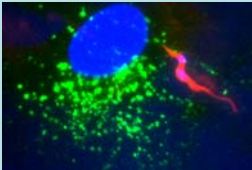


Trypanosoma cruzi
and
Chagas' Disease

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



Trypanosoma cruzi, the
(Latin) American trypanosome

16-18 million people currently infected




■ Endemic Countries



Carlos Chagas
Brazil 1907



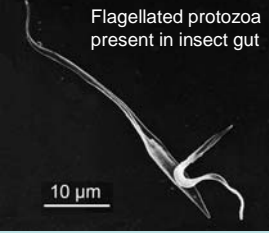
Reduviid insect



Carlos Chagas
Brazil 1907





Flagellated protozoa present in insect gut




10 µm

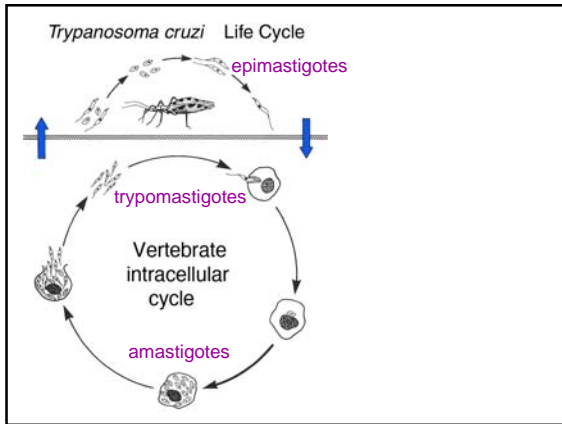
Carlos Chagas
Brazil 1907



Trypanosoma cruzi



Chagas' Disease

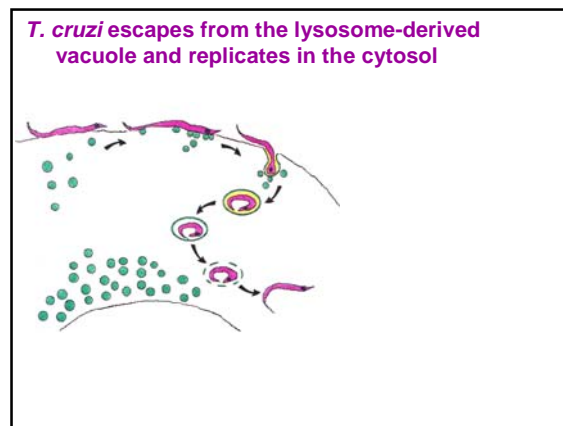
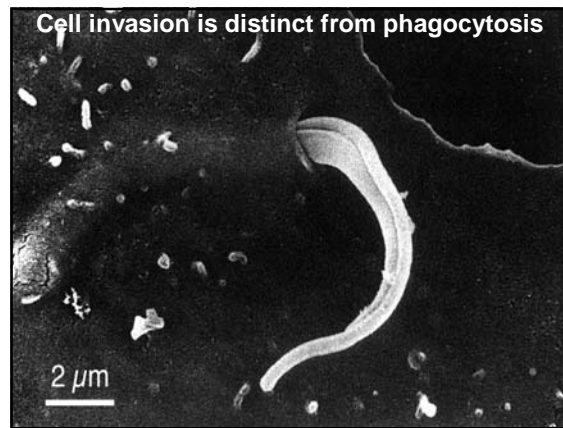


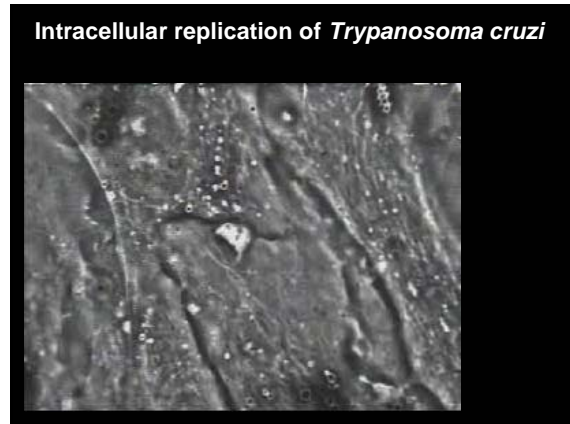
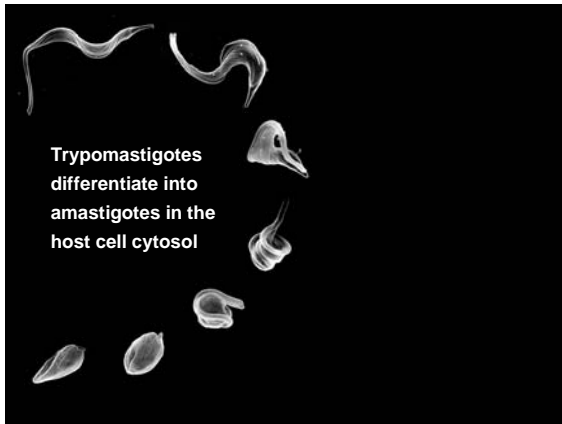
Epimastigotes are lysed by the alternative pathway of complement activation

Trypomastigotes are resistant

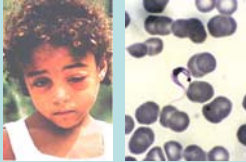
Muniz and Borriello 1945
Nogueira, Bianco and Cohn 1975

The diagram shows the alternative pathway of complement activation. It starts with C3 hydrolysis, which produces C3a and C3b. C3b cleaves C5 into C5a and C5b. C5b, along with C6, C7, C8, and C9, forms the membrane attack complex (MAC).





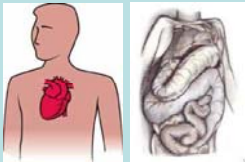
Chagas' Disease



Acute phase:

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

Chagas' Disease



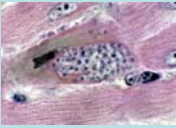
Chronic phase: immunity to re-infection but parasites are not eliminated

- 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

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

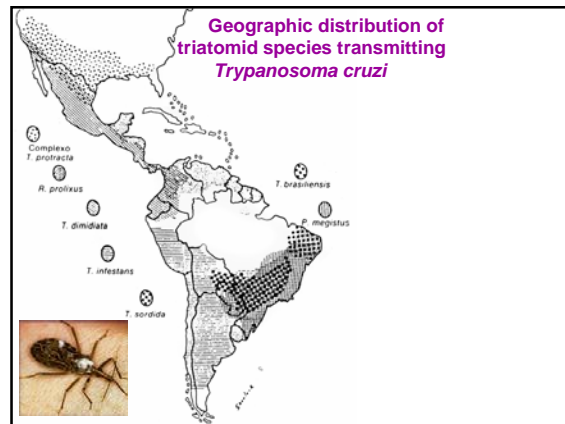
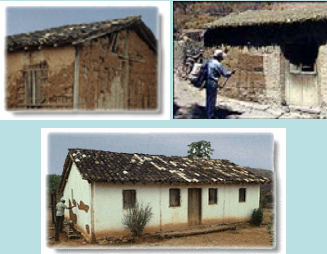
Chagas' Disease



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
Ecuador
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