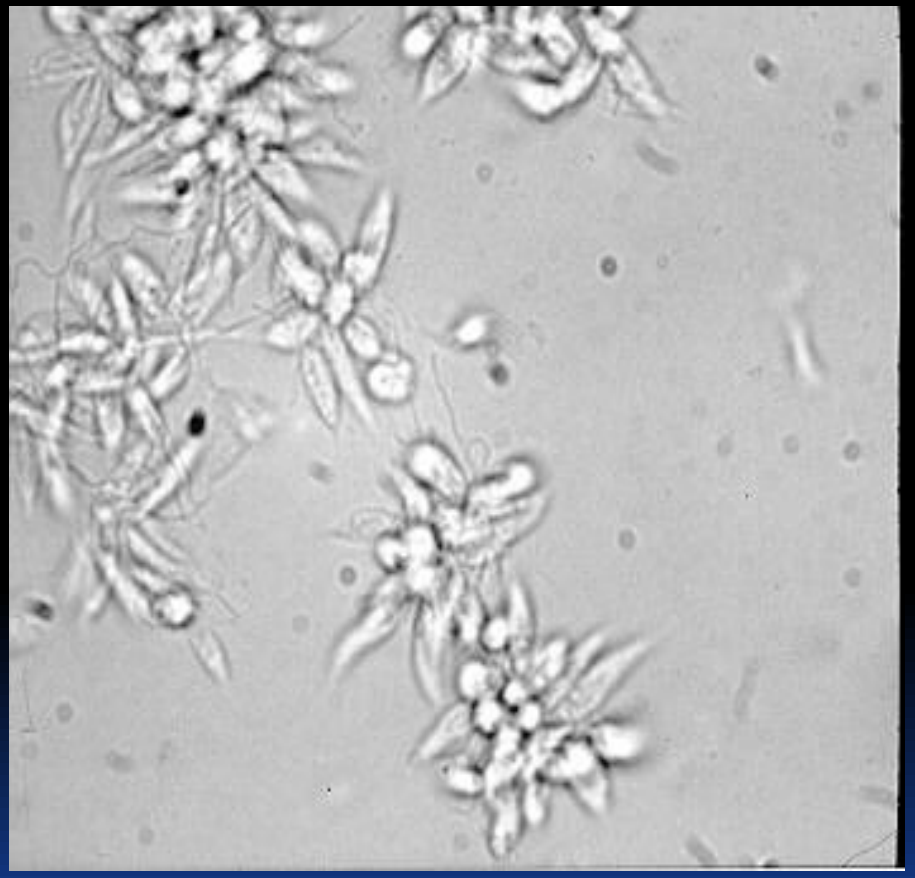
# Amastigotes of Leishmania

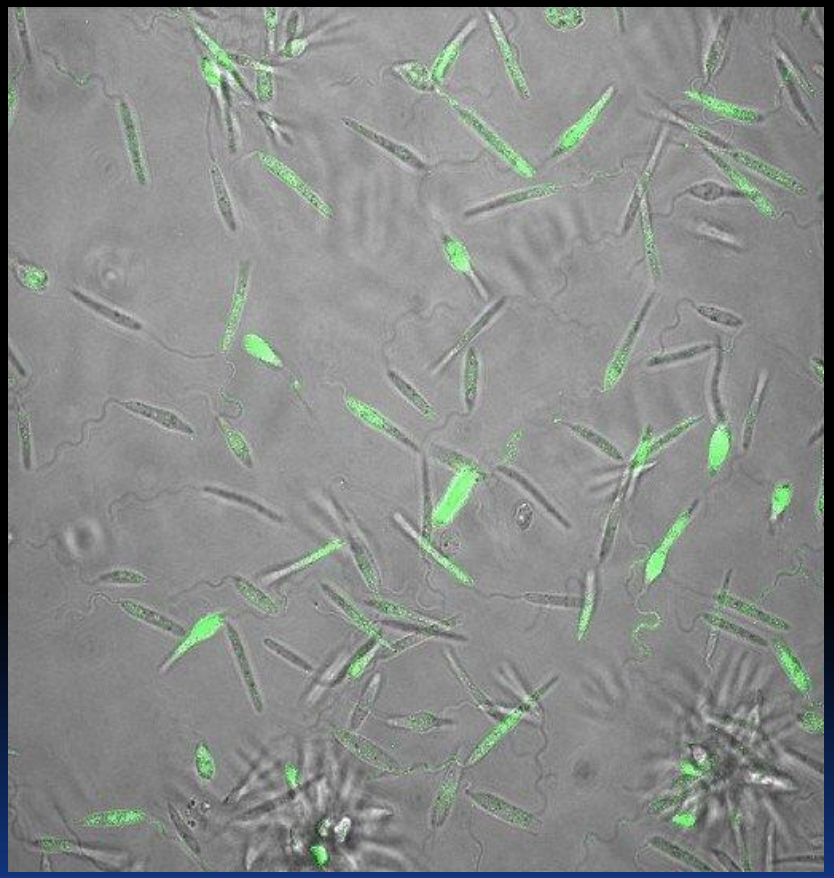












Promastigotes of Leishmania

# NNN medium

# Treatment

- **No treatment** – self-healing lesions
- **Medical:**
  - **Pentavalent antimony (Pentostam),** An
  - Antifungal drugs
  - +/- Antibiotics for secondary bacterial infection.

- **Surgical:**
  - Cryosurgery
  - Excision
  - Curettage


REFERENCE :WHO (2010) Control of leishmaniasis. Report of a mee
expert committee on the control of leishmaniasis.
http://whqlibdoc.who.int/trs/WHO_TRS_949_eng.pdf

# Visceral leishmaniasis

- There are geographical variations.
- The diseases is called **kala-azar**
- *Leishmania infantum* mainly affect children
- *Leishmania donovani* mainly affects adults
- The incubation period is usually 4-10 months.
- The early symptoms are generally low grade fever with malaise and sweating .
- In later stages ,the fever becomes intermittent and their can be liver enlargement or spleen enlargement or hepatosplenomegally because of the hyperplasia of the lymphoid –macrophage system.

# Presentation

- Fever
- Splenomegaly, hepatomegaly, hepatosplenomegaly
- Weight loss
- Anaemia
- Epistaxis
- Cough
- Diarrhoea

# Untreated disease can be fatal

After recovery it might produce a condition called post kala-azar dermal leishmaniasis (PKDL)

