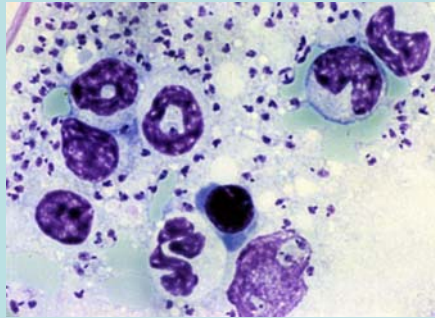


***Leishmania* spp.
and
Leishmaniasis**

**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***

12 million people infected - 350 million at risk

QuickTime™ and a
TIFF (LZW) decompressor
are needed to see this picture.



Clinical Associations of *Leishmania Sp.*

L. major
L. tropica
L. mexicana



Cutaneous

Clinical Associations of *Leishmania Sp.*

L. braziliensis



Mucocutaneous

Clinical Associations of *Leishmania Sp.*

L. donovani

L. infantum

L. chagasi



- Periodic fever
- Severe enlargement of liver and spleen
- Weight loss
- Anemia

Visceral

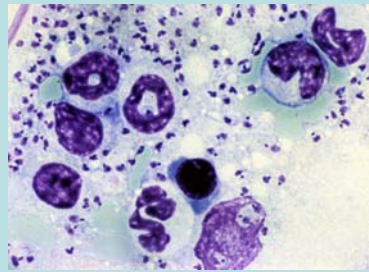


William Boog Leishman

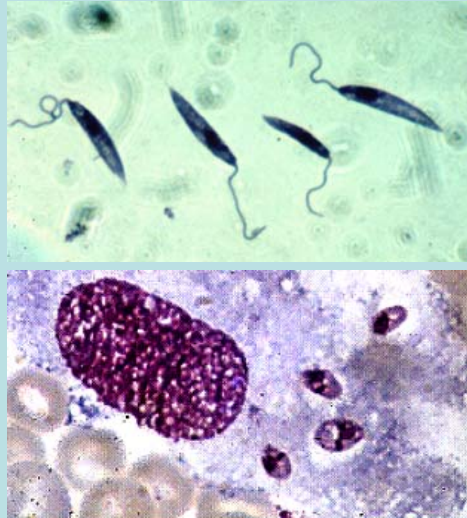
Charles Donovan

1900-1903

Leishman-donovan bodies
in spleen macrophages



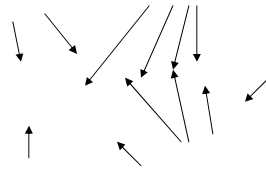
Leonard Rogers 1904
Charles Nicolle 1908
Culture of promastigotes revealed
existence of extracellular form



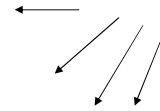
John Sinton 1924
Incidence of visceral leishmaniasis
in eastern India coincided with
distribution of silvery sandfly



Sandfly species transmitting *Leishmania*



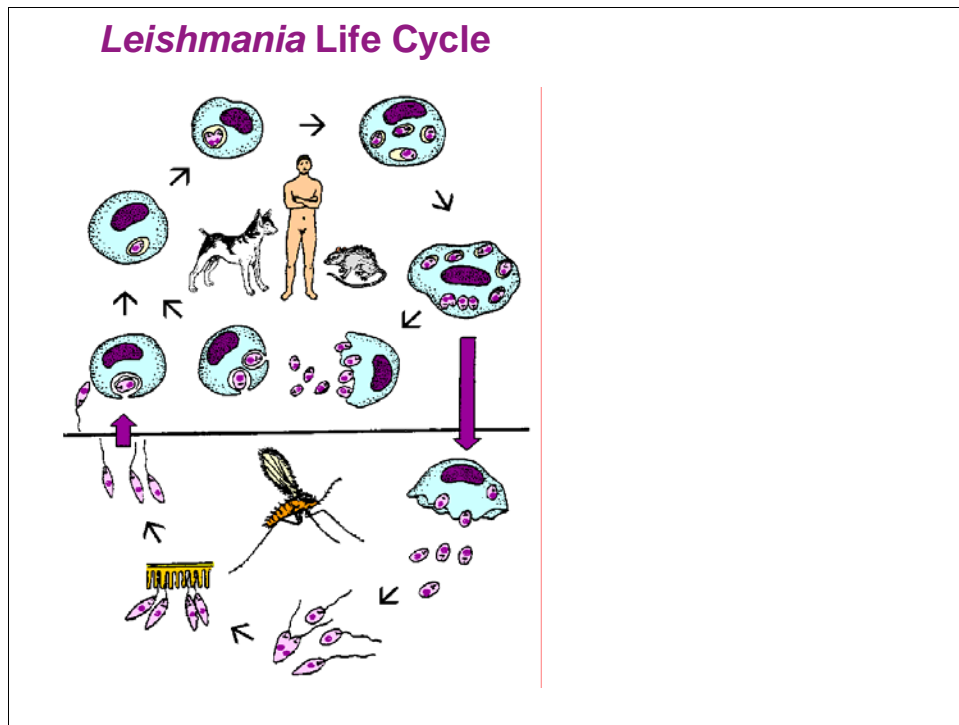
QuickTime™ and a
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are needed to see this picture.





