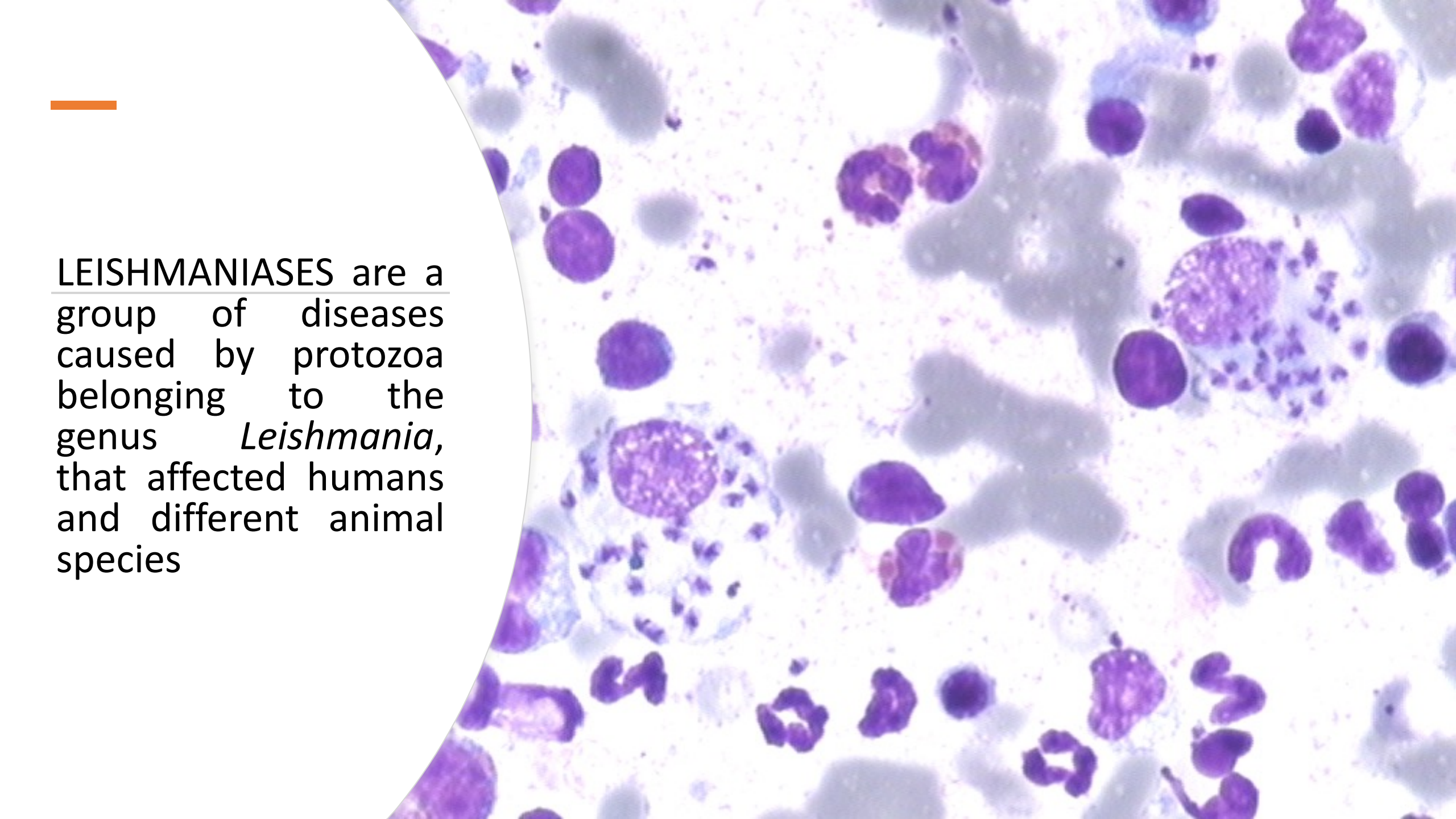
LEISHMANIASES: NEGLETED DISEASES OF HUMANS AND ANIMALS