# Fever 2 times a day due to kala-azar

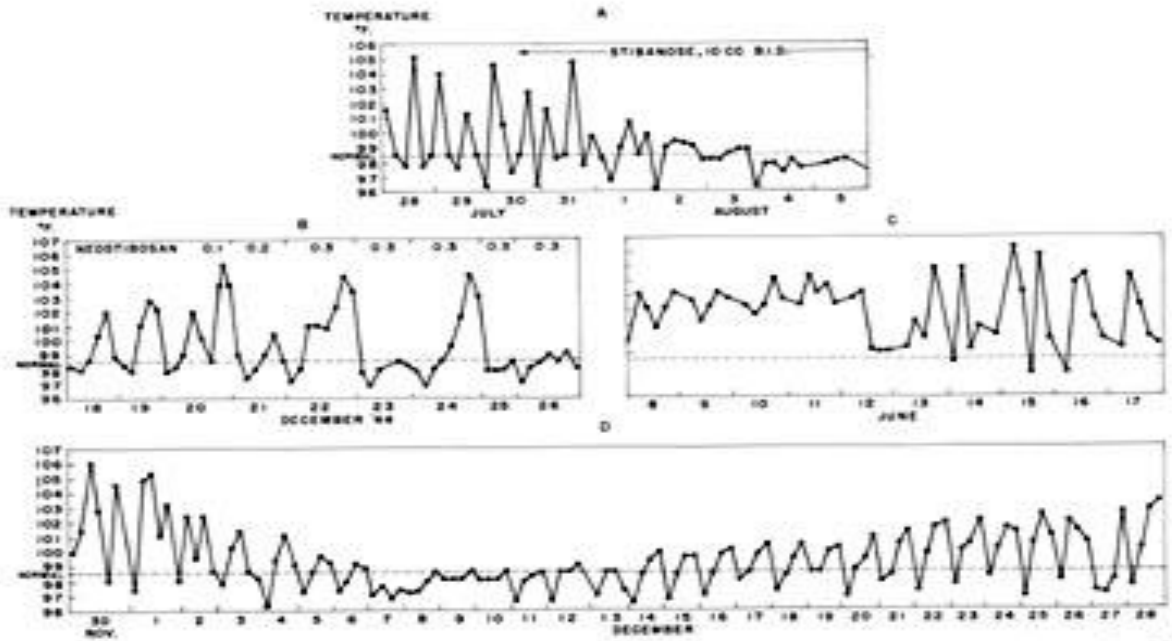
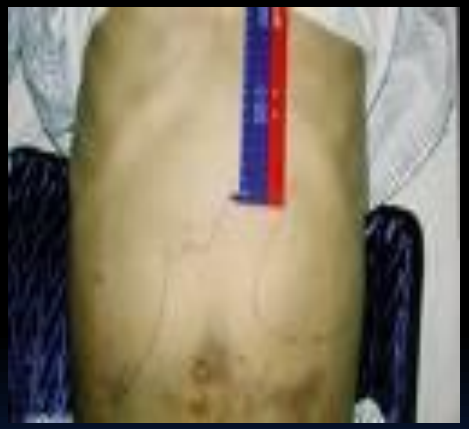



FIGURE 1.—Types of fever in untreated kala-azar and response to specific therapy. A. Daily intermittent fever before treatment. Note double daily peaks. This type of fever was present in this patient for almost 3 months before treatment. Note prompt control of fever after institution of specific therapy (200 cc. stibanose). No relapse occurred during 6 months' observation. B. Note control of fever in this patient within 6 days after institution of specific treatment (Neostibosan, 5.0 gm.). Before treatment, two rises in temperature (101°–105° F.) occurred daily for 4 months. The tertian periodicity that occurred during treatment may also occur in untreated patients and may simulate the form of malaria caused by *Plasmodium vivax*. C. Period of sustained fever simulating typhoid. Note characteristic double peaks later. D. Spontaneous remission and exacerbation of fever without treatment simulating undulant fever.

# Hepatosplenomegaly in visceral leishmaniasis



# Visceral leishmaniasis

Diagnosis

(1) Parasitological diagnosis:

**Bone marrow aspirate**

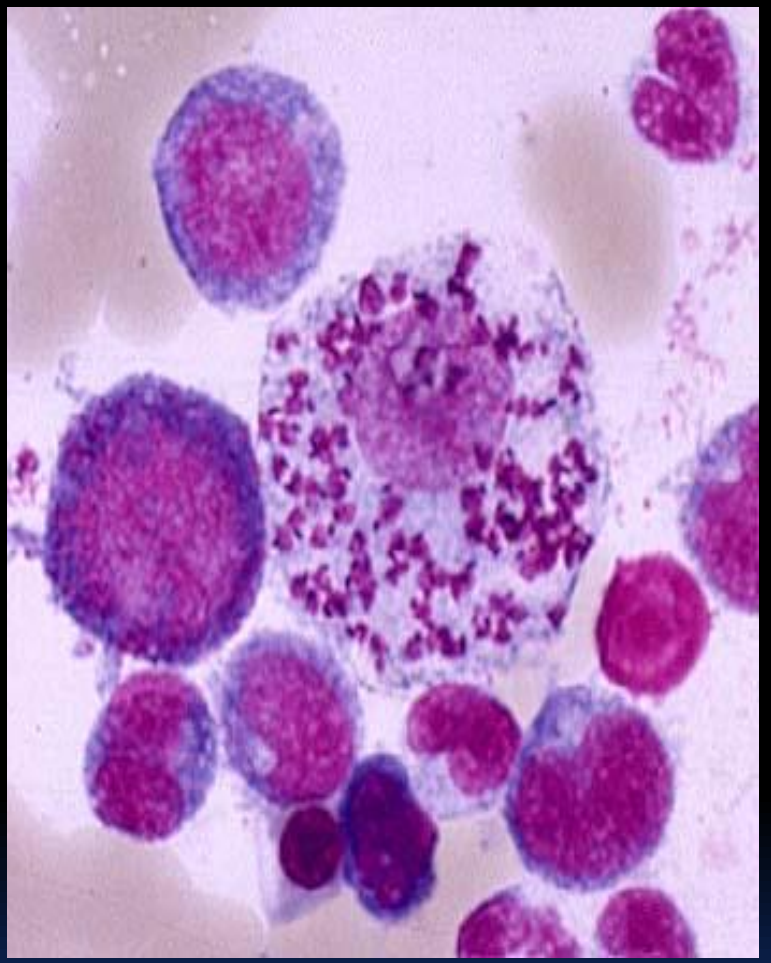
Splenic aspirate

Lymph node

Tissue biopsy

1. microscopy (LD bodies)
2. culture in NNN medium (promastigotes)

Bone marrow aspiration

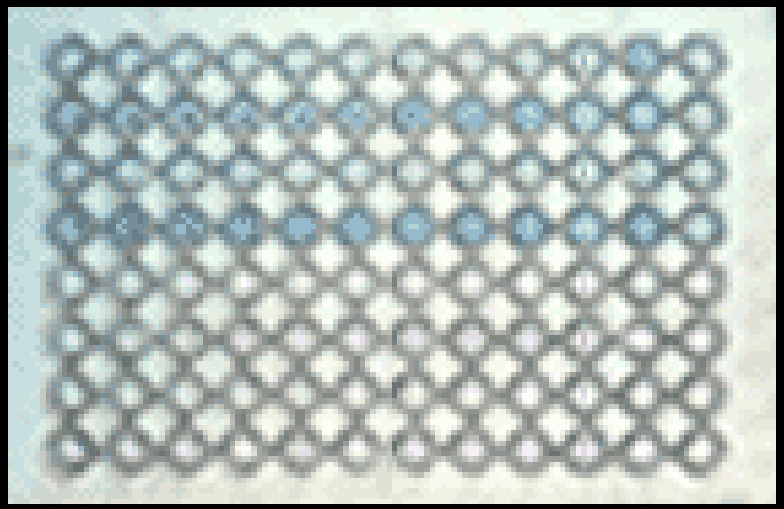


Bone marrow amastigotes

# (2) Immunological Diagnosis:

- Specific serologic tests: Direct Agglutination Test (DAT), ELISA, IFAT
- Skin test (leishmanin test) for survey of populations and follow-up after treatment.

