



# Protozoarios

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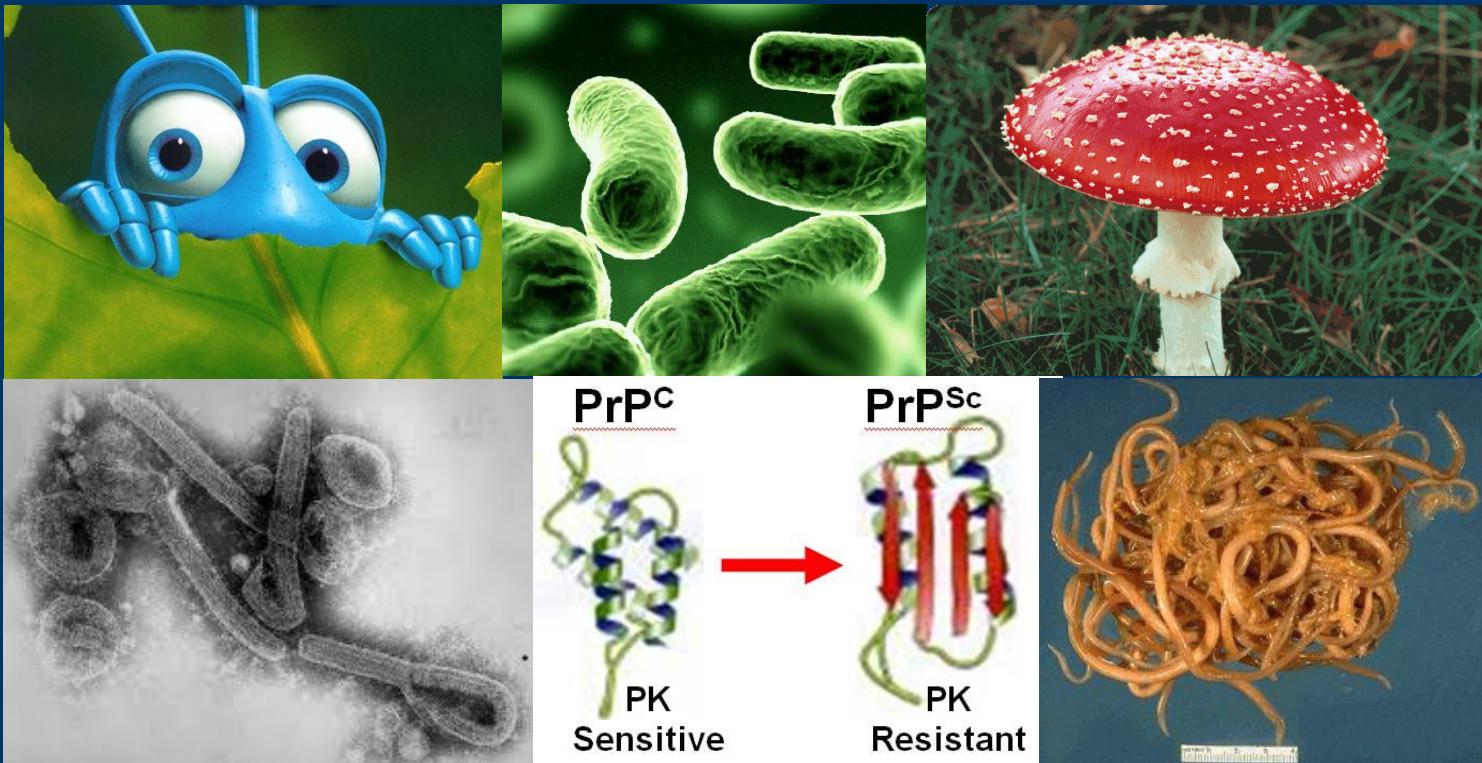
Consejo Consultivo, **Revista Peruana de Medicina Experimental y Salud Pública** (RPMESP).  
Editor Asistente, **Revista Médica de Risaralda** (RMR).

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# Protozoarios

## Introducción

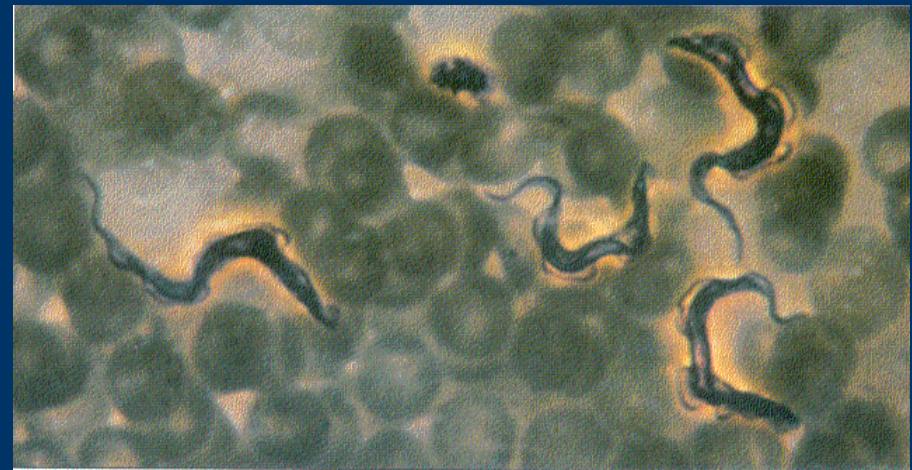
- ¿Como se clasifican los agentes infecciosos?



# Protozoarios

## Introducción

- ¿Como se clasifican los agentes infecciosos?
  - Bacterias
  - Hongos
  - Virus
  - Priones
  - Parásitos
    - *Helmintos*
    - *Protozoarios*



# Protozoarios

## Introducción

- Protozoosis como NTDs (Enfermedades Desatendidas u Olvidadas)
- Enfermedades Olvidadas, Desatendidas, de la Pobreza (*neglected tropical diseases*)
  - 13 infecciones bacterianas y parasitarias:

1. Ascariasis
2. Anquilostomiasis
3. Trichuriasis
4. Filariasis linfática
5. Oncocercosis
6. Dracunculiasis
7. Esquistosomiasis
8. Enfermedad de Chagas
9. Tripanosomiasis Africana Humana
10. Leishmaniasis
11. Ulcera de Buruli
12. Lepra (Enf. de Hansen)
13. Tracoma

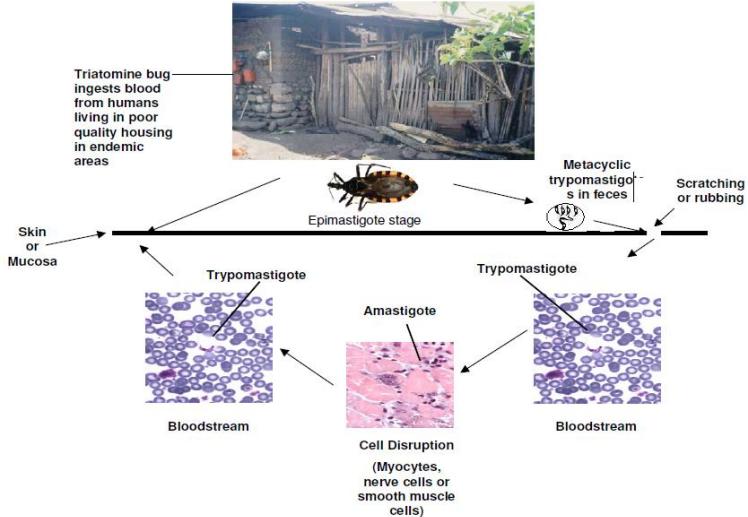


# Fatal Chagas Disease Among Solid-Organ Transplant Recipients in Colombia

Carlos Fernando Gómez-P,<sup>1</sup> Julio César Mantilla-H,<sup>2</sup> and Alfonso J. Rodriguez-Morales<sup>3</sup>

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<sup>3</sup>Public Health and Infection Research Group, Faculty of Health Sciences, Universidad Tecnológica de Pereira, Risaralda, Colombia



## Urban outbreak of acute orally acquired Chagas disease in Táchira, Venezuela

Jesús A. Benítez<sup>1,2</sup>, Benjamín Araujo<sup>3</sup>, Krisell Contreras<sup>4</sup>, Marianela Rivas<sup>5</sup>, Pedro Ramírez<sup>6</sup>, Watermo Guerra<sup>7</sup>, Noel Calderon<sup>8</sup>, Carlo Ascaso Terren<sup>9</sup>, Reggie Barrera<sup>8</sup>, Alfonso J. Rodríguez-Morales<sup>10,11,12</sup>

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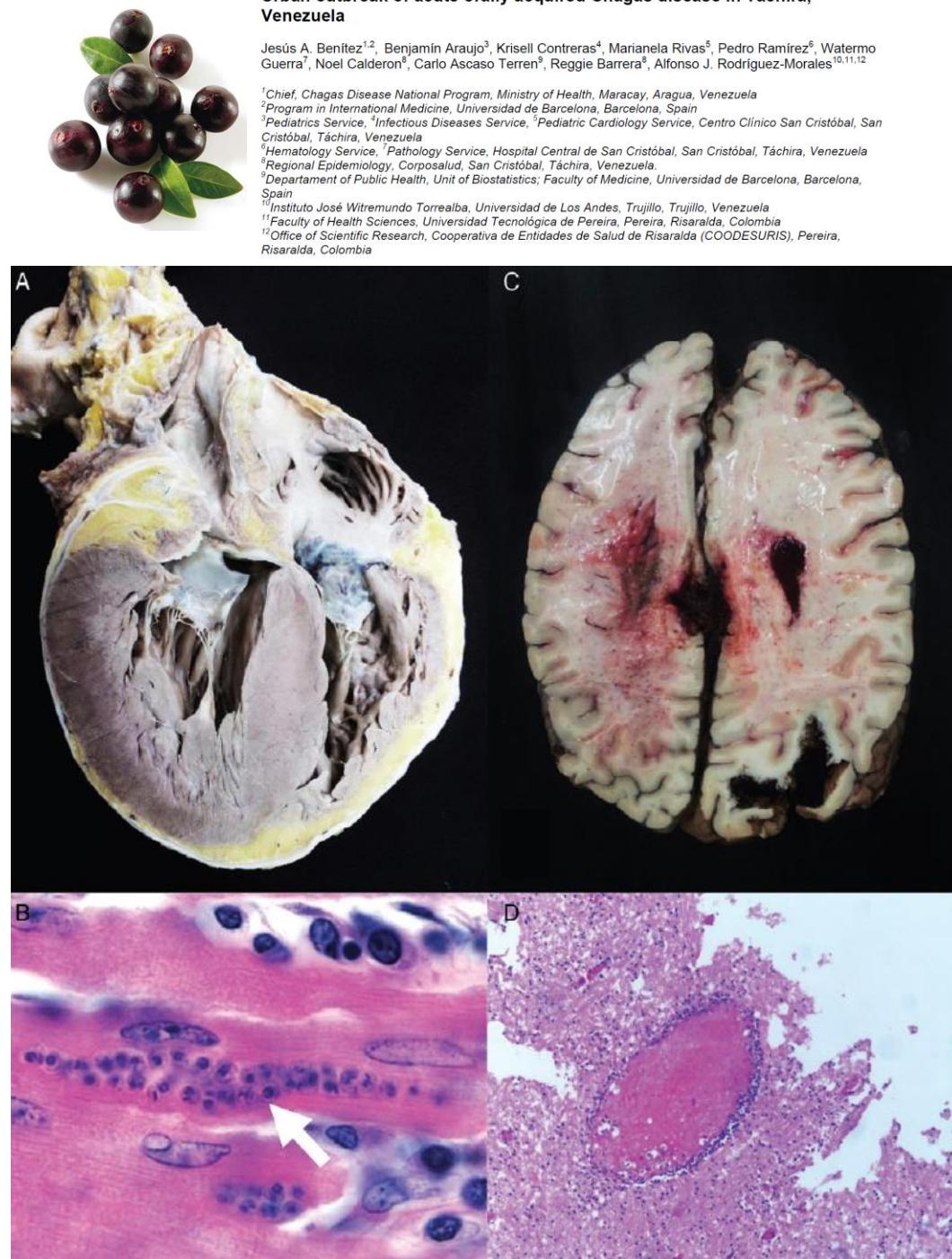
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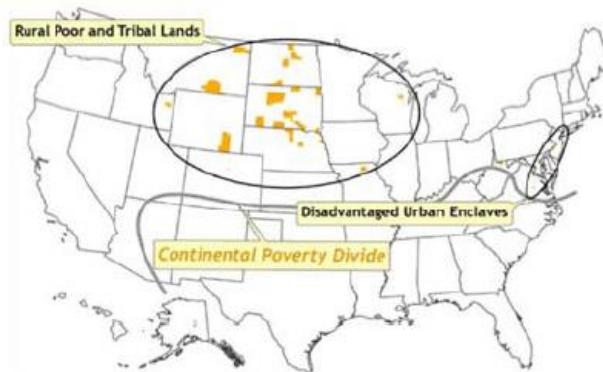
- Gómez-P CF, Mantilla-H JC, Rodriguez-Morales AJ. Fatal chagas disease among solid-organ transplant recipients in Colombia. *Open Forum Infect Dis*. 2014 Jun 7;1(1):ofu032.
- Benítez JA, Araujo B, Contreras K, Rivas M, Ramírez P, Guerra W, Calderon N, Ascaso Terren C, Barrera R, Rodríguez-Morales AJ. Urban outbreak of acute orally acquired Chagas disease in Táchira, Venezuela. *J Infect Dev Ctries*. 2013 Aug 15;7(8):638-41.
- Franco-Paredes C, Von A, Hidron A, Rodríguez-Morales AJ, Tellez I, Barragán M, Jones D, Náquira CG, Mendez J. Chagas disease: an impediment in achieving the Millennium Development Goals in Latin America. *BMC Int Health Hum Rights*. 2007 Aug 28;7:7.