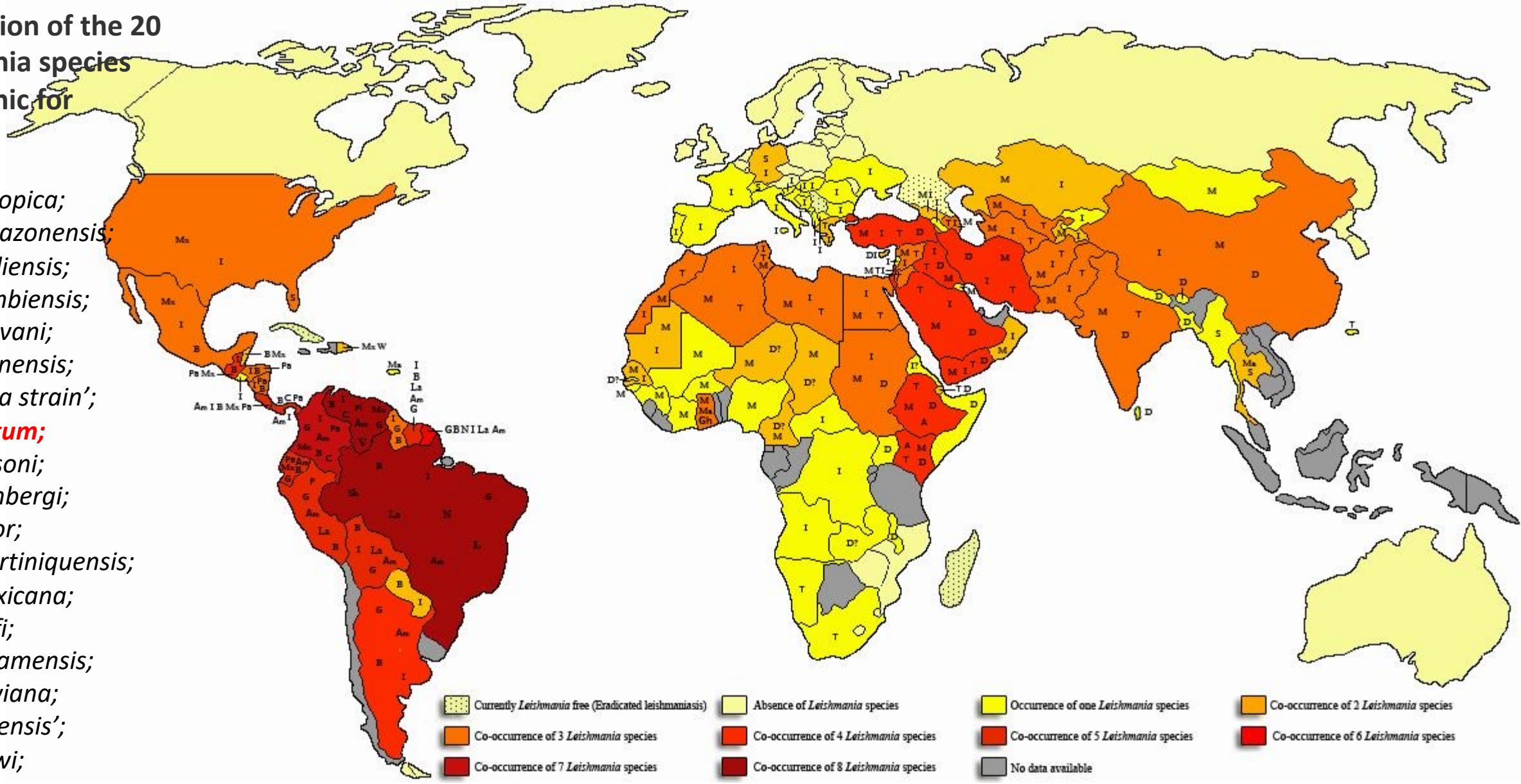
Gaetano Oliva

LEISHMANIASES are a group of diseases caused by protozoa belonging to the genus *Leishmania*, that affected humans and different animal species



Distribution of the 20 Leishmania species pathogenic for humans

A: L. aethiopica;
Am: L. amazonensis;
B: L. braziliensis;
C: L. colombiensis;
D: L. donovani;
G: L. guyanensis;
Gh: 'Ghana strain';
I: L. infantum;
La: L. lainsoni;
L: L. lindenbergi;
M: L. major;
Ma: L. martiniquensis;
Mx: L. mexicana;
N: L. naiffi;
Pa: L. panamensis;
P: L. peruviana;
S: L. 'siamensis';
Sh: L. shawi;
T: L. tropica;
V: L. venezuelensis;
W: L. waltoni