DAT test



ELISA test

# Treatment of visceral leishmanisis

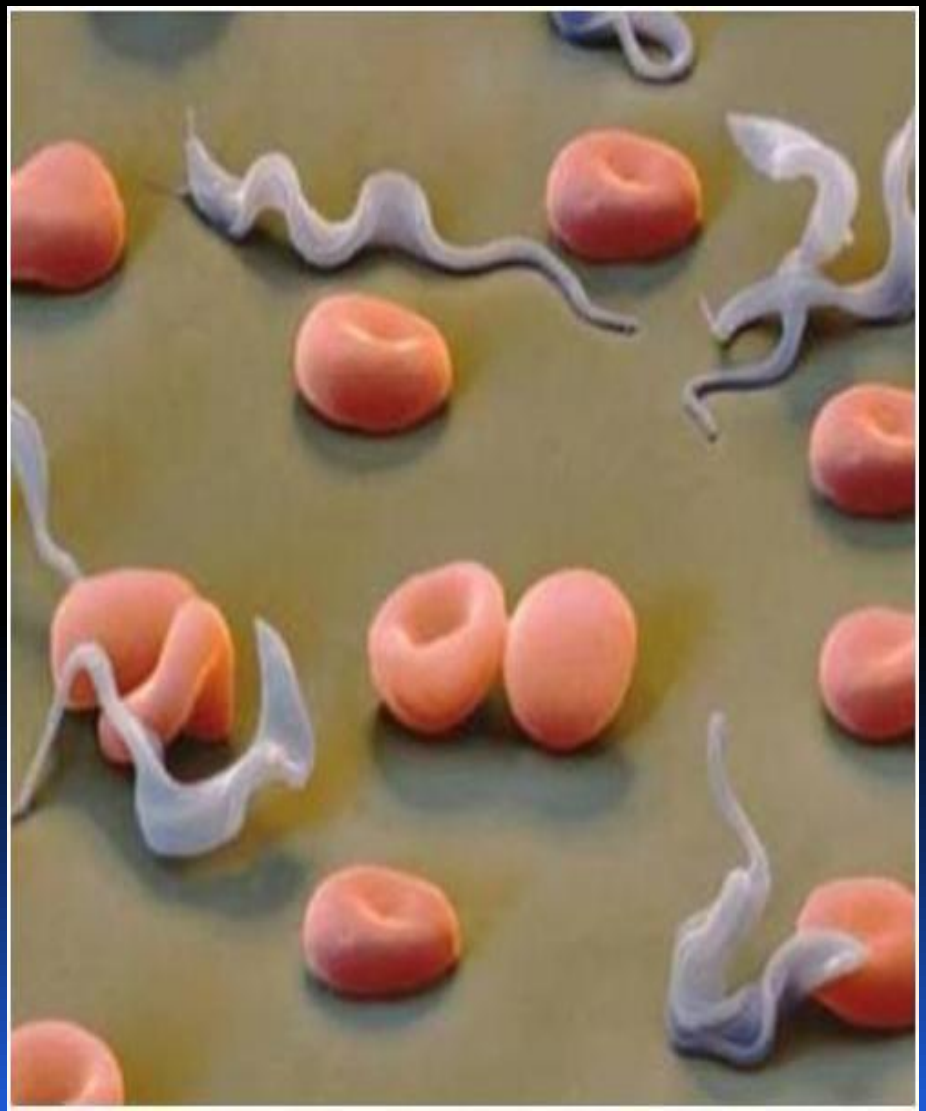
- Recommended treatment varies in different endemic areas:
  - Pentavalent antimony- sodium stibogluconate (Pentostam)
  - Amphotericin B

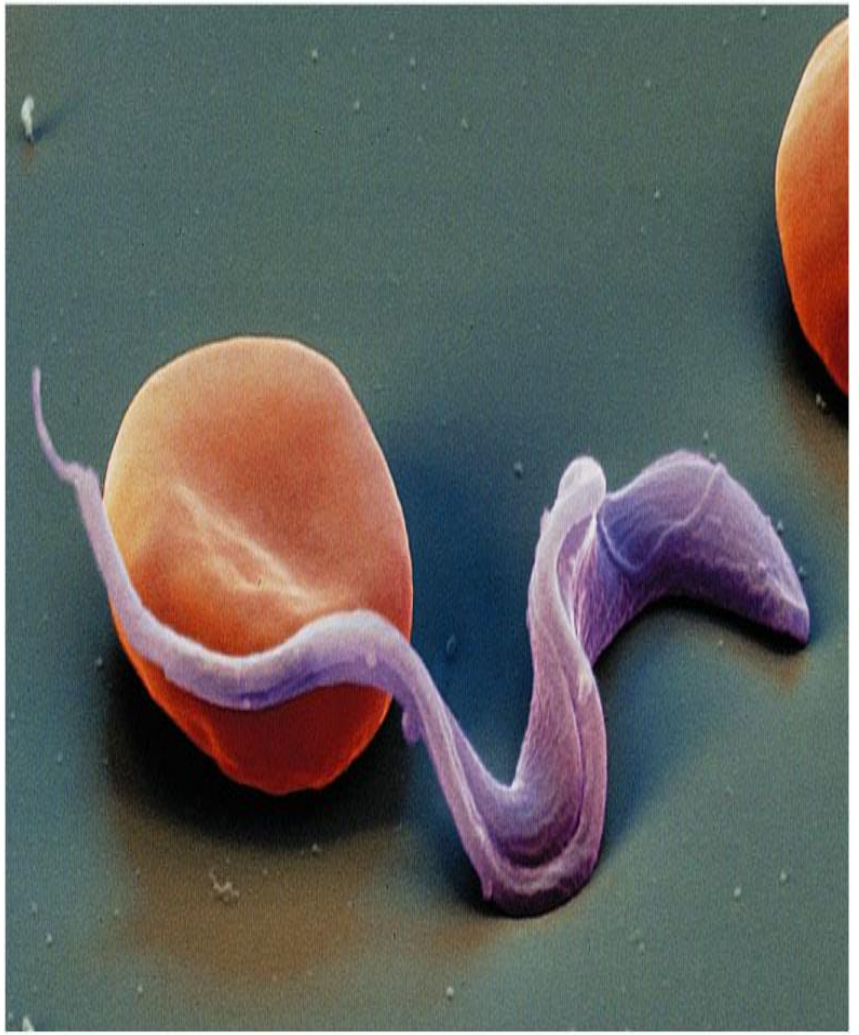
**Treatment of complications:**

- Anaemia
- Bleeding
- Infections etc.

REFERENCE :WHO (2010) Control of leishmaniasis. Report of a meeting 571 of the WHO expert committee on the control of leishmaniasis. http://whqlibdoc.who.int/trs/WHO_TRS_949_eng.pdf