## Review

# Neglected Infections of Poverty in the United States of America

Peter J. Hotez\*

Department of Microbiology, Immunology, and Tropical Medicine, The George Washington University and Sabin Vaccine Institute, Washington, D.C., United States of America



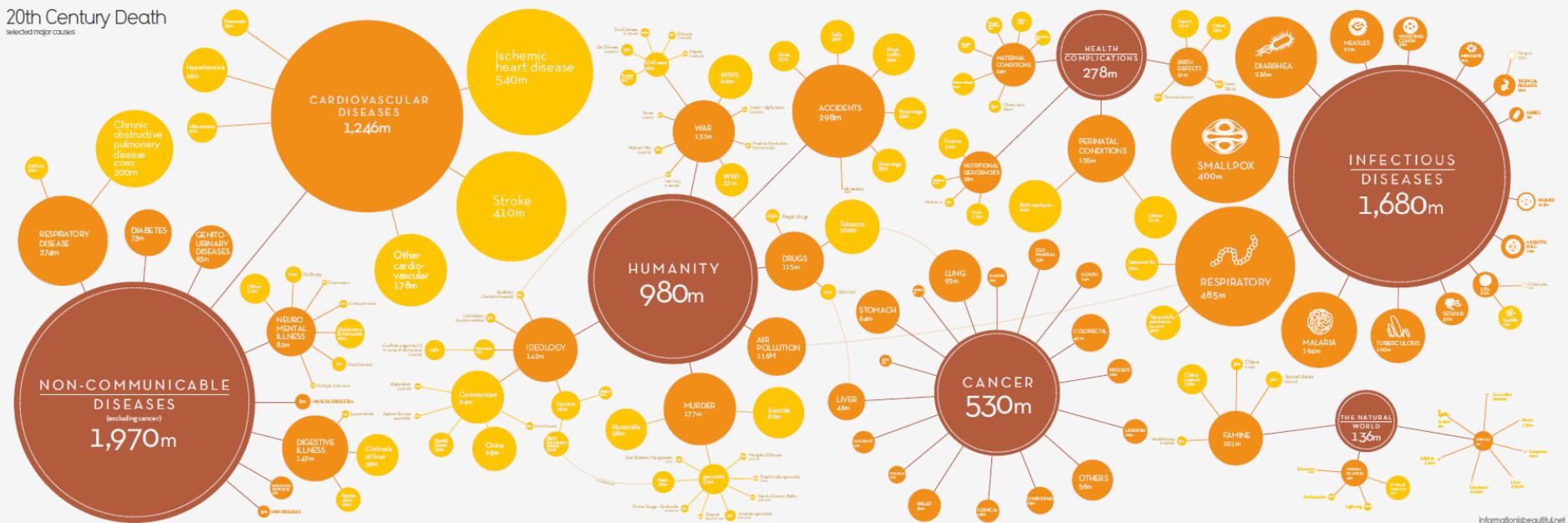
Tribal Lands	Border Region	Mississippi Delta	Appalachia
Echinococcosis	Brucellosis	Cysticercosis	Ascariasis
	Cysticercosis	Chagas Disease	Strongyloidiasis
	Chagas Disease	Congenital CMV	
	Dengue	Congenital toxoplasmosis	
	Leishmaniasis	Toxocariasis	
	Leprosy	Trichomoniasis	

Rural Poor and Tribal Lands	Disadvantaged Urban Enclaves
Echinococcosis	Congenital CMV infection
Toxoplasmosis	Congenital syphilis
Trichinellosis	Congenital toxoplasmosis
	Leptospirosis
	Toxocariasis
	Trench fever
	Trichomoniasis

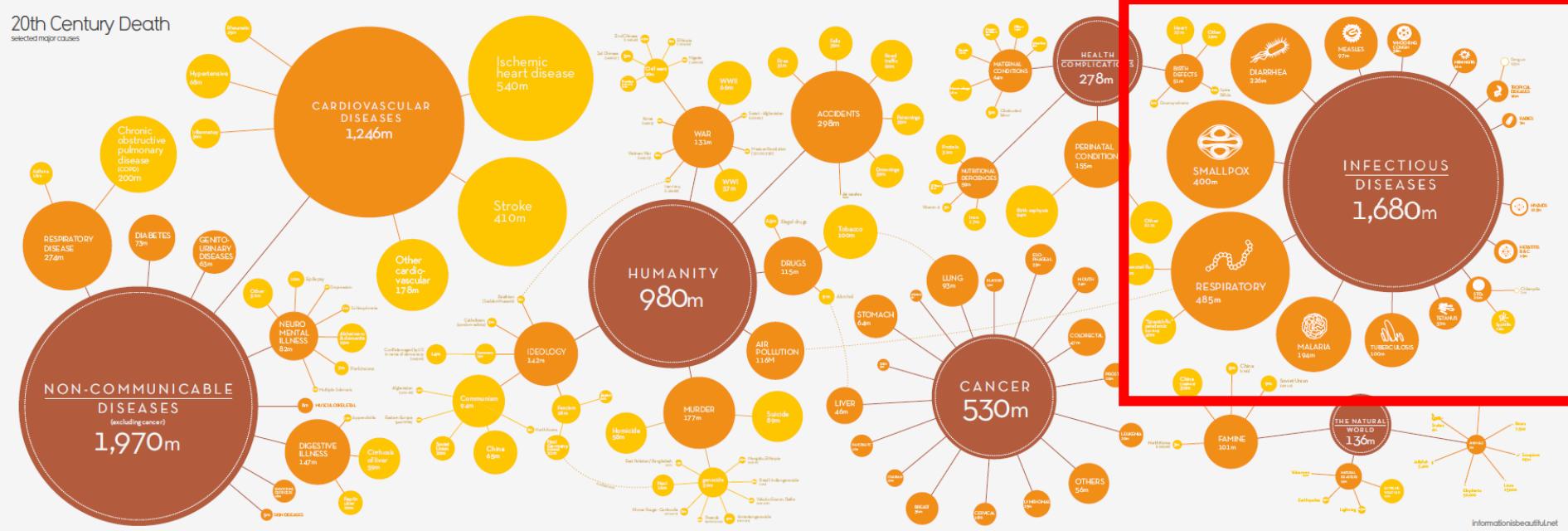
**Table 2.** Estimated Prevalence of Neglected Infections of Poverty in the US.

Neglected Disease Category	Disease	Estimated Number of Cases	Major Regions or Populations at Risk	References
Soil-transmitted helminth infections	Ascariasis	<4 million	Appalachia, American South	[29]
	Toxocariasis	1.3–2.8 million	Inner cities, American South, Appalachia	[14,79,84]
	Strongyloidiasis	68,000–100,000	Appalachia, African refugees	[14,19,25,35]
	Trichinellosis	16 (insufficient data)	Arctic Alaska	[149]
Platyhelminth Infections	Cysticercosis	41,400–169,000	US–Mexico borderlands	[19,96,113]
	Schistosomiasis	8,000	African refugees	[89,90]
	Echinococcosis	Insufficient data	Tribal Lands and Arctic Alaska	—
Protozoan Infections	Giardiasis	2.0–2.5 million	All regions	[123,147]
	Trichomoniasis	880,000 (black women)	American South, inner cities	[14,66]
	Cryptosporidiosis	300,000	All regions	[123]
	Chagas disease	3,000 to >1 million	US–Mexico borderlands, American South	[11,102,103,105,109]
	Cyclosporiasis	16,624	All regions	[123]
	Congenital toxoplasmosis	≤4,000 annually	American South, inner cities, US–Mexico borderlands, Arctic Alaska	[65]
	Leishmaniasis	Insufficient data	US–Mexico borderlands	—
	Amebiasis	Insufficient data	US–Mexico borderlands	—
Bacterial Infections	Congenital syphilis	1,528 between 2000 and 2002	American South, inner cities	[62]
	Brucellosis	1,554	US–Mexico borderlands	[122,123]
	Bovine tuberculosis	129 cases between 1994 and 2000	US–Mexico borderlands	[124]
	Leprosy	166	US–Mexico borderlands	[148]
	Trench fever	Insufficient data	Inner cities	—
	Leptospirosis	Insufficient data	Inner cities	—

