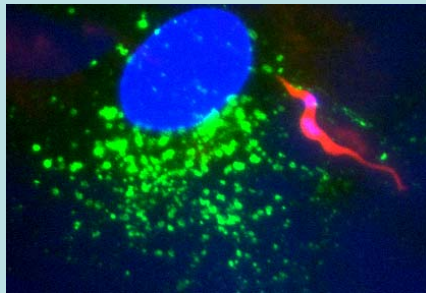


# *Trypanosoma cruzi* and Chagas' Disease

**Norma Andrews**  
**Professor, Yale University**



Kingdom: **Protista**

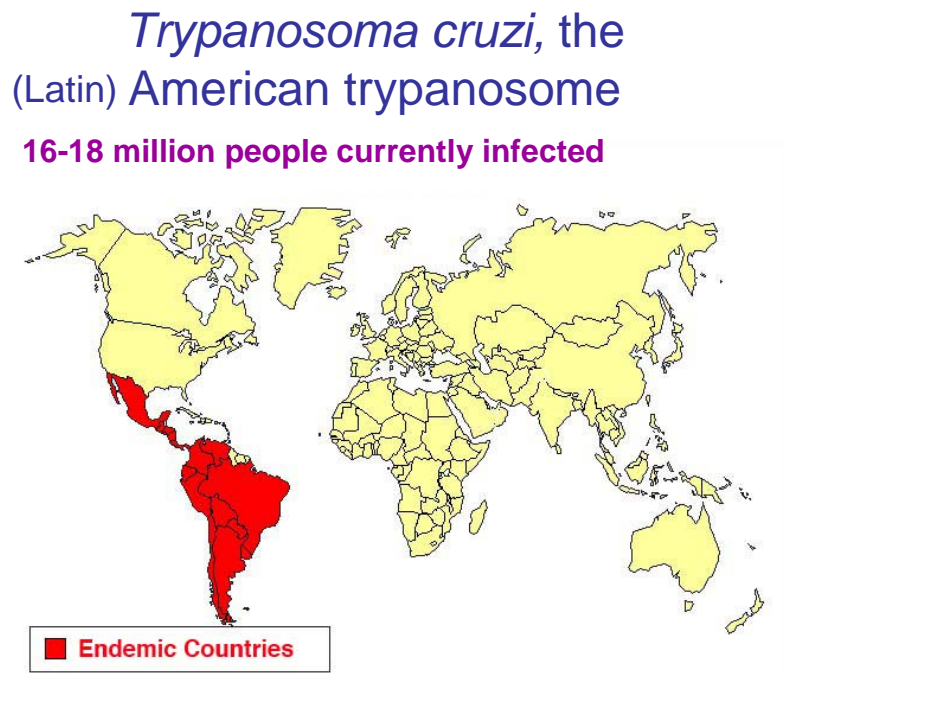
Sub-kingdom: **Protozoa**

Phylum: **Sarcomastigophora**

Order: **Kinetoplastida**

Family: **Trypanosomatidae**

Genus: *Crithidia* *Leptomonas*  
*Herpetomonas* *Blastocrithidia*  
*Endotrypanum* *Rhynchoidomonas*  
**Trypanosoma *Leishmania***