Knowles 1928
Leishmania detected in sandflies

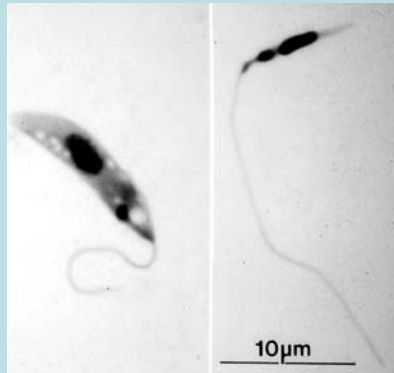
Swaminath 1942
Formal demonstration that sandflies
could transmit *Leishmania* to humans



Promastigotes differentiate to complement resistant metacyclic promastigotes in the sand fly midgut

David Sacks 1984-1985

procyclic metacyclic

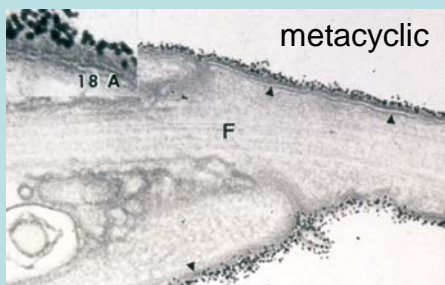
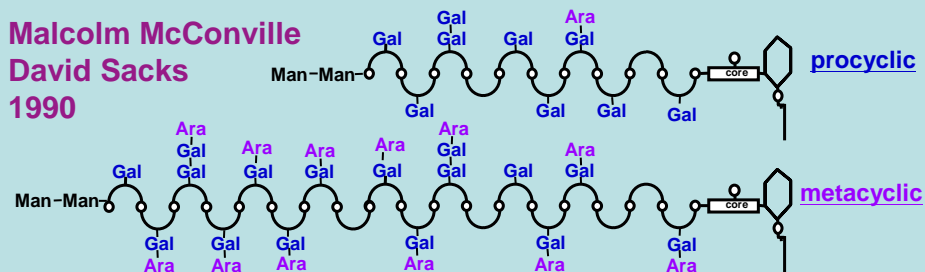