# ¿De qué se murió la gente en el siglo XX?

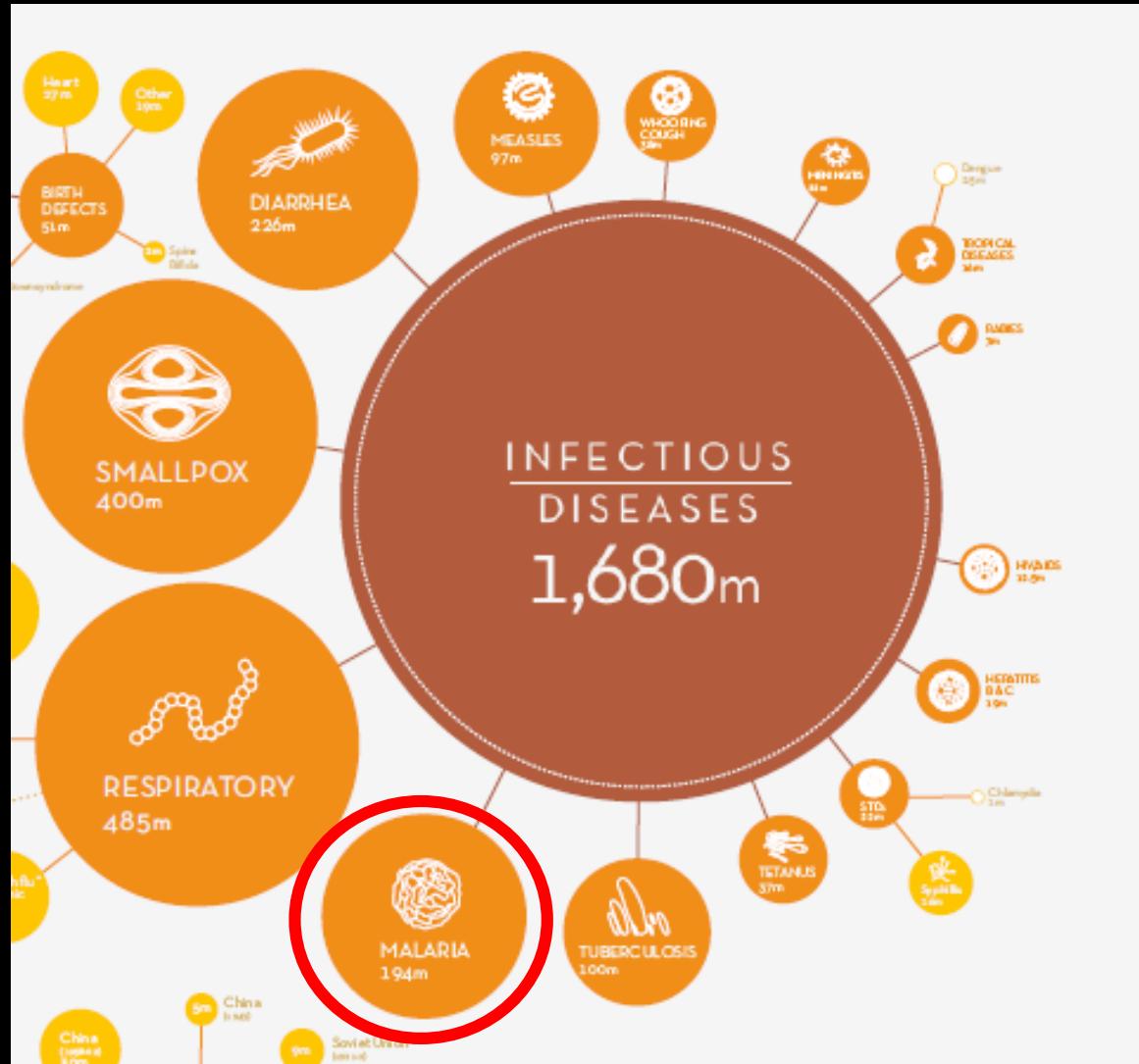


# ¿De qué se murió la gente en el siglo XX?



<http://www.informationisbeautiful.net/visualizations/20th-century-death/>  
WHO Mortality report (PDF) & app, WHO Global Burden of Disease (PDF), OECD Mortality Stats

# ¿De qué se murió la gente en el siglo XX?



**MALARIA****Global View****Impact**

219 million new cases\*

660,000 deaths \*

33,976,000 DALYs \*\*

Malaria is the leading parasitic cause of morbidity and mortality worldwide, especially in developing countries where it has serious economic and social costs.

**Malaria is thought to slow annual economic growth by 1.3% in endemic areas with high prevalence.** The economic cost of malaria in Africa alone is estimated at US\$12 billion every year.

**LEISHMANIASIS****Global View****What is leishmaniasis?**

Leishmaniasis is a poverty-associated disease with several different forms, of which the two following are the most common:

- **Visceral Leishmaniasis (VL)** (also known as kala azar): fatal without treatment
- **Cutaneous leishmaniasis (CL)**: usually presents as ulcers on exposed body parts (arms, legs, face).

**Impact**

300,000 new cases of VL each year;

1 million new cases of CL each year

Approx. 40,000 deaths due to VL

1,974,000 DALYs\*

A lack of surveillance systems and frequency of disease in remote areas and marginalized population means that it is difficult to estimate the true incidence of leishmaniasis and the case-fatality of VL.

**Geography**

Leishmaniasis occurs in 98 countries with 350 million people living at risk.

**VL affects poor populations living in remote areas of over 80 countries across Asia, East Africa, South America, and the Mediterranean region (see map).**

The 7 most affected countries – Bangladesh, Brazil, India, Ethiopia, Kenya, Mexico, and Pakistan.

**CHAGAS****Global View****Impact**

Approximately 8 million cases \*

12,000 deaths

430,000 DALYs \*\*

Chronic Chagas disease results in significant disability with great social and economic impact including unemployment and decreased earning ability. In Brazil alone, losses of over US\$ 1.3 billion in wages and industrial productivity were due to workers with Chagas disease.

**HUMAN AFRICAN TRYpanosomiasis****Global View****Impact**

The number of actual cases is currently estimated at 20,000.

1,673,000 DALYs \*

Fatal if left untreated. Displacement of populations, war, and poverty lead to increased transmission, with severe social and economic consequences.

Some areas are still not covered by surveillance and control efforts.

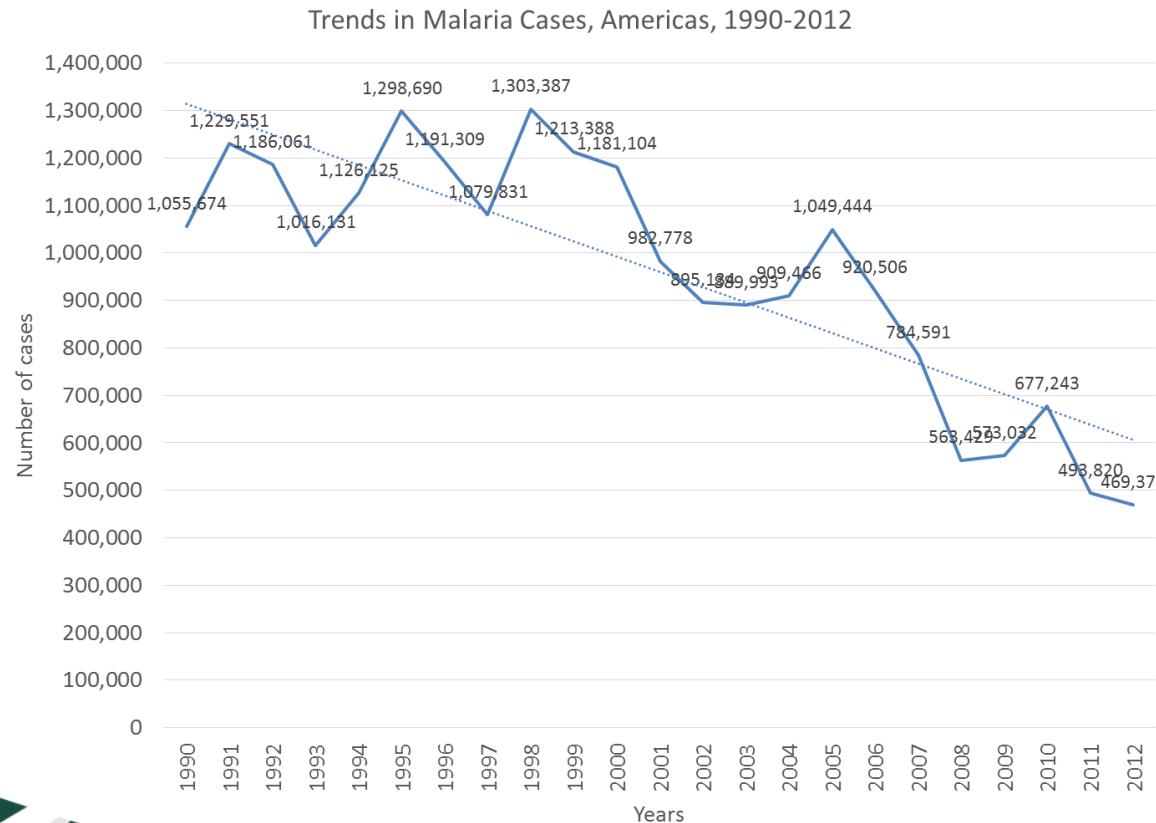
Large proportions of communities can be affected by HAT, with serious social and economic consequences. Epidemics at the end of the 20th century infected up to 50% of the population in several villages across rural Africa.



\* The Global Burden of Disease Report, WHO, 2004.

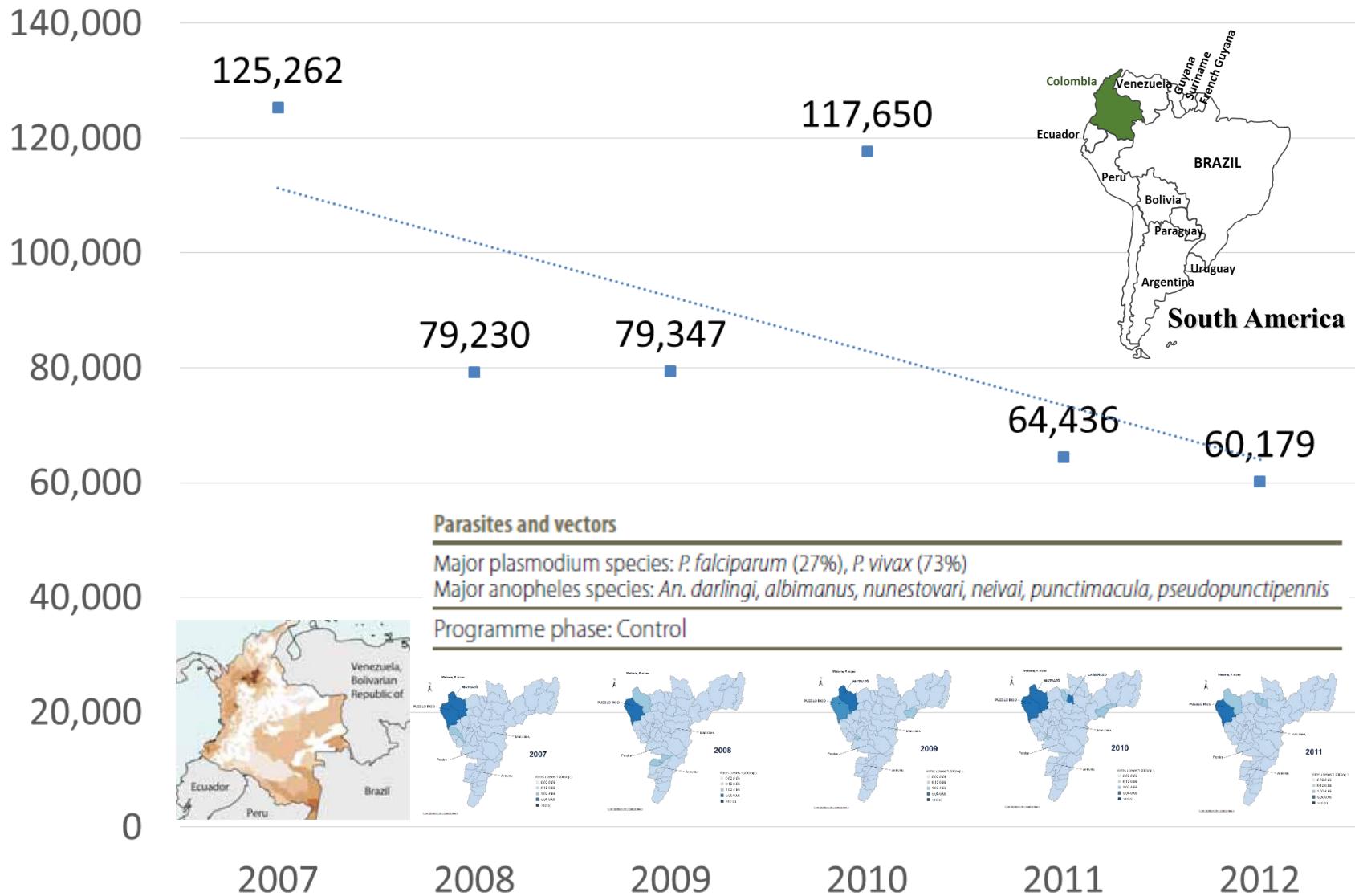
# Trends 1990-2012

- The number of confirmed malaria cases reported in the region decreased by almost 58%, from 1.1 million in 2000 to 469,000 in 2012.



Modified from WHO 2014.

# Malaria in Colombia, 2007-2012



Rodríguez-Morales, AJ, Orrego-Acevedo CA, Zambrano-Muñoz YA, García-Folleco FJ. **Mapping malaria in municipalities of the Coffee-Triangle Region of Colombia using Geographic information system (GIS).** ICOPA 2014 (Abstract A1184).