**Carlos Chagas**  
**Brazil 1907**



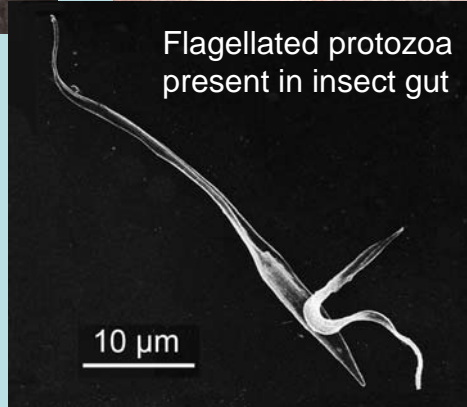
Reduviid insect



**Carlos Chagas**  
**Brazil 1907**



Flagellated protozoa  
present in insect gut



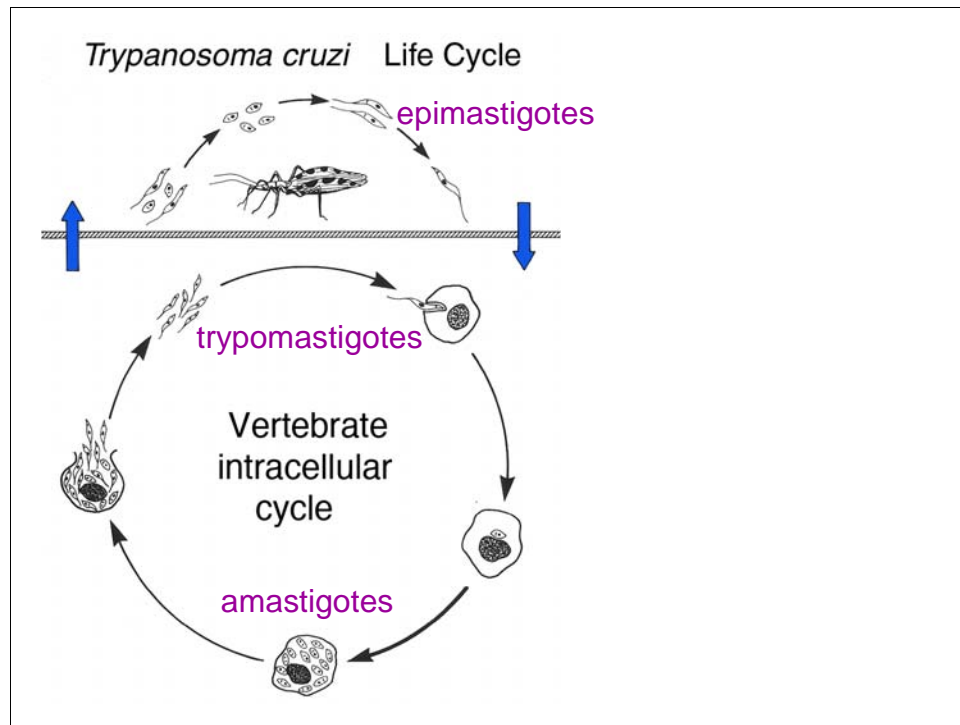
**Carlos Chagas**  
**Brazil 1907**



*Trypanosoma cruzi*



**Chagas' Disease**

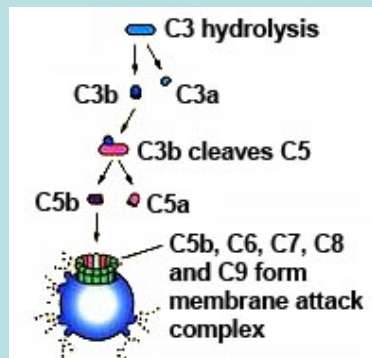


**Epimastigotes are lysed  
by the alternative pathway  
of complement activation**

**Trypomastigotes are resistant**

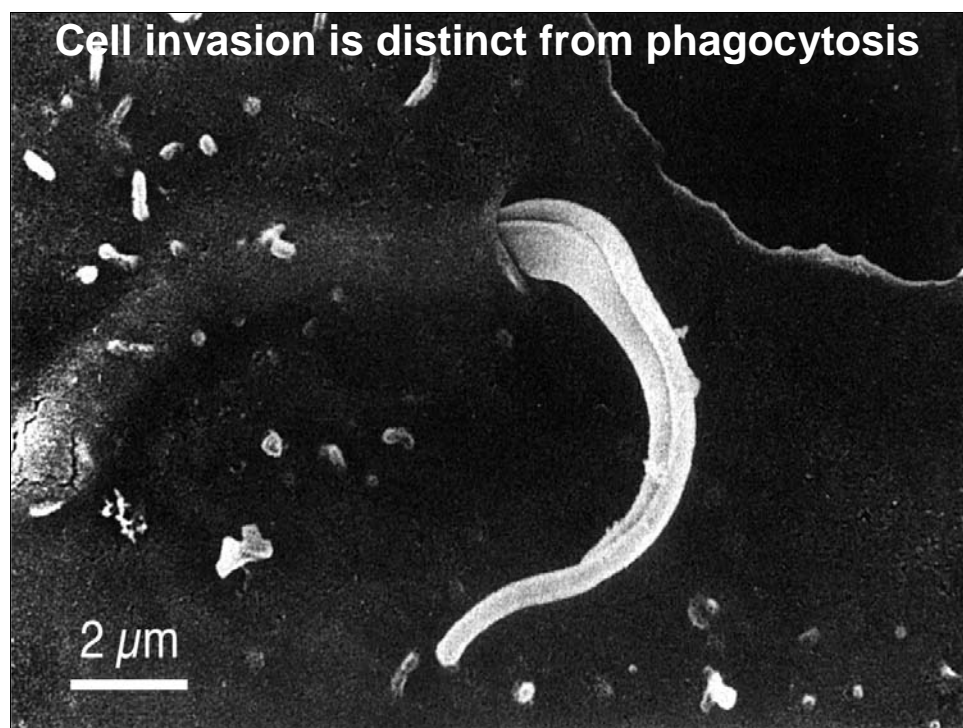
**Muniz and Borriello 1945**

**Nogueira, Bianco and Cohn 1975**





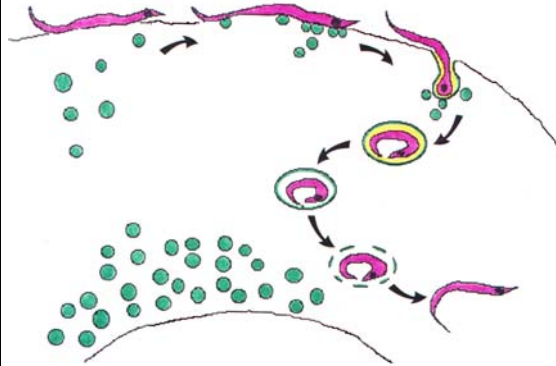


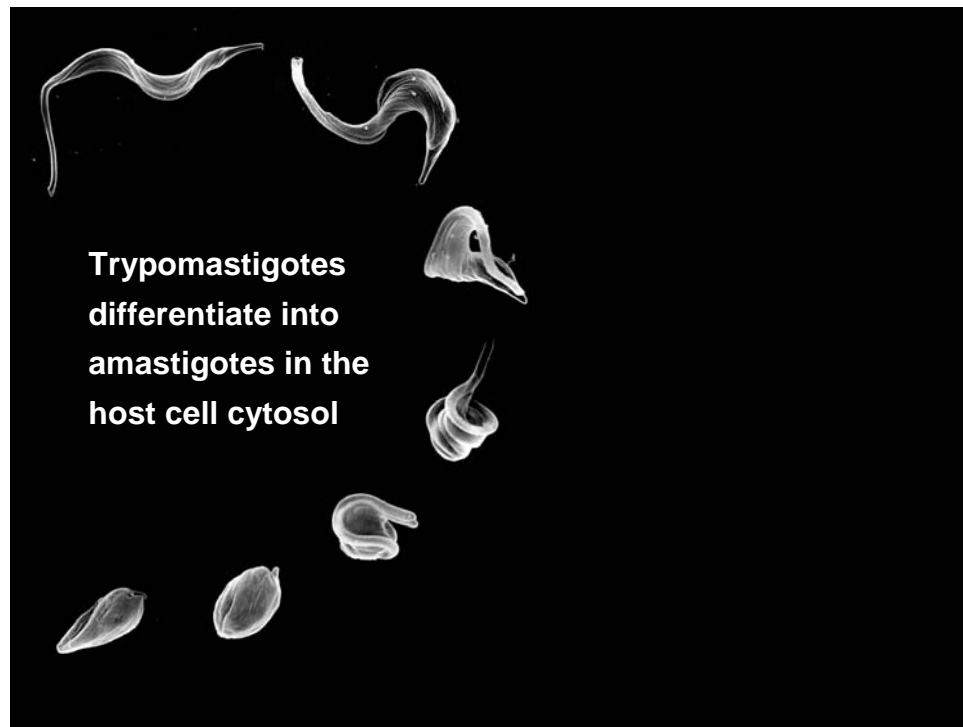


**Host cell invasion by *Trypanosoma cruzi***



***T. cruzi* escapes from the lysosome-derived vacuole and replicates in the cytosol**

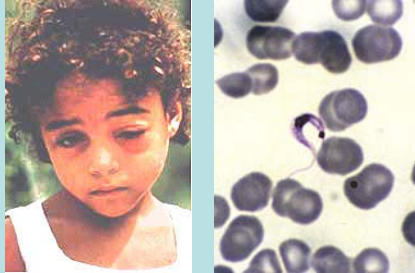