# TRYPANOSOMIASES





# 1-African sleeping sickness

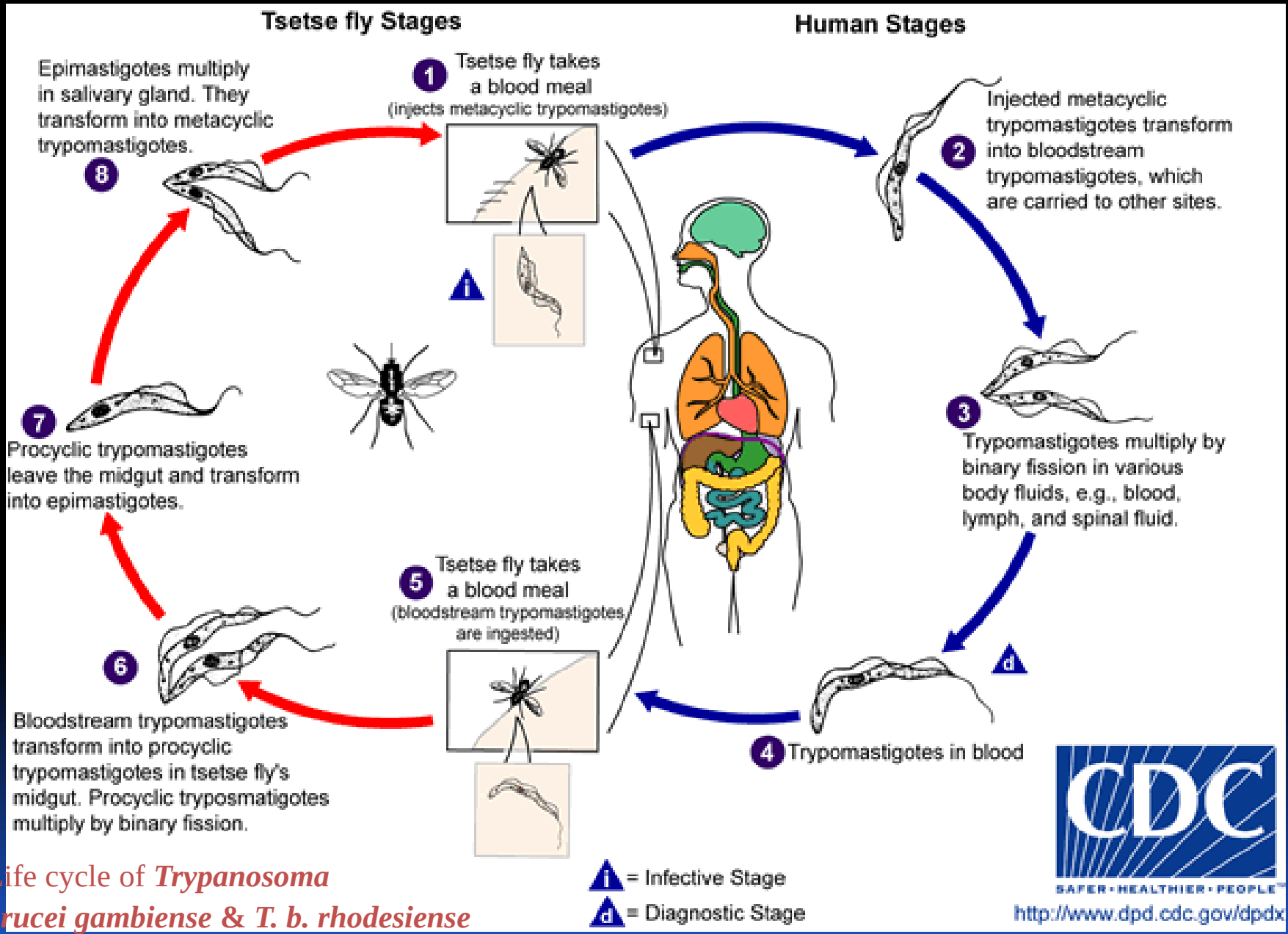
*Trypanosoma brucei rhodesiense*: East Africa, wild and domestic animal reservoirs

*Trypanosoma brucei gambiense*: West and Central Africa, mainly human infection

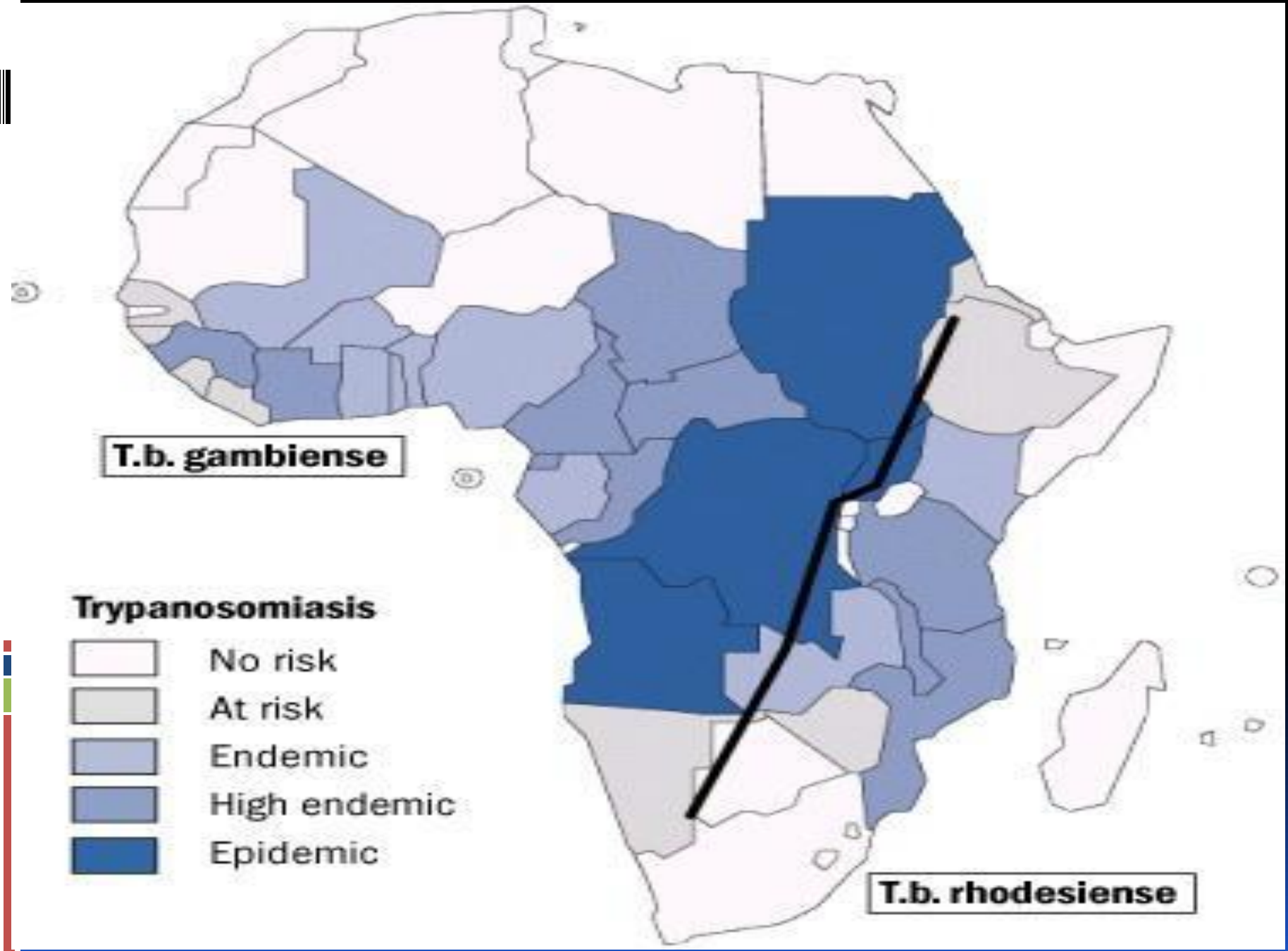
## 2-Chaga's disease in central and south America

*Trypanosma cruzi cause Chaga's disease.*

# African Trypanosomiasis




Life cycle of ***Trypanosoma brucei gambiense & T. b. rhodesiense***


T.b. gambiense
Trypanosomiasis
No risk
At risk
Endemic
High endemic
Epidemic
T.b. rhodesiense

Infection occurs when a vector tsetse fly bites a man. The fly injects the short metacyclic trypomastigotes into the skin tissue…..

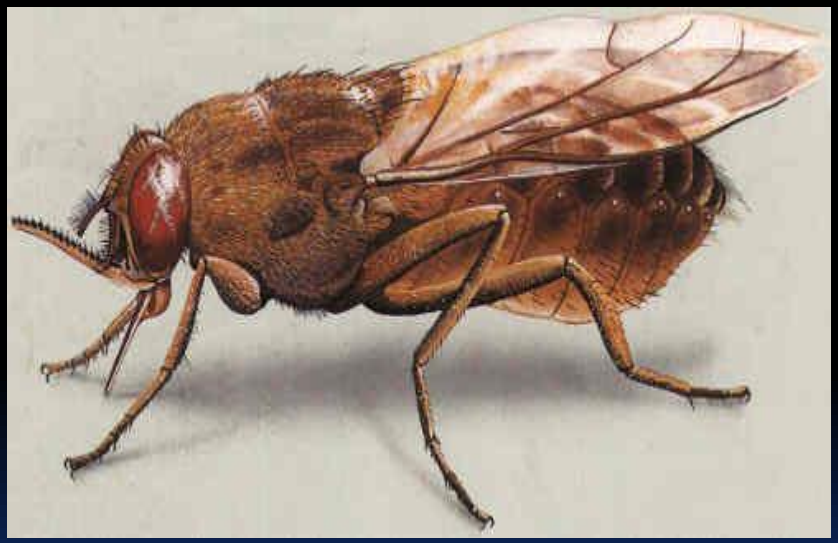
Once inside the bloodstream the trypomastigots become longer, Then, they multiply by binary fission..