Modified from WHO 2014.



#### Trends in malaria incidence

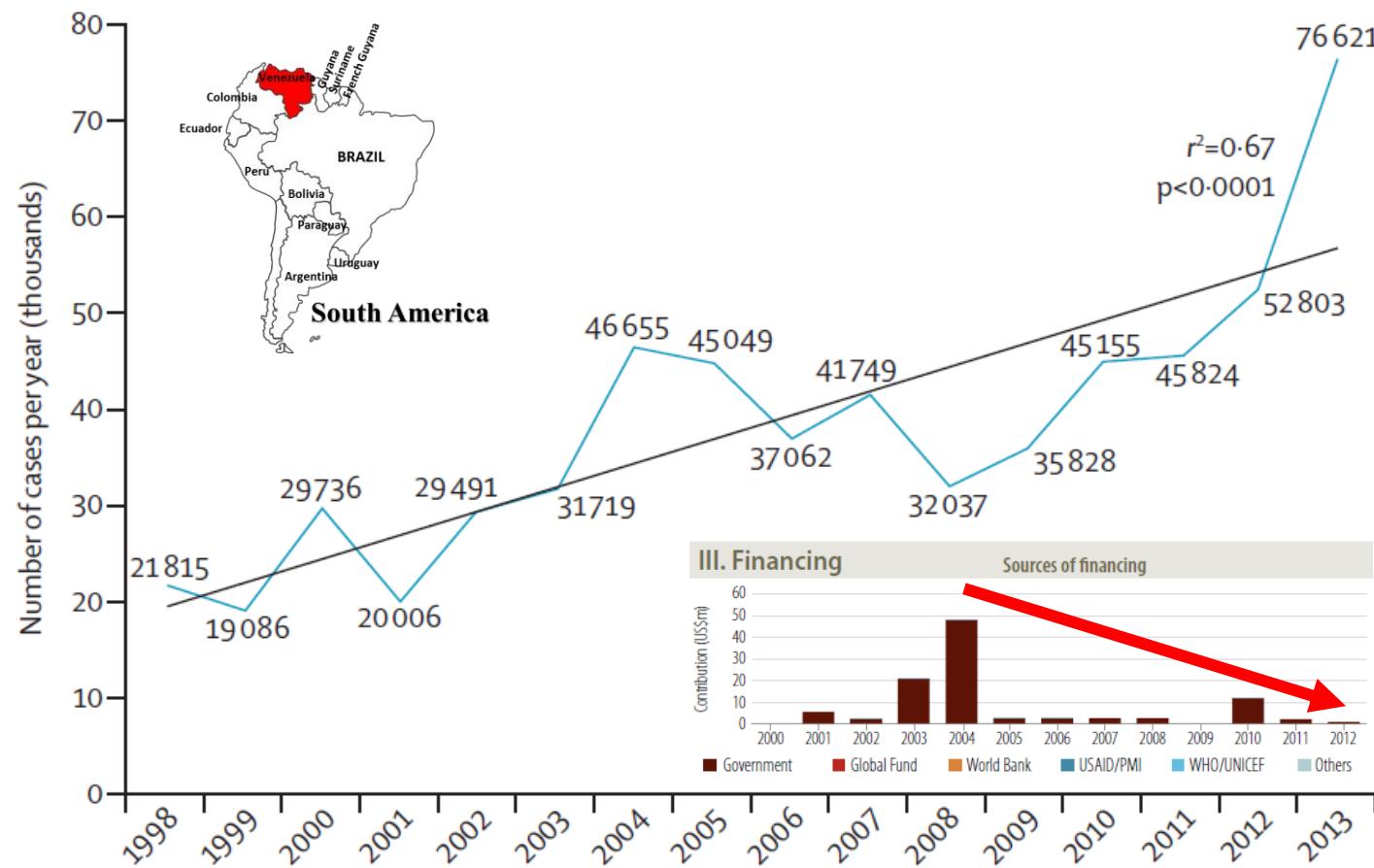
Not applicable or malaria-free	Insufficiently consistent data to assess trends
On track for ≥75% decrease in incidence 2000–2015	Increase in incidence 2000–2012
50%–75% decrease in incidence projected 2000–2015	Progress in reducing cases sub-nationally where interventions have been intensified OR Country has recently expanded diagnostic testing
<50% decrease in incidence projected 2000–2015	

D – Percentage change in incidence of microscopically confirmed cases, 2000–2012



In Venezuela—a country with a Human Development Index (HDI) of 0.748 [#71, 2012] and Gross national income [GNI] per capita of US\$11,475), malaria incidence increased between 2000-12.

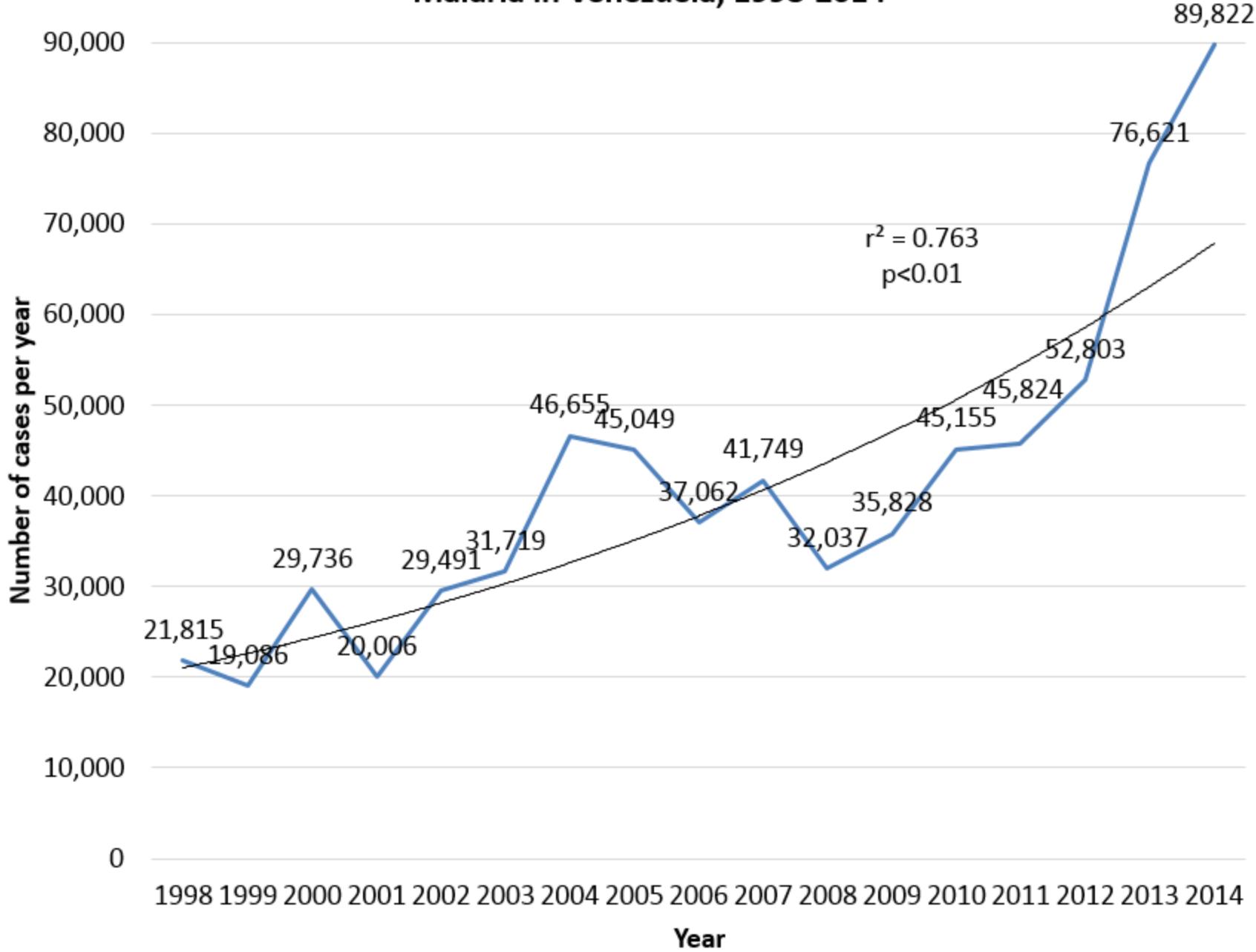
A similar increased in incidence was seen in Guyana and Haiti, but both of these countries have a much lower HDI than Venezuela [0.636, ranked 118 and 0.456, ranked 161, for 2012, respectively; GNI per capita of US\$3,387 and US\$1,070, respectively], and a devastating earthquake hit Haiti during that period.



## Figure: Malaria in Venezuela, 1998–2013

Rodríguez-Morales AJ, Paniz-Mondolfi AE. Venezuela's failure in malaria control. *The Lancet* 2014; 384(9944):663-4.

## Malaria in Venezuela, 1998-2014



# ¿Nuevos efectos de las protozoosis?

Rodríguez-Morales AJ, Barbella RA, Case C, Arria M, Ravelo M, Perez H, Urdaneta O, Gervasio G, Rubio N, Maldonado A, Aguilera Y, Viloria A, Blanco JJ, Colina M, Hernández E, Araujo E, Cabaniel G, Benitez J, Rifakis P. **Intestinal parasitic infections among pregnant women in Venezuela.** *Infect Dis Obstet Gynecol.* 2006;2006:23125.

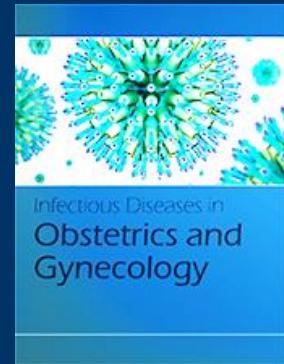


TABLE 1: Parasite positivity in stool specimens examined from pregnant women studied.

	Number	(%)	Helminths	
Protozoans			<i>Ascaris lumbricoides</i>	437 57.0
Nonpathogenic			<i>Trichuris trichiura</i>	276 36.0
<i>Entamoeba coli</i>	44	5.7	<i>Necator americanus</i>	62 8.1
<i>Endolimax nana</i>	30	3.9	<i>Enterobius vermicularis</i>	48 6.3
Pathogenic			<i>Strongyloides stercoralis</i>	25 3.3
<i>Giardia lamblia</i>	108	14.1		
<i>Entamoeba histolytica/dispar</i>	92	12.0		
<i>Cryptosporidium spp</i>	2	0.3		

TABLE 2: Relative risk for anemia at pregnancy according to the presence of intestinal parasitosis.