**Intracellular replication of *Trypanosoma cruzi***



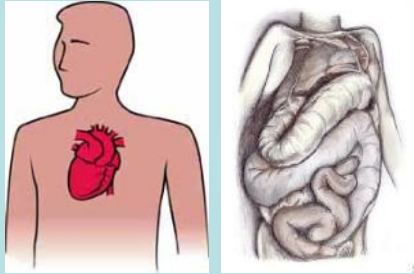
## Chagas' Disease



### Acute phase:

- Localized swelling
- Intense febrile episodes
- Enlargement of the spleen
- Possibility of seizures and death

## Chagas' Disease



**Chronic phase: immunity to re-infection but parasites are not eliminated**

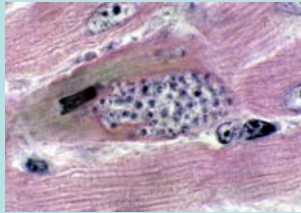
- Asymptomatic (~41%)
- Cardiomyopathy (~45%)
- Megaesophagus (~11%)
- Megacolon (~3%)



## Chagas' Disease

### Chronic phase:

- **Cardiomyopathy - sudden death by heart failure in ~58% of patients**



**Parasitism of  
cardiomyocytes**

QuickTime™ and a  
H.264 decompressor  
are needed to see this picture.