The **trypomastigotes** are able to penetrate the blood vessel endothelium and invade extravascular tissues, including the central nervous system (CNS).

Sometimes, wild animals can be infected by the tsetse fly and they act as reservoirs. In these animals, they do not produce the disease, but the live parasite can be transmitted back to the normal hosts

# Animal reservoir hosts for African sleeping sickness

# Tsetse fly

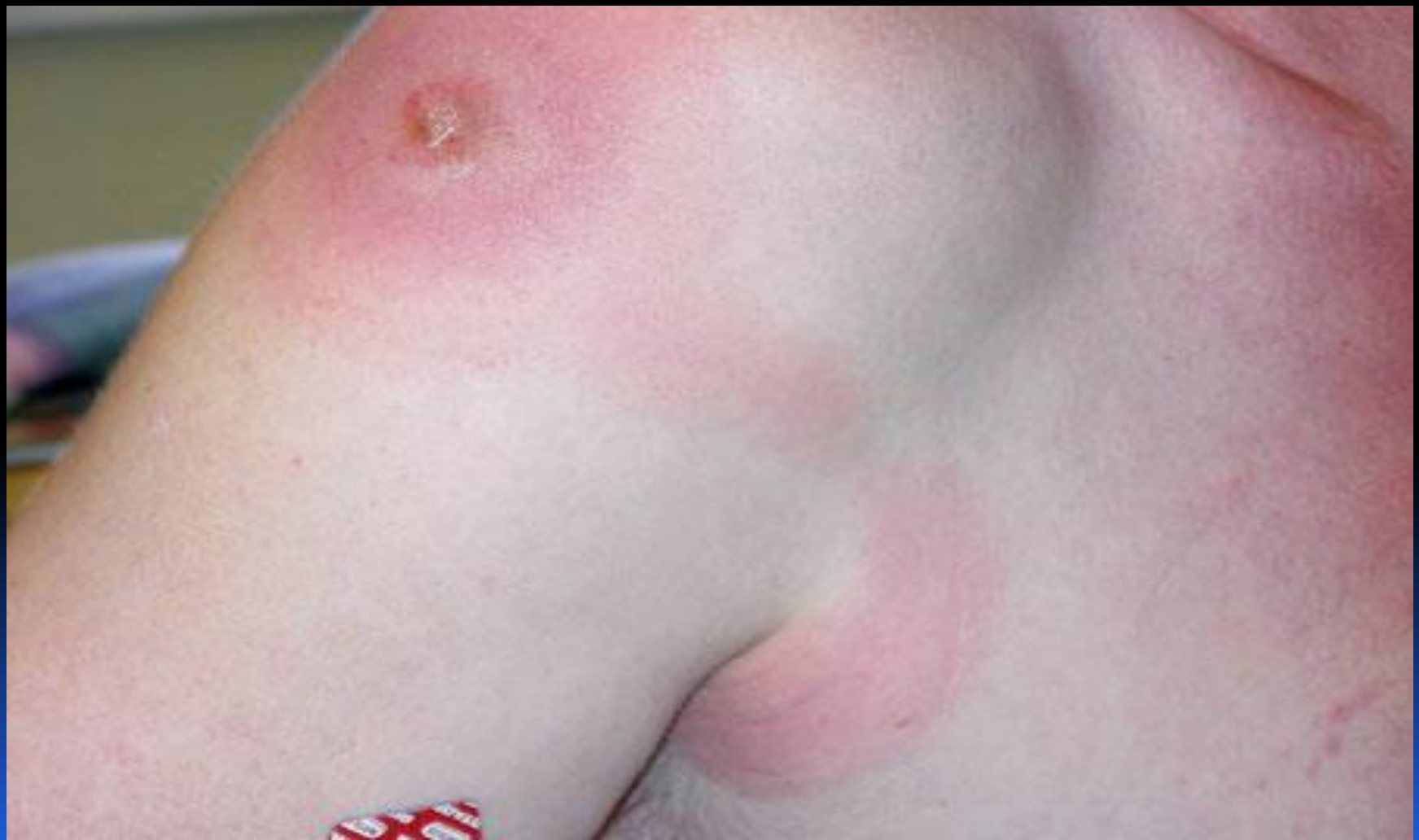


# Pathology and clinical picture

1. A primary reaction occurs at the site of inoculation of Trypanosoma ,skin stage: **chancre** which resolve in 2-3 weeks.
2. **Systemic Haemato-lymphatic stage**: **intermittent fever**, headache and generalized lymphadenopathy mainly in the cervical and sub occipital region (**Winterbottom'sign**), anaemia, generalized organ involvement.
3. **Central nervous system stage (CNS):** Meningoencephalitis.

(Development of the disease more rapid in *Trypanosoma brucei rhodesiense*)