Variable (risk for anemia)	Anemia	Normal			$\chi^2$ Yates	P
		Hb	RR			
Intestinal parasitosis at pregnancy						
Present	594	173	2.56	194.24	< .0001	
Absent	82	189	—	—	—	
Helminth infection at pregnancy						
Present	322	61	1.56	94.63	< .0001	
Absent	354	301	—	—	—	
Protozoan infection at pregnancy						
Present	179	23	1.49	59.65	< .0001	
Absent	497	339	—	—	—	



<http://www.elsevier.com/locate/jiph>

# Potential impact of macroclimatic variability on the epidemiology of giardiasis in three provinces of Cuba, 2010–2012



Angel A. Escobedo<sup>a,b,c</sup>, Pedro Almirall<sup>d</sup>, Raisa Rumbaut<sup>e</sup>,  
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<sup>b</sup> Working Group on Zoonoses, International Society for Chemotherapy, Aberdeen, United Kingdom

<sup>c</sup> Committee on Clinical Parasitology, Panamerican Association for Infectious Diseases (Asociación Panamericana de Infectología), La Habana, Cuba

<sup>d</sup> Analisis and Health Trends Unit, Unidad Municipal de Higiene, Epidemiología y Microbiología, Plaza, La Habana, Cuba

<sup>e</sup> Ministerio de Salud Pública, La Habana, Cuba

<sup>f</sup> Research Group Public Health and Infection, Faculty of Health Sciences, Universidad Tecnológica de Pereira (UTP), Pereira, Risaralda, Colombia

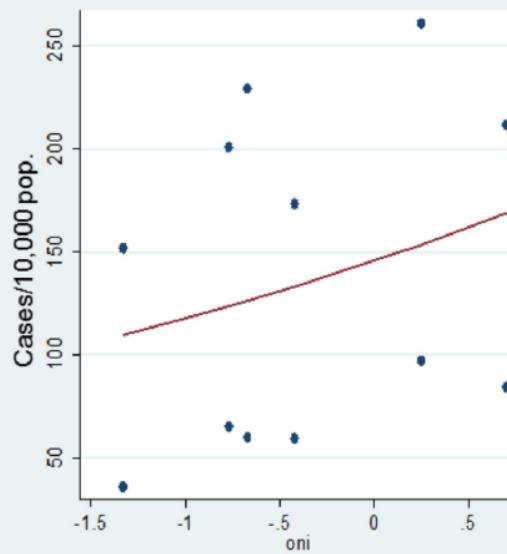
<sup>g</sup> Committee on Zoonoses and Hemorrhagic Fevers of the Colombian Association of Infectious Diseases (Asociación Colombiana de Infectología, ACIN), Bogotá, Colombia

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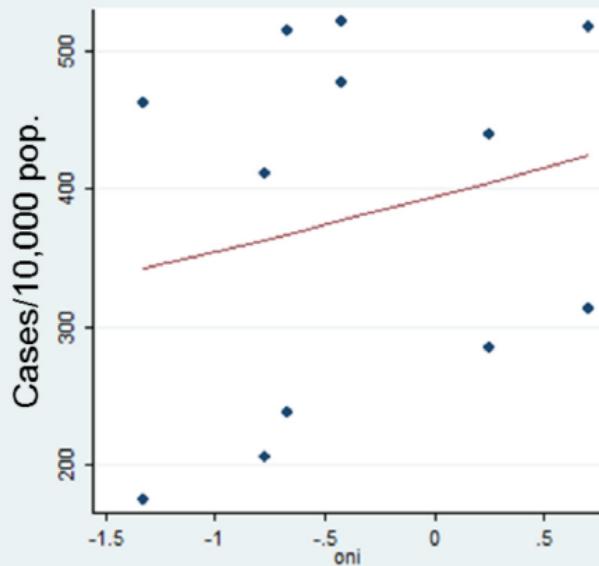
Escobedo AA, Almirall P, Rumbaut R, Rodríguez-Morales AJ. Potential impact of macroclimatic variability on the epidemiology of giardiasis in three provinces of Cuba, 2010–2012. *J Infect Public Health*. 2015 Jan-Feb;8(1):80–9.



Figure 1 Study locations in Cuba during the period of January 2010–December 2012: the provinces of Havana (3), Ciego de Ávila (9) and Guantánamo (15).



A



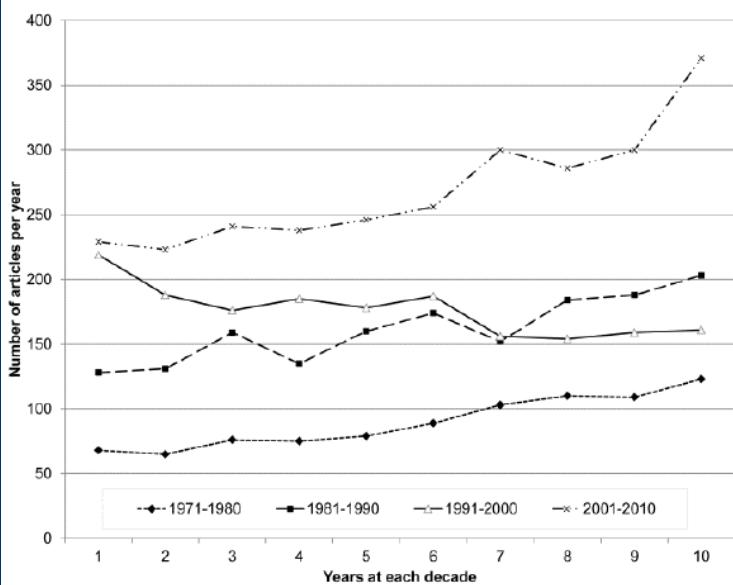
C

Figure 4 Regression models for Havana (A), Ciego de Ávila (B) and Guantánamo (C).

## A bibliometric study of international scientific productivity in giardiasis covering the period 1971–2010

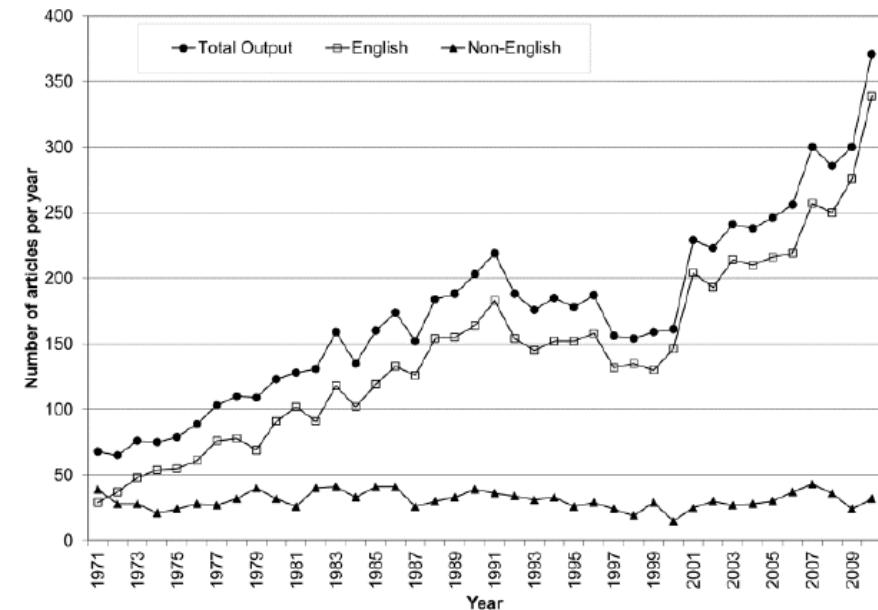
Angel A Escobedo<sup>1,2,3</sup>, Ricardo Arencibia<sup>4</sup>, Rosa L Vega<sup>5</sup>, Alfonso J Rodríguez-Morales<sup>2,6,7</sup>, Pedro Almirall<sup>3,8</sup>, Maydel Alfonso<sup>8,9</sup>

**Figure 1.** Scientific output per year during four decades on *Giardia* and giardiasis in PubMed, 1971–2010\*



\*1971–1980: 897 articles; 1981–1990: 1,614 articles; 1991–2000: 1,763 articles; 2001–2010: 2,690 articles

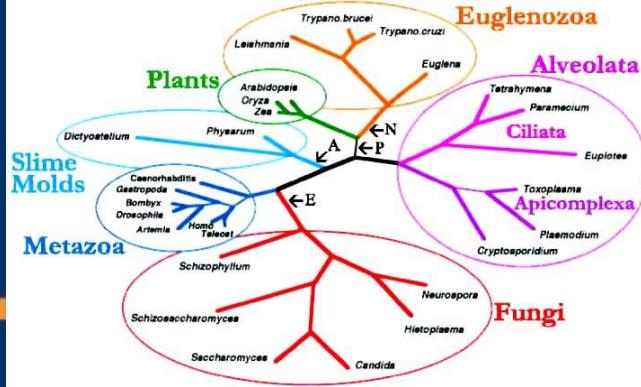
**Figure 2.** Total number of giardiasis research publications in PubMed in any language (black circles), in English (squares), and in non-English languages (black triangles) between 1971 and 2010



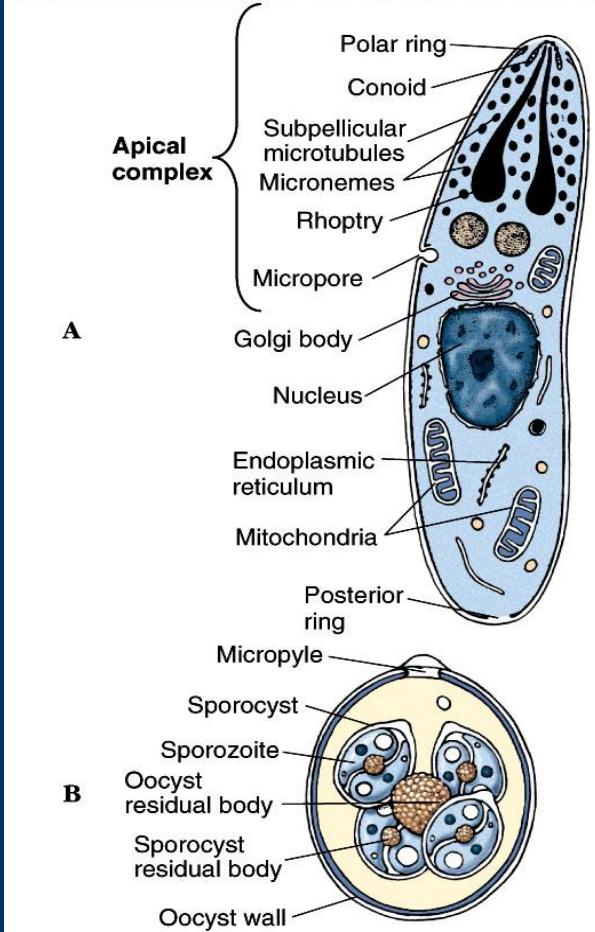
# Protozoarios

## Introducción

- Organismos unicelulares
- Especialización intracelular
- En el pasado era un phylum, como los helmintos, el phylum Protozoa (1964)
  - Contaba con 4 subphyla:
    - Sarcomastigophora
    - Sporozoa
    - Cnidospora
    - Ciliophora
- En 1980 algunos de esos subphyla fueron elevados al rango de Phylum



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**Table 2** Taxonomic classification of the animal subkingdom Protozoa according to the Report published by Levine *et al.* (1980), but here omitting all categories below the rank of class. The total number of suprafamilial categories reached 229, nearly double the number endorsed in the preceding Honigberg Report of 1964 (see Table 1). (Modified and abbreviated from Corliss, 1998.)