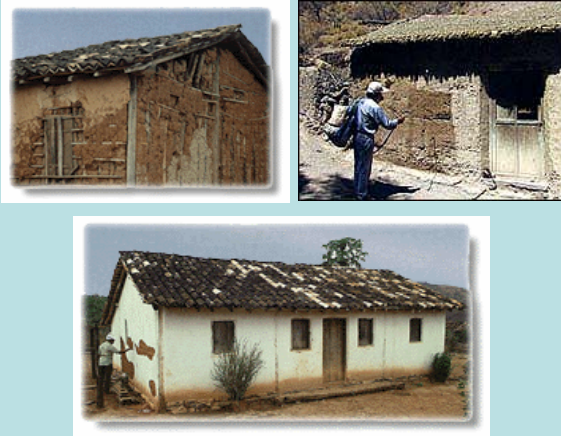
## Chagas' Disease

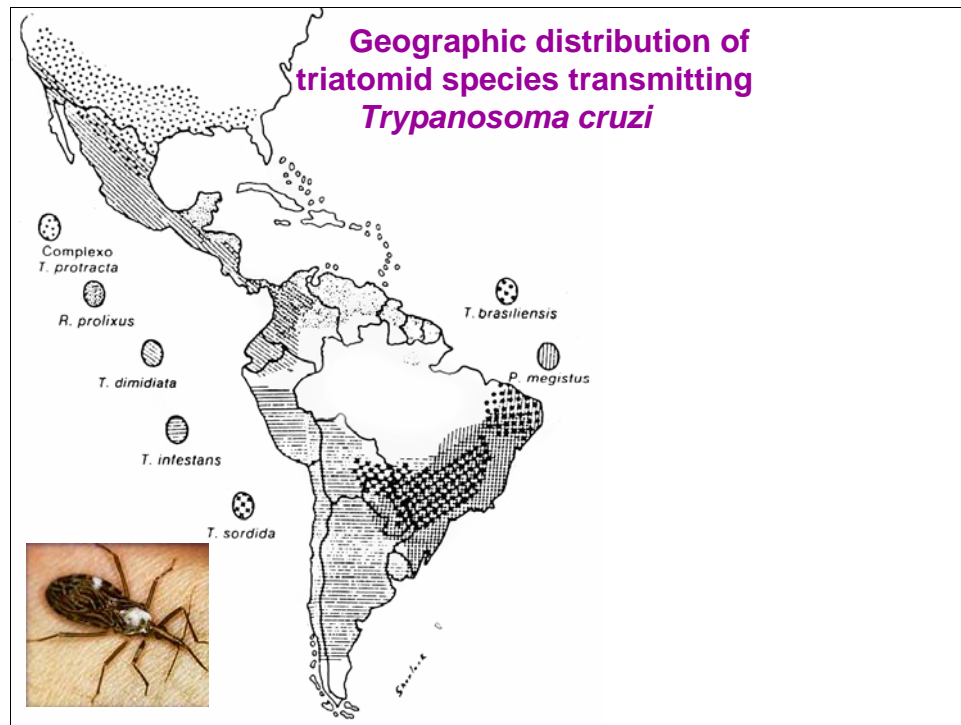


### Chronic phase:

- Asymptomatic population (~41% of infected individuals) can transmit the infection by blood transfusion

**Housing improvement and  
insecticide spraying effectively  
prevent human infections  
by *Trypanosoma cruzi***





**Southern Cone initiative\*  
(PAHO/WHO)**

**Reduction in incidence 1991-1999 :**

Chile - 99%

Uruguay - 99%

Brazil - 96%

Argentina - 85%

Paraguay - 60%

**2000 : 94% reduction in 7 countries  
surveillance phase initiated**

**\*Cited by the Center for Global  
Development as one of the 17  
most cost-effective international  
public health interventions**

**1997: Andean Pact Initiative:**

Colombia  
Equador  
Venezuela

**1997: Central American Initiative:**

El Salvador  
Guatemala  
Honduras.  
Nicaragua  
Mexico  
Panama

**2001: Mexican Initiative**

***Trypanosoma cruzi* will never  
be eliminated (more than 100  
vertebrate species serve as  
hosts in nature)**

**Chagas' disease  
can be prevented by  
improvement in social and  
economical conditions**

**Critical issues are  
effective and sustained  
epidemiological surveillance  
and treatment for the  
large chronically infected  
population**