Differentiation into metacyclics involves LPG coat extension

Malcolm McConville

David Sacks

1990

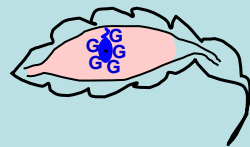


**Immunogold surface labeling
of *L. major* lipophosphoglycan**



LPG modification promotes infective stage detachment from sandfly midgut

David Sacks 1992

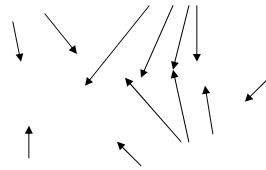


procyclic: attachment

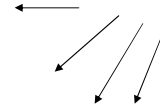


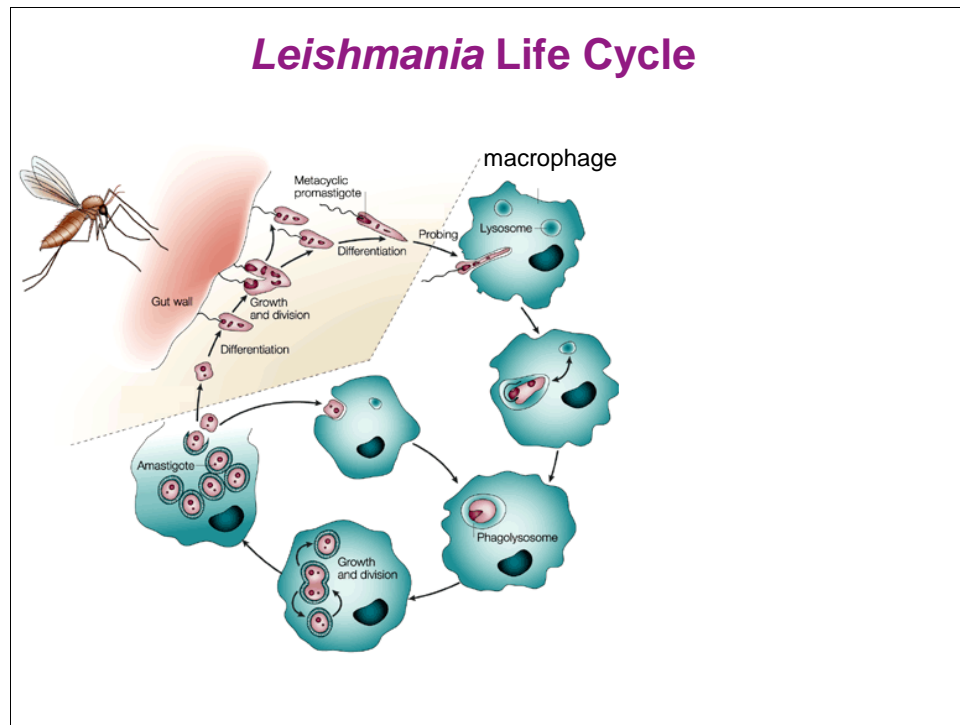
metacyclic: detachment

Sandfly vectorial competence for different species of *Leishmania* is associated with LPG polymorphisms

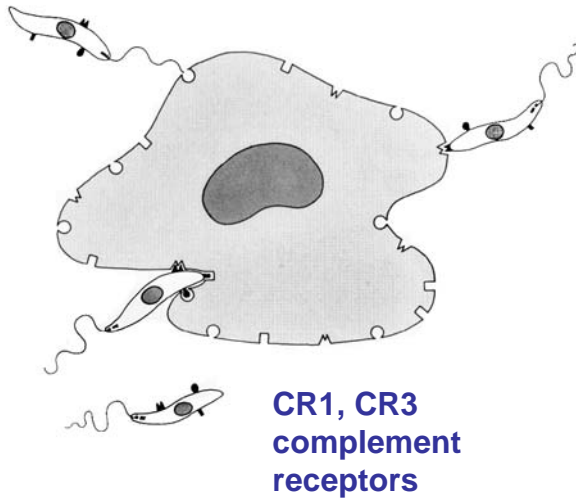


QuickTime™ and a
TIFF (LZW) decompressor
are needed to see this picture.



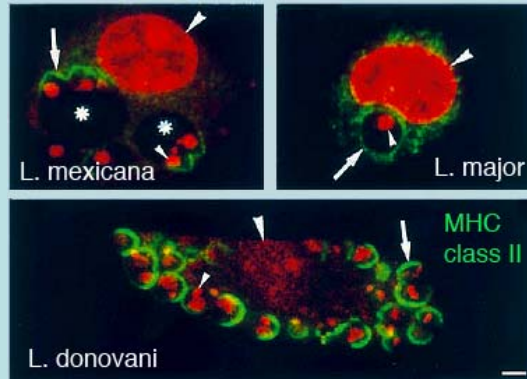


***Leishmania* invades macrophages
by receptor-mediated phagocytosis**



***Leishmania* amastigotes replicate in acidic vacuoles containing lysosomal enzymes and membrane proteins**

Jean Claude Antoine, Pasteur Institute



**Control of *Leishmania*
transmission is challenging
because of difficulties in
limiting contact with sandflies**



*There is a strong need for
new drugs with less
toxicity*