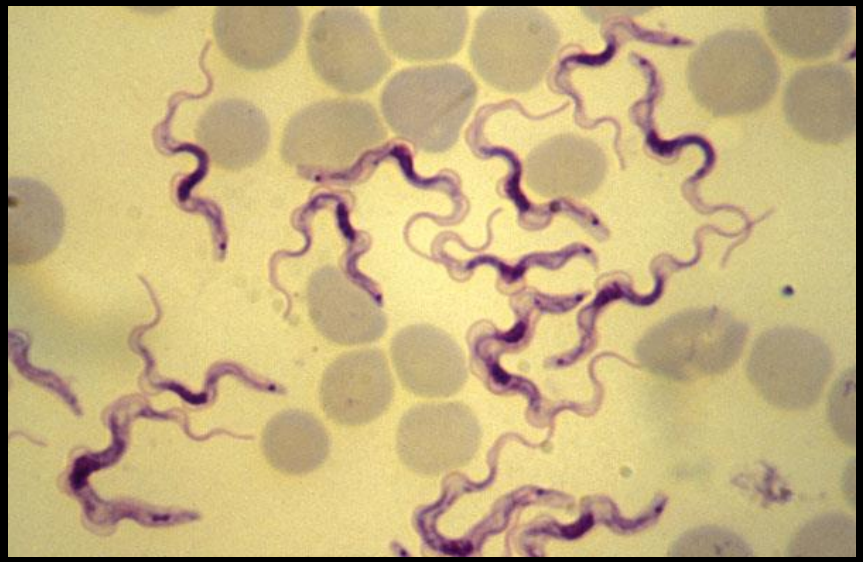
# Chancre skin stage

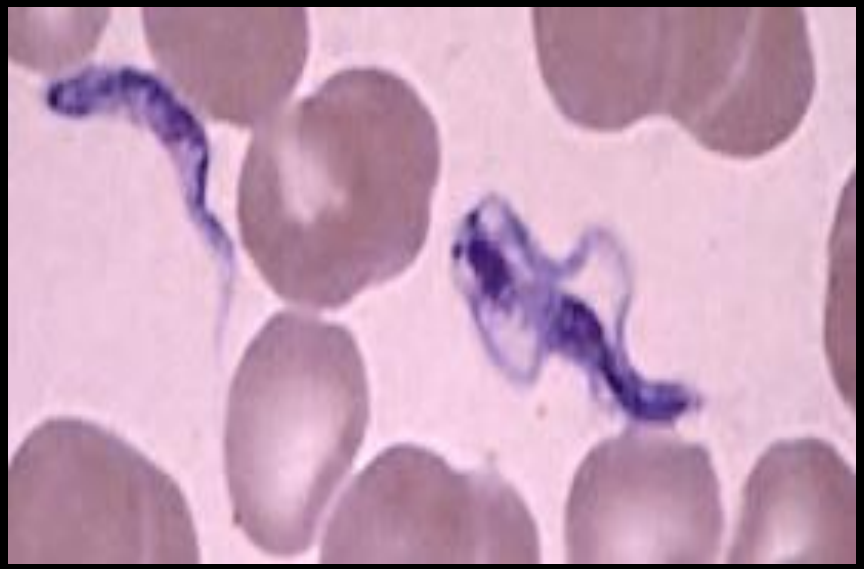


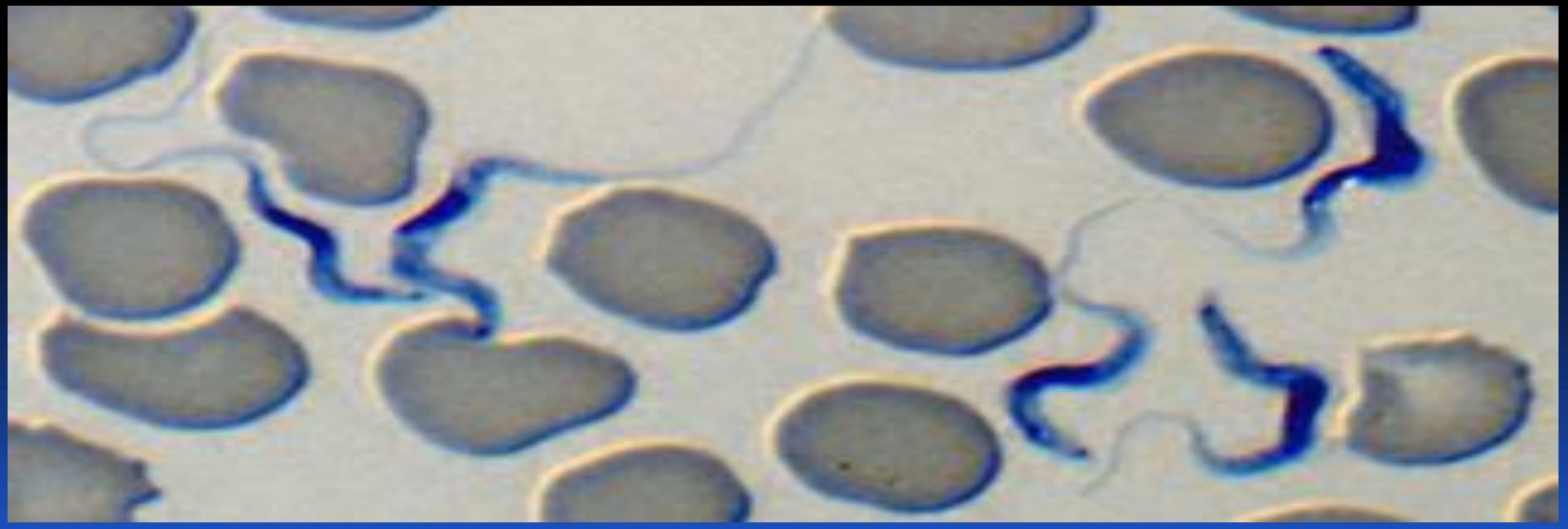
# Winterbottom’s stage

3rd stage CNS: CNS involvement in typical case there is daytime sleeping, psychological changes ,tremors ,convulsions and finally coma.