Phylum I. Sarcomastigophora	Phylum II. Labyrinthomorpha
Subphylum 1. Mastigophora	Class (1) Labyrinthulea
Class (1) Phytomastigophorea	
(2) Zoomastigophorea	Phylum III. Apicomplexa
Subphylum 2. Opalinata	Class (1) Perkinsea
Class (1) Opalinatea	(2) Sporozoea
Subphylum 3. Sarcodina	Phylum IV. Microspora
Superclass 1. Rhizopoda	Class (1) Rudimicrosporea
Class (1) Lobosea	(2) Microsporea
(2) Acarpomyxea	Phylum V. Ascetospora
(3) Acrasea	Class (1) Stellatosporea
(4) Eumycetozoea	(2) Paramyxaea
(5) Plasmodiophorea	Phylum VI. Myxozoa
(6) Filosea	Class (1) Myxosporea
(7) Granuloreticulosea	(2) Actinosporea
(8) Xenophyophorea	Phylum VII. Ciliophora
Superclass 2. Actinopoda	Class (1) Kinetofragminophorea
Class (1) Acantharea	(2) Oligohymenophorea
(2) Polycystinea	(3) Polyhymenophorea
(3) Phaeodarea	
(4) Heliozoea	

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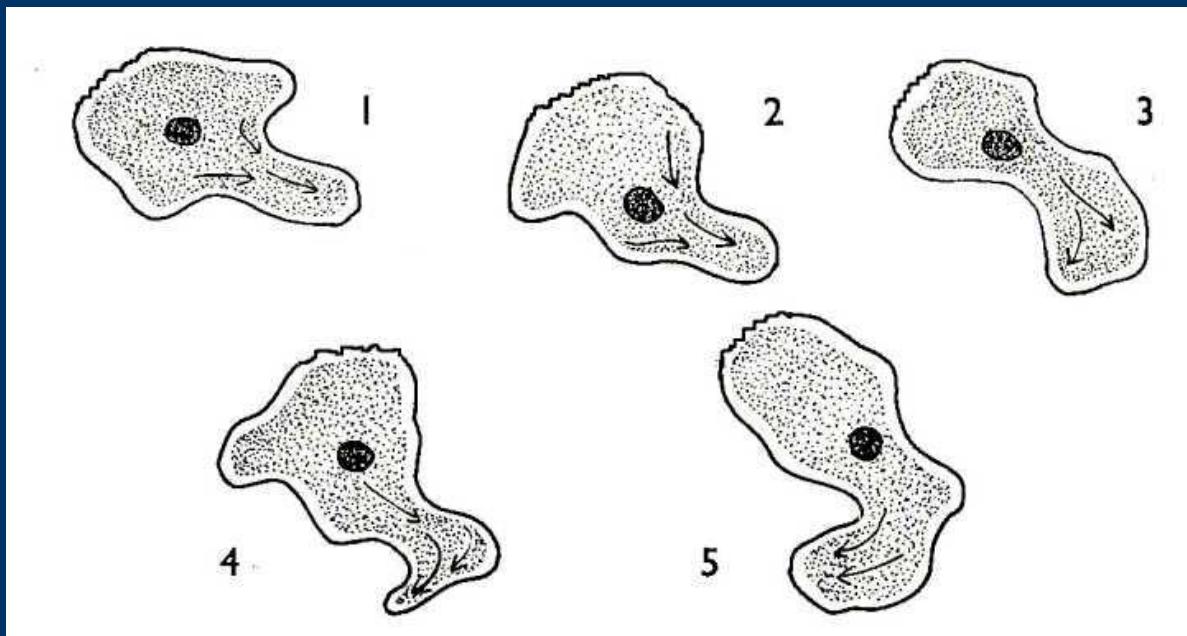


- Posteriormente se crea el reino Protozoa
- Comprende protistas unicelulares (eucariotas)
- Ya no existe como tal, y los phylum que lo componían se ubican fundamentalmente en el super-reino Eukaryota (opc: Reino Protista)
  - Eukaryota; Amoebozoa (ph); Archamoebae (c); Entamoebidae (f); Entamoeba
  - Eukaryota; Fornicata (ph); Diplomonadida (c); Hexamitidae (f); Giardiinae (sf)
  - Eukaryota; Euglenozoa (ph); Kinetoplastida (o); Trypanosomatidae (f)
  - Eukaryota; Alveolata; Apicomplexa (ph); Aconoidasida (c); Haemosporida (o)

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## Introducción

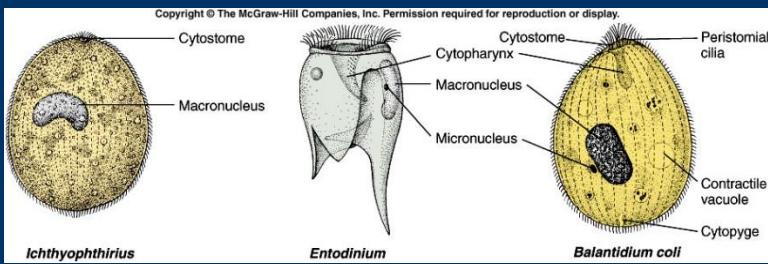
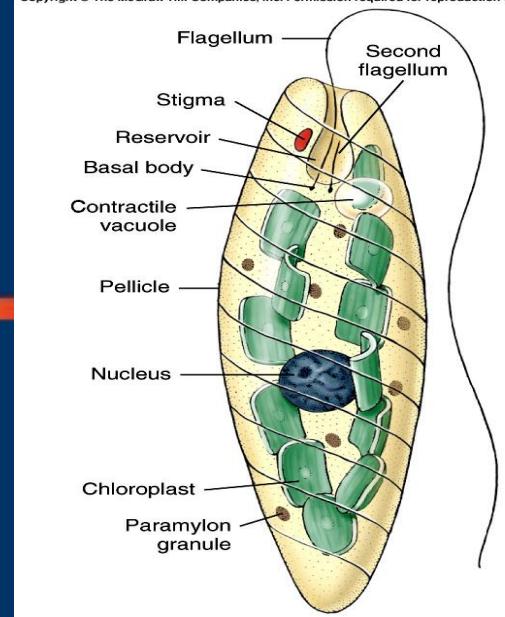
- Reproducción asexual o sexual
- Exoesqueletos
- Diferentes tipos de nutrición – enzimas
- Tienen capacidad de locomoción



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## Introducción

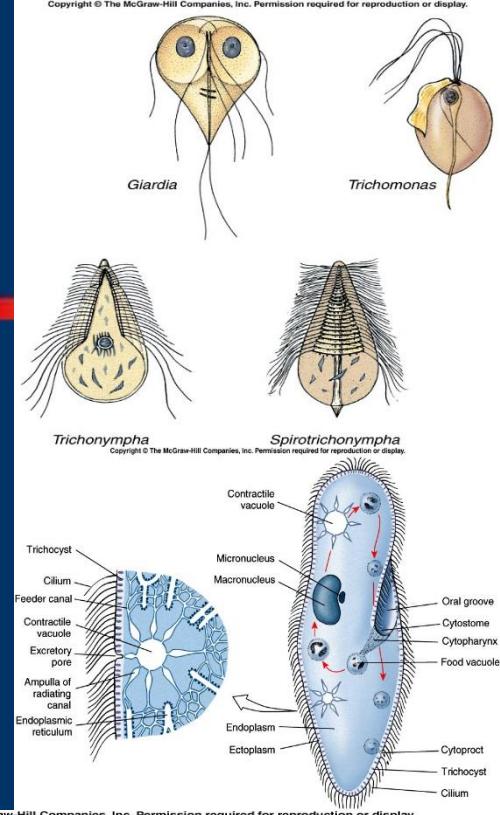
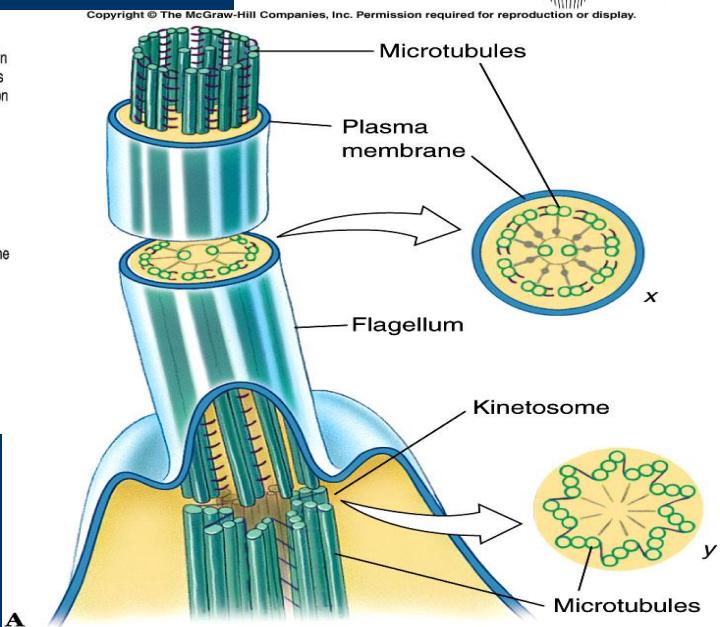
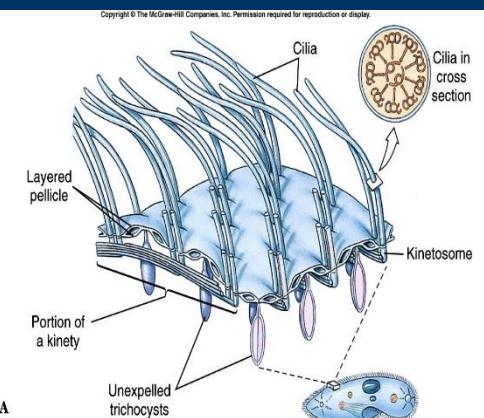
- Unicelulares, algunos coloniales, algunos con etapas de vida multicelulares
- Mayormente microscópicos
- Todo tipo de simetría
- Sin capas germinativas
- Eucariontes con orgánulos especializados
- De vida libre y todo tipo de simbiosis
  - mutualismo
  - comensalismo
  - parasitismo



# Protozoarios

## Introducción

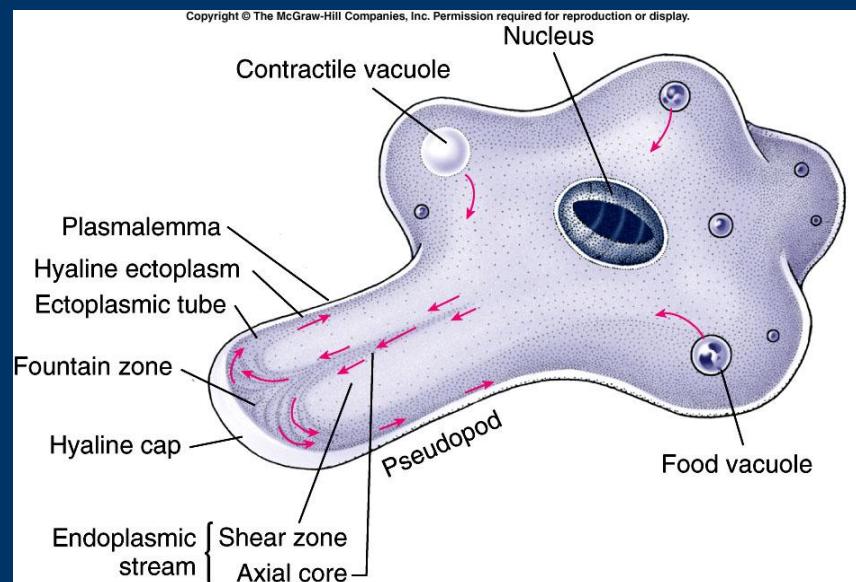
- Locomoción
  - Por estructuras especializadas o pseudópodos
  - ESPECIALIZADOS:
  - Cílios
  - Flagelos
    - Axonema
    - Quinetosoma
    - Requiere ATP



# Protozoarios

## Introducción

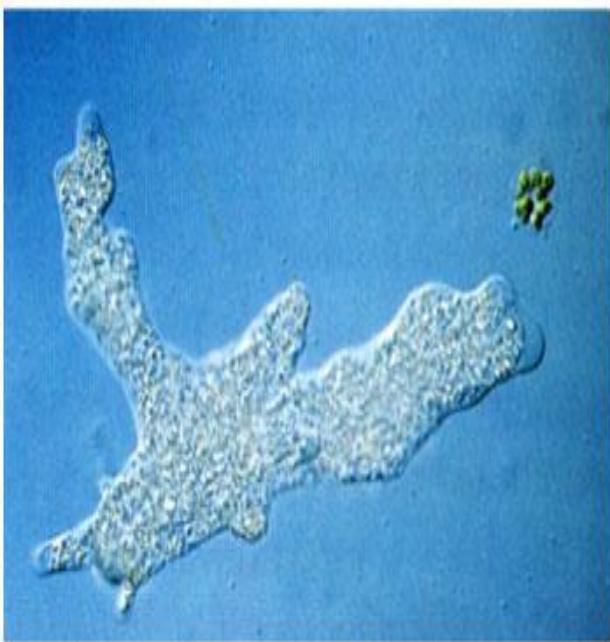
- Locomoción por seudópodos
  - basado en características del citoplasma
  - distintos tipos
    - lobopodios
    - filopodios
    - reticulopodios
    - axopodios



# Protozoarios

## Introducción

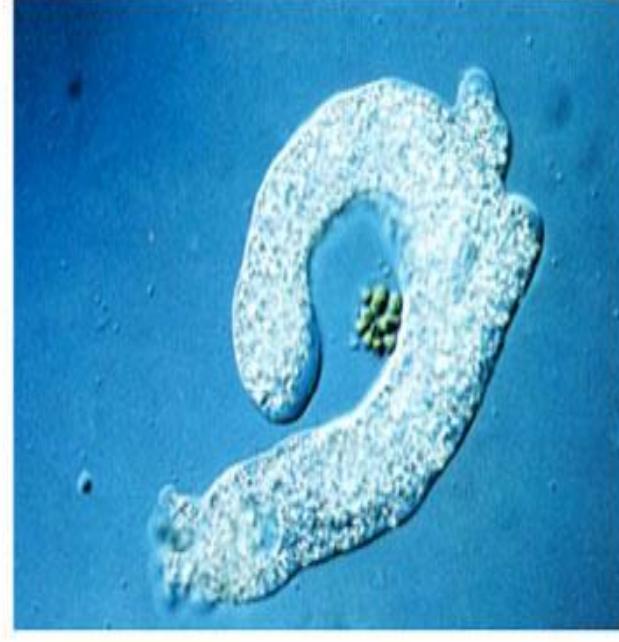
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A



B



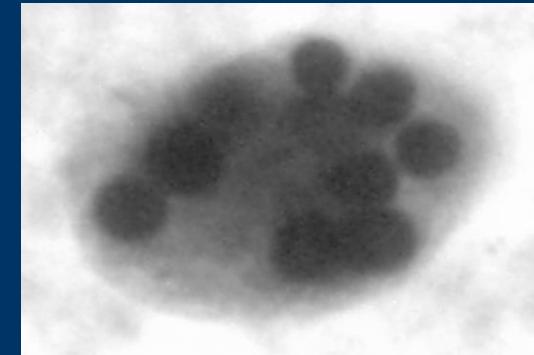
C

Movimiento por pseudópodos

# Protozoarios

## Introducción

- Algunos con endoesqueleto o exoesqueleto simple; algunos desnudos
- Digestión intracelular (fagocitosis)
- Todo tipo de nutrición
  - autótrofos
  - heterótrofos
    - saprozoicos u osmótrofos - implica pinocitosis
    - holozoicos o fagótrofos - implica fagocitosis
      - fagosoma o vacuola digestiva
      - citostoma
      - citopigio o citoprocto

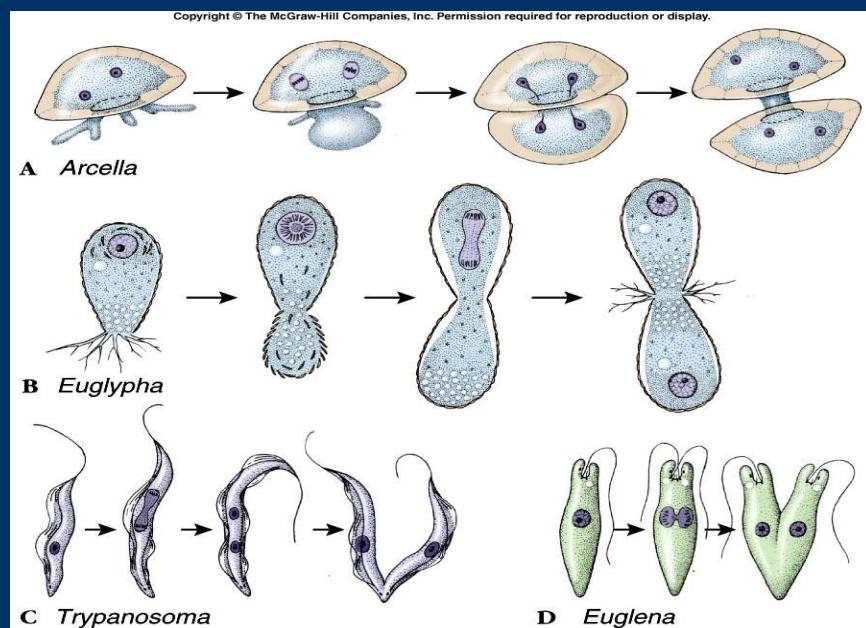


MARIA CAROLINA ISEA,  
ANDRES ESCUDERO-  
SEPULVEDA, ALFONSO  
JAVIER RODRIGUEZ  
MORALES, "Amebic  
Colitis" Colitis . En:  
Croacia ISBN: 978-953-  
307-799-4 ed: , v. , p.49 -  
3 ,2012

# Protozoarios

## Introducción

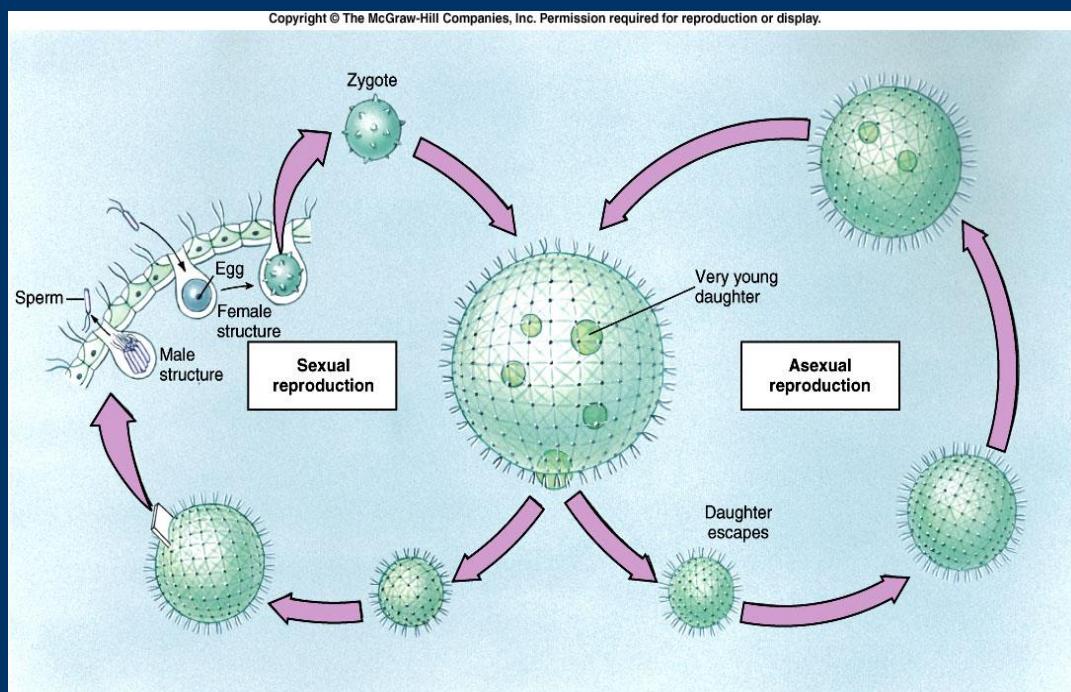
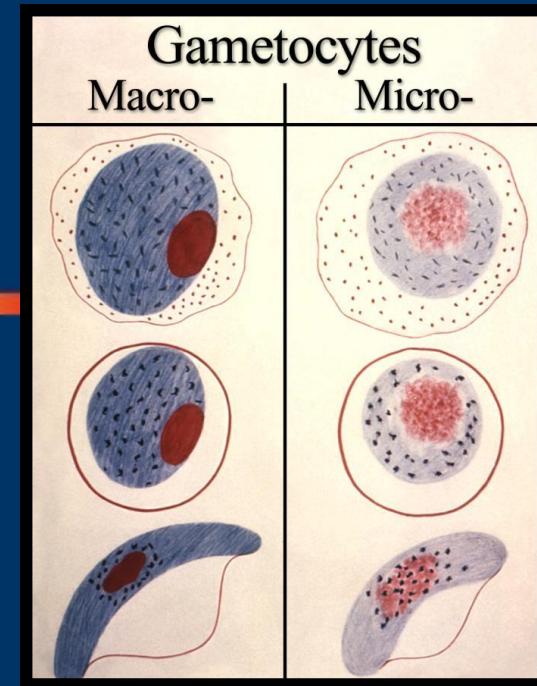
- De hábitats acuáticos o terrestres
- Reproducción asexual por fisión, gemación; quistes
  - fisión binaria
    - longitudinal
    - transversal
  - fisión múltiple
    - esquizogonia
    - esporogonia



# Protozoarios

## Introducción

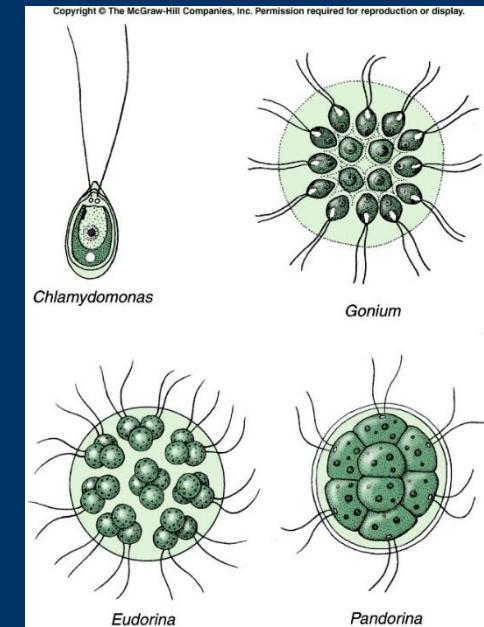
- Reproducción sexual
  - gametos nucleares o pronúcleos
  - isogametos vs. anisogametos
  - singamia
  - autogamia
  - conjugación



# Protozoarios

## Introducción

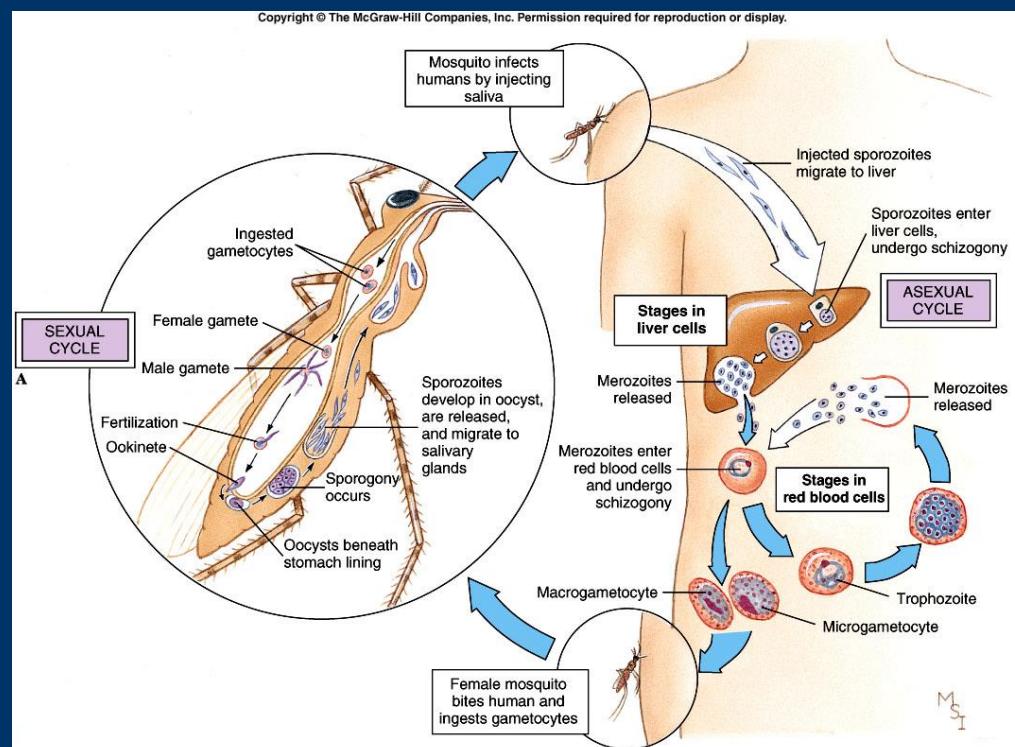
- Osmoreguladores con vacuolas contráctiles; osmoconformes
- Excreción por difusión; amoniaco
- Intercambio de gases a través de la cubierta del cuerpo
- Circulación por movimientos del citoplasma