# trypanosoma



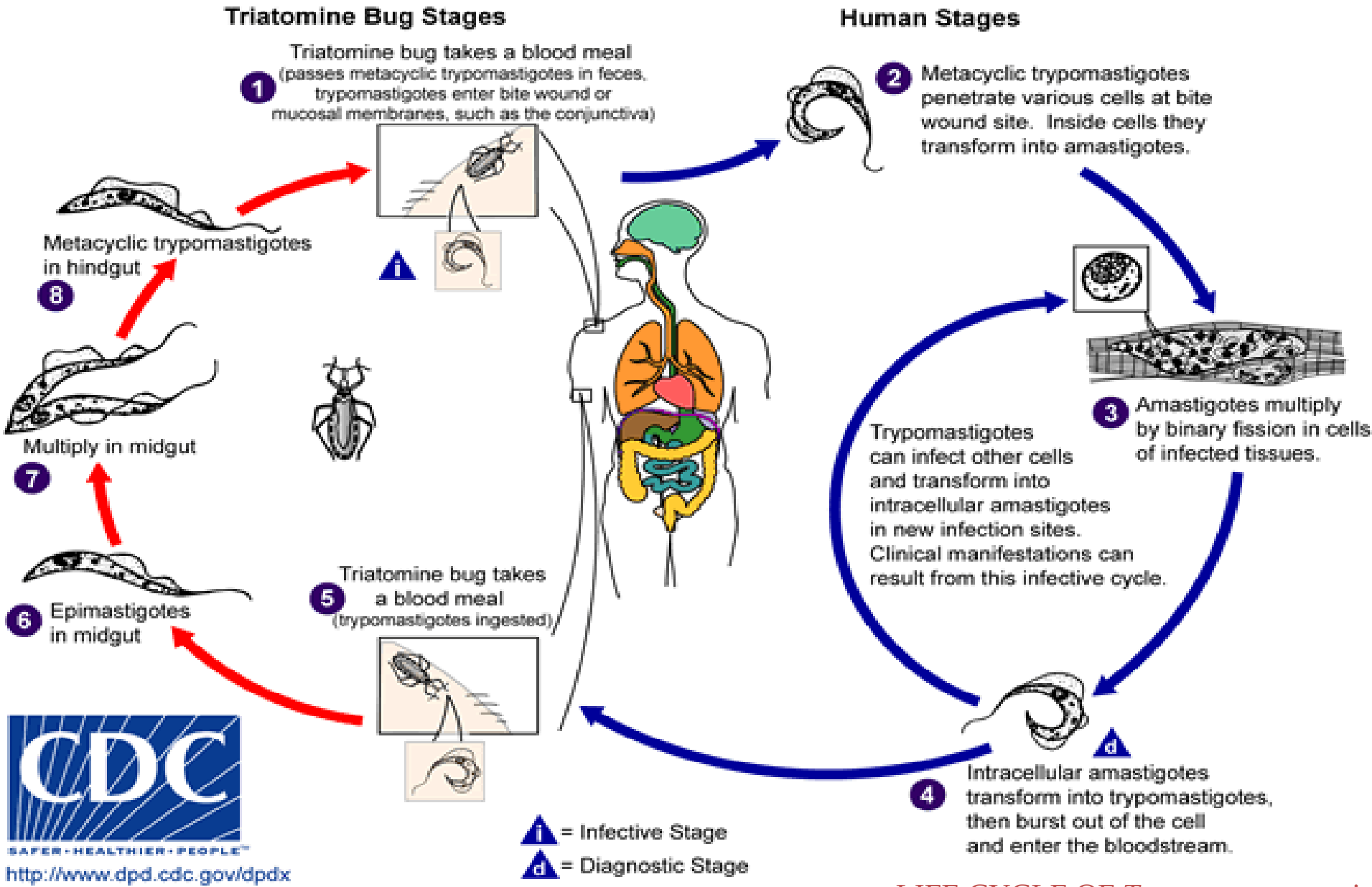




# CSF lumbar puncture

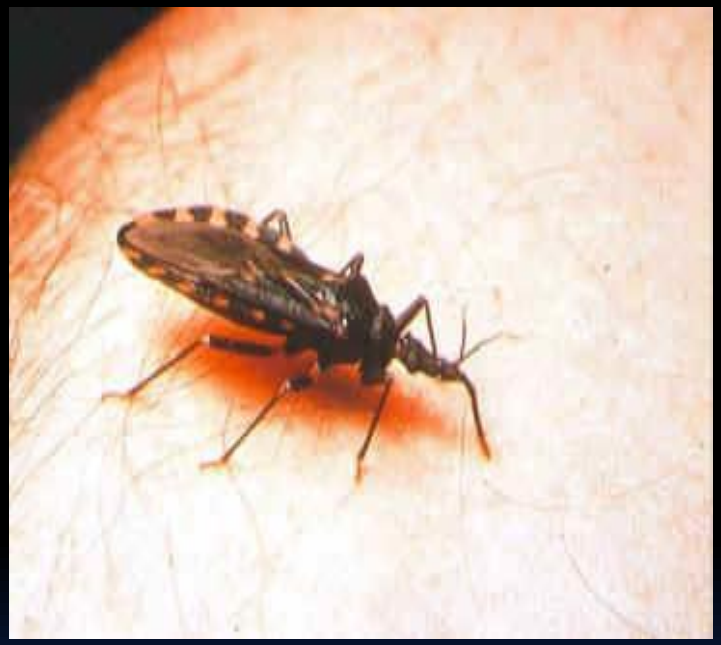
# Chagas Disease

# AMERICAN TRYPANOSOMIASIS




LIFE CYCLE OF *Trypanosoma cruzi*

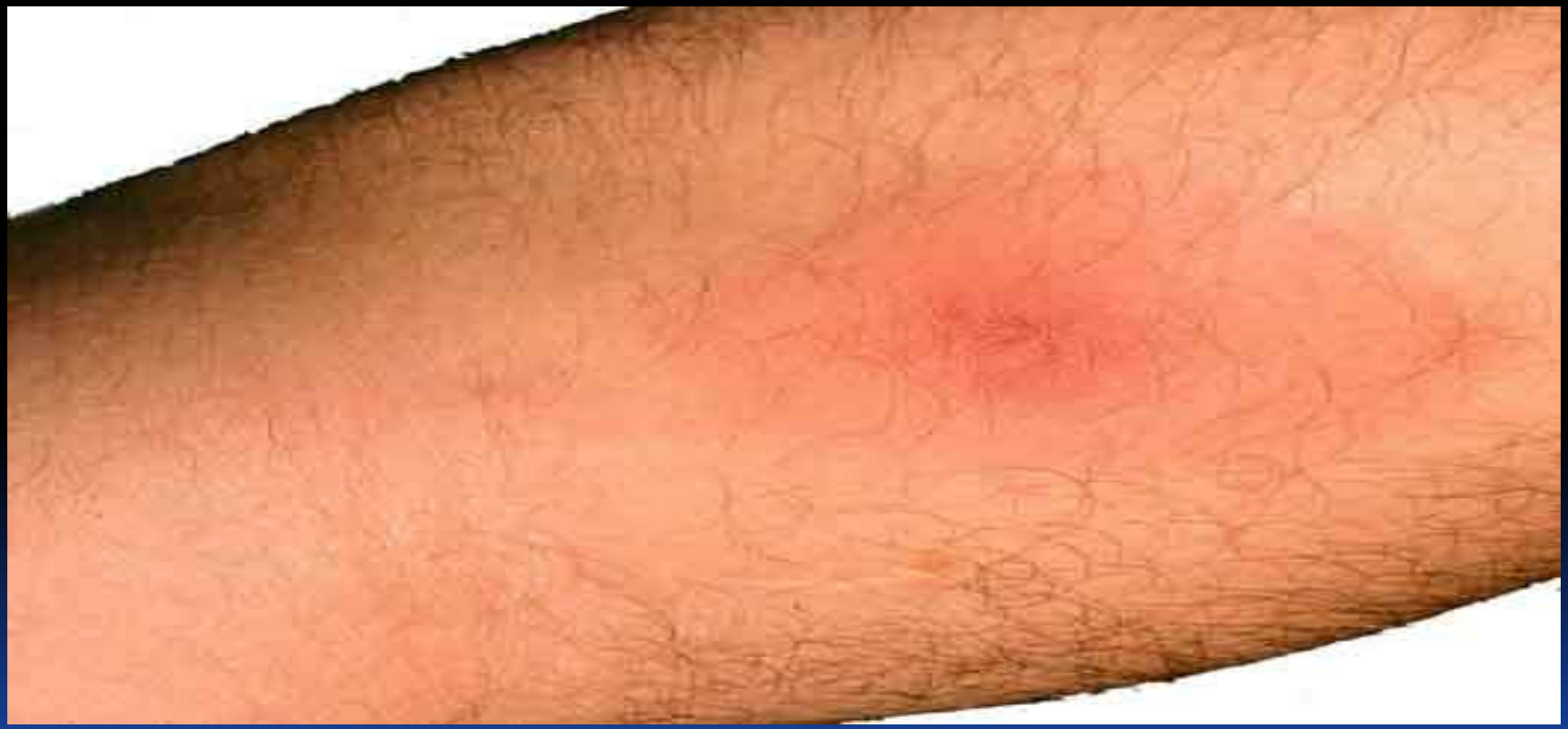
# Reduviid (*Triatomine*) bug



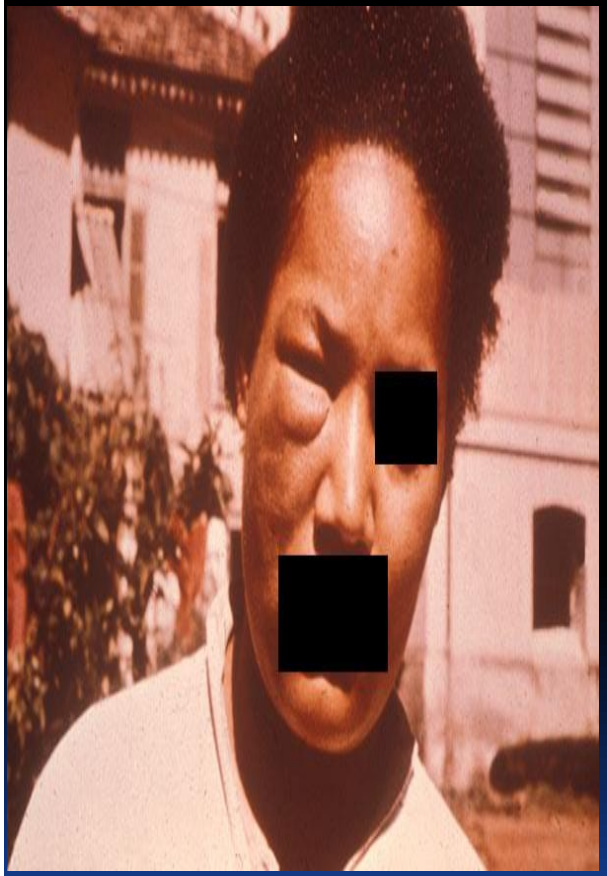
# American trypanosomes (Chaga's disease)