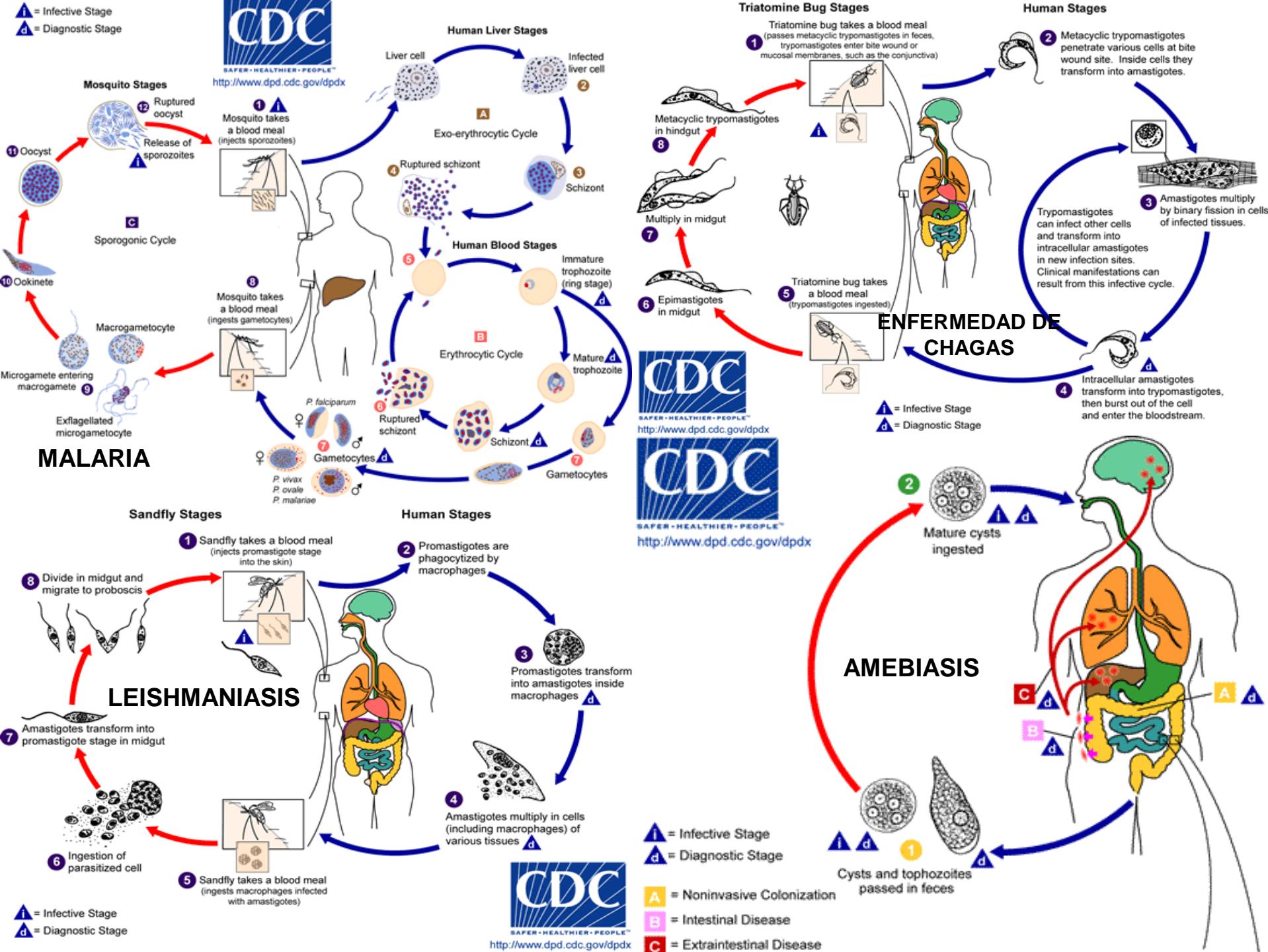


# Protozoarios

## Introducción

- Pueden tener ciclos complejos en más de un hospedador y requerir de algunos específicos para completar su ciclo





# Protozoarios

## Introducción

- Pueden producir dos grandes grupos de patologías en el ser humano
  - Intestinales, protozoosis intestinales
    - Ej: amebiasis, giardiasis, cystoisosporiasis
  - Tisulares, protozoosis sistémicas
    - Ej: malaria, tripanosomiasis, leishmaniasis, toxoplasmosis
  - Su manifestaciones pueden ser de amplia índole

# Current Opinion in Infectious Diseases

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Editor-in-Chief: Thomas Patterson &  
Robert C. Read  
**ISSN:** 0951-7375  
**Online ISSN:** 1473-6527  
**Frequency:** 6 issues / year  
**Ranking:** 8 of 69 Infectious Diseases  
**Impact Factor:** 4.87

**PRT** Current Issue: June 2014 - Volume 27 - Issue 3

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## REVIEW



### Skin manifestations of arthropod-borne infection in Latin America

Adrián Bolívar-Mejía<sup>a</sup>, Camila Alarcón-Olave<sup>b</sup>, and Alfonso J. Rodríguez-Morales<sup>c,d</sup>

#### Purpose of review

Arthropods are a significant cause of human skin lesions and infections, especially in Latin America. This review summarizes recent articles on the cutaneous manifestations of arthropod-borne diseases, with an emphasis on those diseases causing direct skin damage but also considering those systemic diseases with cutaneous manifestations.

#### Recent findings

Studies have shown a variety and increase of cutaneous manifestations caused by arthropod-borne infections, including petechiae, purpura, ulcers, nodules, atrophic, miliary and hyperpigmented lesions. Although unspecific, when considering other features they become a useful tool in the diagnostic approach. Unusual cutaneous presentation of these diseases has been found to be associated with development of immunity, virulent strain, drug resistance and immunosuppressive states. Also, because of globalization, climate change and large-scale migration, these manifestations have spread to new areas.

#### Summary

Cutaneous manifestations of arthropod-borne infections are varied and nonspecific. Their atypical presentations are mainly related to immune impairment and strain virulence. When considering a patient with skin lesions, other clinical and laboratory features must be taken into account in order to make an accurate diagnostic approach.

#### Keywords

arthropod-borne infection, epidemiology, Latin America, skin manifestations

#### INTRODUCTION

Many arthropod-borne diseases (ABDs) are considered among the currently accepted neglected tropical diseases, most of them present in Latin American countries [1]. This multifactorial and multietiological group of diseases causes enormous suffering and burden to humans and animals, being responsible for hundreds of millions of cases each year in the region [2]. Usually, these diseases are strongly related to poverty and restricted to the tropics; however, many of them are expanding their range into new areas because of global travel and large-scale emigration [2,3].

Arthropods are a significant cause of human skin lesions, as people are unavoidably exposed to biting and stinging not only in the rural, suburban environment but also in the urban environment, so physicians and other healthcare providers from endemic and nonendemic areas are frequently confronted with patients having skin lesions related to this cause [4].

The purpose of this review is to describe the cutaneous manifestations of arthropod-borne diseases, which still remain a public health problem, particularly in tropical developing regions including Latin America. The review emphasizes those diseases causing direct skin damage, such as leishmaniasis, verruga peruana (Peruvian wart and chronic *Barttinella bacilliformis* infection) and onchocerciasis, but also considers those systemic ABDs with cutaneous

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Correspondence to Alfonso J. Rodríguez-Morales, Department of Community Medicine, Faculty of Health Sciences, Universidad Tecnológica de Pereira, Pereira, Risaralda 660003, Colombia. Tel: +57 300 8847448; email: arodriguezm@utp.edu.co

Curr Opin Infect Dis 2014, 27:288–294

DOI:10.1097/QCO.0000000000000060

# Protozoarios

## Introducción

- ✓ **Rizópodos (amebas):** *Entamoeba histolytica.*
- ✓ **Ciliados:** *Balantidium coli.*
- ✓ **Flagelados:**
  - **Hemáticos y tisulares:** *Leishmania spp.*  
*Trypanosoma spp.*
  - **Cavidades naturales:** *Trichomonas vaginalis.*  
*Giardia lamblia*
- ✓ **Esporozoos:**
  - **Hemáticos y tisulares:** *Plasmodium spp.*  
*Toxoplasma gondii*
  - **Cavidades naturales:** *Cryptosporidium spp.*

# Protozoarios

Diagnóstico

## DIAGNÓSTICO PARASITOLÓGICO

DIRECTO

Visualización:

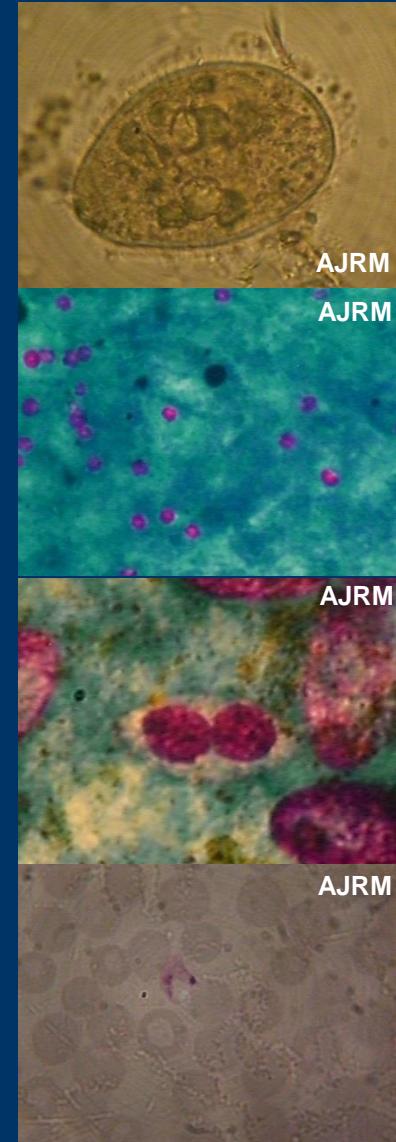
**Trofozoitos o quistes (protozoos)**

**MUESTRAS:**

**Gastrointestinales:**

HECES, aspirados duodenal/yeyunal (técnicas de concentración).

Examen macro/microscópico: fresco o tinciones (KY, hematoxilina férrica).



Rodríguez-Morales AJ, Castañeda-Hernández DM. *Cystoisospora belli* (Syn. *Isospora belli*). En: Motarjemi Y, Moy GG, Todd ECD. Encyclopedia of Food Safety. Volume 2. ISBN 978-0-12-378612-8. Elsevier, San Diego, CA, EUA, Enero 2014. Páginas:45-48. doi:10.1016/B978-0-12-378612-8.00136-0.

# Protozoarios

Diagnóstico

## DIAGNÓSTICO PARASITOLÓGICO

**MUESTRAS:**

**Sangre:**

Tinciones de Giemsa, Wright.

**Otras:**

Esputo, urogenitales (fresco)

LCR (fresco/tinciones)

Biopsias, aspirados de tejidos  
(tinciones histopatológicas)



- Dickson-Gonzalez SM, de Uribe ML, Rodriguez-Morales AJ. Polymorphonuclear neutrophil infiltration intensity as consequence of *Entamoeba histolytica* density in amebic colitis. *Surg Infect (Larchmt)*. 2009 Apr;10(2):91-7.
- Isea MC, Escudero-Sepulveda A, Rodriguez-Morales AJ. Amebic Colitis. In: Fukata M. (Editor). *Colitis*. ISBN 978-953-307-799-4. InTech, Croatia, 2012: Chapter 3: 49-64.

# Protozoarios

Diagnóstico

## DIAGNÓSTICO PARASITOLÓGICO

**DIRECTO**

**CULTIVO:** algunos protozoos.

**DETECCIÓN DE ANTÍGENOS.**

**MÉTODOS MOLECULARES.**

**INDIRECTO:**

**Parasitosis hemáticas/tisulares:**

**Serología (ELISA, WB, IFI)**