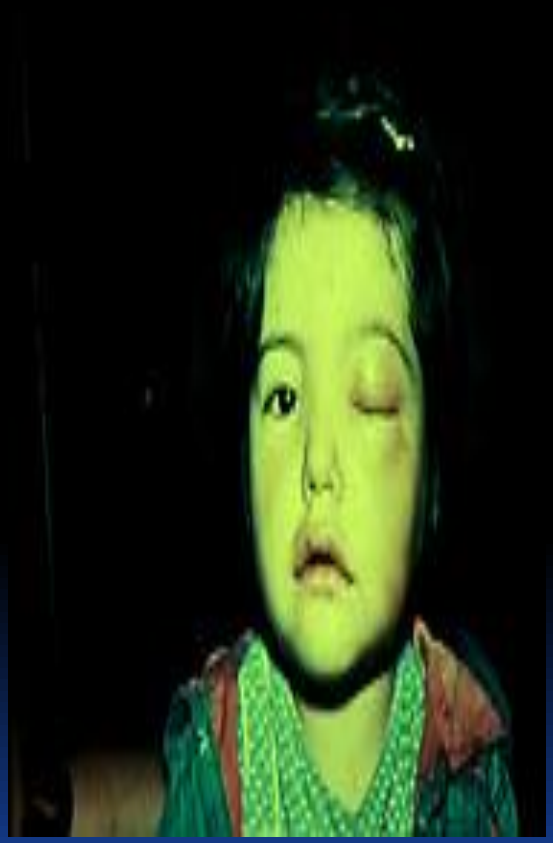
- The parasites produce focal lymphangitis and oedema at the site of parasites entry (**chagoma**) after that parasites ( trypomastigote) enter the blood stream and find there way ,mainly on the face near the eyelids ,it produces a swelling of the eye and temporal region with conjunctivitis (**ROMANA'S sign**) , and also find their way mainly to the cardiac muscles cells . The most constant feature of the cardiac disease is cardiomyopathy , in severe cases can lead to partial or complete heart block which may lead to cardiac failure.
- NOTE: Parasite when free in blood stream in form ( **TRYPTOMASTIGOT)** , but in the tissue it become in form of(**Amastigote**).

# *T. cruzi* causes cutaneous stage (chagoma)



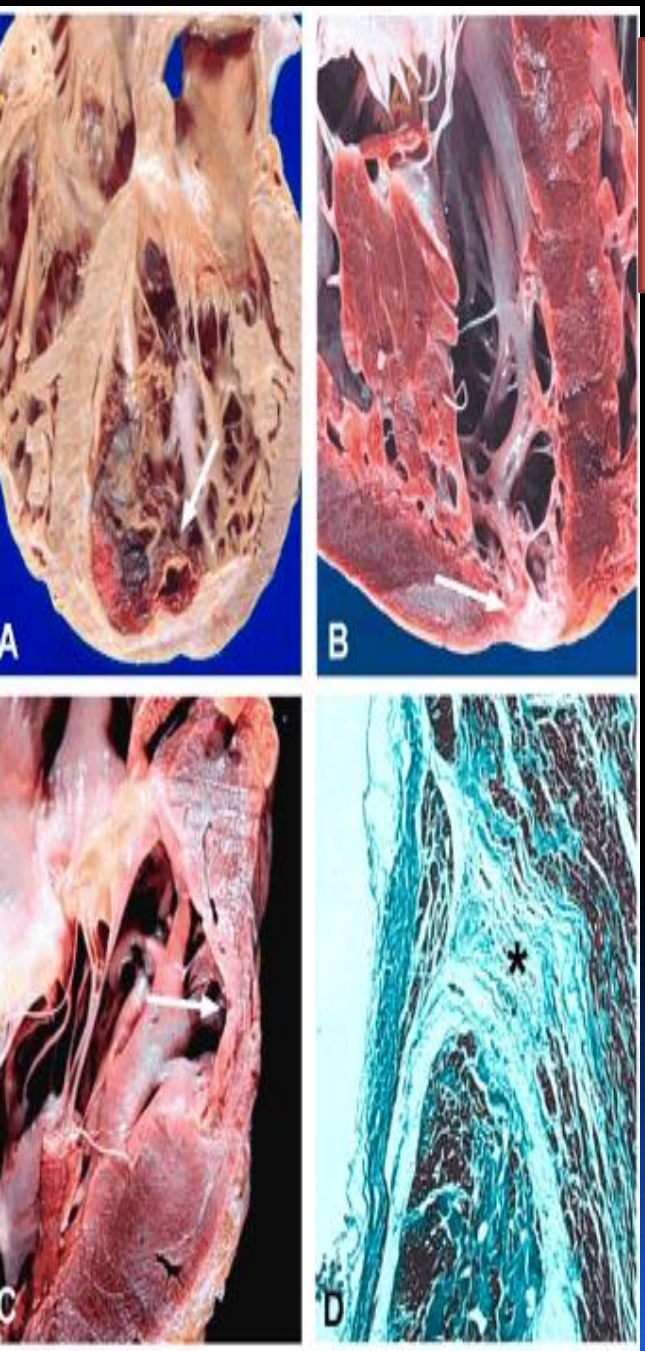
# Ocular lesion (Romana’ sign)





# Diagnosis

- Blood film
- Serology: IFAT
- Xenodiagnosis: feeding bugs on a suspected cases.



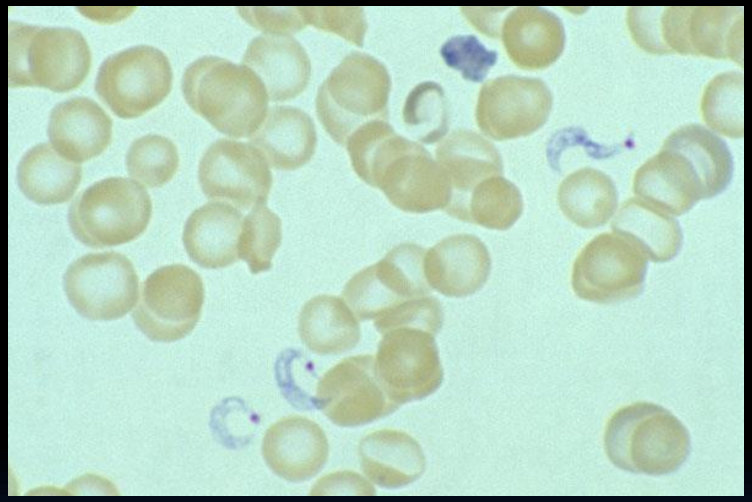

# Heart damage due to American trypanosomiasis

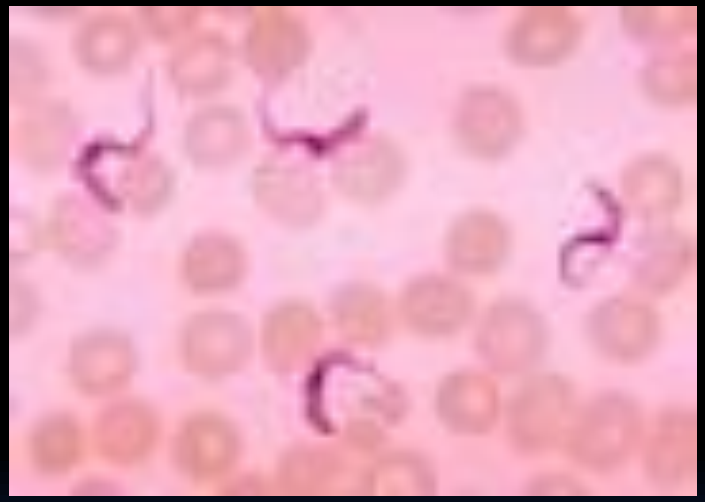
Researchers of Chagas' disease have demonstrated several processes that occur with all cardiomyopathies. The first event is an inflammatory response. Following inflammation, cellular damage occurs. Finally, in the body's attempt to recover from the cellular damage, fibrosis begins in the cardiac tissue

Thromboembolism describes thrombosis,

the formation of a clot, and its main complication is embolism,

# C-shape





# TREATMENT OF TRYPANOSOMIASIS

African trypanosomiasis

For early infection

- pentamidine
- suramin

For late infection

- eflornithine (Diflouromethylornithine- DFMO)

American trypanosomiasis (Chaga's disease)

- benznidazole
- nifurtimox