WHO Leishmaniasis map: www.who.int

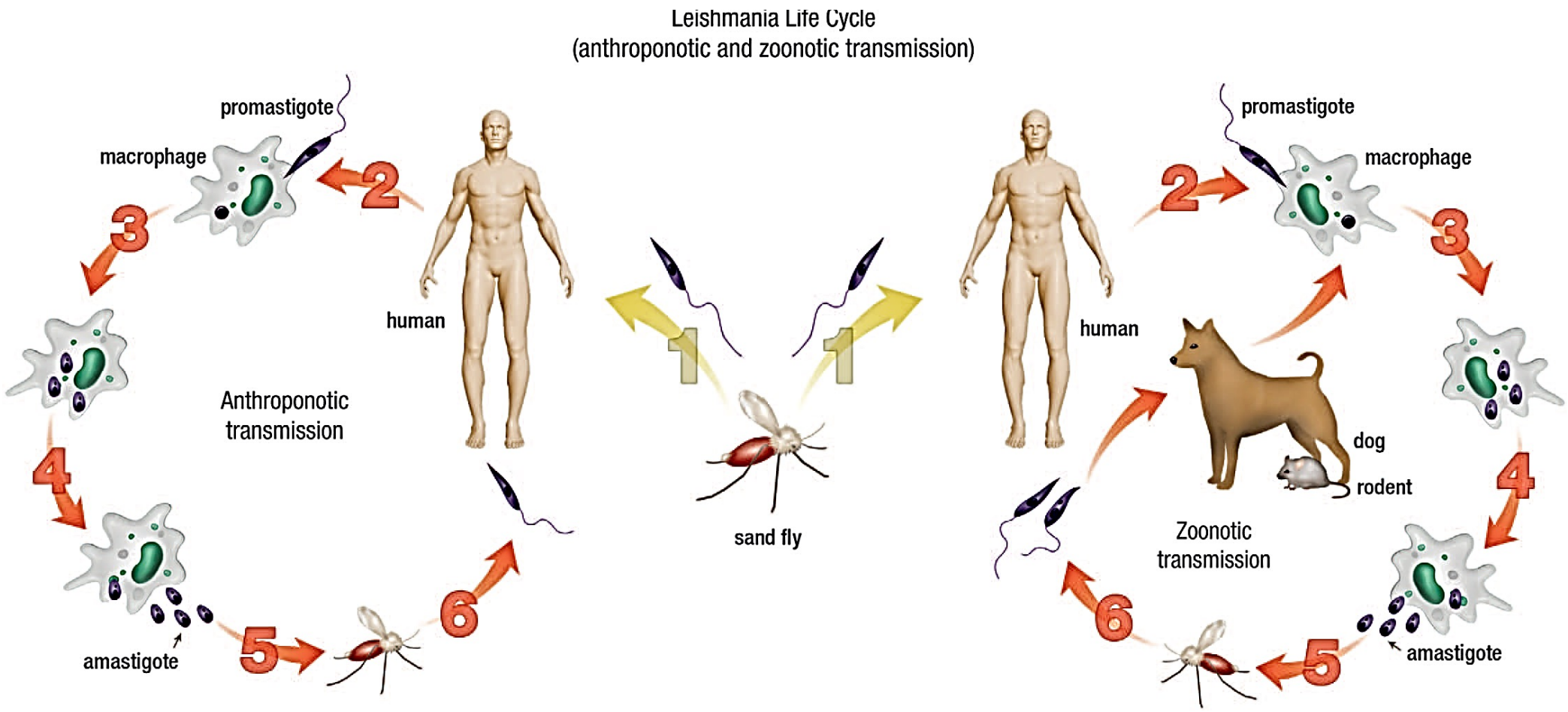
Clinical manifestations, reservoir host, and geographical distribution of *Leishmania* species

	Species	Clinical Manifestation	Reservoir Host	Country/Region
Eurasia (Old World)	*L. (L.) donovani*	AVL, PKDL, CL	Human	VL: West and Central Asia, China, The Indian subcontinent, The Mediterranean Basin, East Africa; CL: The Mediterranean Basin; ML: North Africa; PKDL: The Indian subcontinent, East and North Africa
	L. (L.) infantum	AVL, ZVL, CL	Human, Dog, Fox, Jackal, Badger, Rodent, Cat, Opossum	VL: Central and West Asia, China, The Mediterranean Basin, Africa; CL: The Mediterranean Basin, West Asia, China, West Africa
	L. (L.) major	ZCL	Rodent	West and Central Asia, The Indian subcontinent, The Mediterranean Basin, Africa
	L. (L.) tropica	ACL, ZCLAVL	Human, HyraxHuman	Central, South and West Asia, The Mediterranean Basin, East Africa
	L. (L.) killicki	CL	Unknown	West Asia
	L. (L.) aethiopica	ZCL, DCL, ML	Hyrax, Rodent	The Mediterranean Basin
	L. (M.) orientalis	CL, DL, VL	Unknown	CL: East Africa (Ethiopia and Kenya); ML: Ethiopia
	L. (L.) infantum chagasi	ZVL, CL	Dog, Cat, Fox, Opossum	Thailand
	L. (L.) mexicana	ZCL, MCL, DCL	Rodent, Opossum	South and Central America, Mexico
	L. (L.) pifanol	DCL	Unknown	Americas
	L. (L.) venezuelensis	CL	Unknown	Venezuela
	L. (L.) garnhami	ZCL	Unknown	Venezuela
	L. (L.) amazonensis	ZCL, DCL, CL	Rodent	Central America, Venezuela
	L. (V.) braziliensis	ZCL, MCL, DL	Dog, Horse, Donkey, Mule, Rodent, Opossum	South America
	L. (L.) waltoni	DCL	Unknown	South and Central America, Mexico
	L. (V.) guyanesis	ZCL, MCL	Sloth, Anteater, Opossum	Dominican Republic
	L. (V.) panamensis	ZCL, MCL	Dog, Sloth, Opossum, Tamandua	South America
	L. (V.) shawi	ZCL	Sloth, Primate	South and Central America
	L. (V.) naiffi	ZCL	Armadillo	Brazil
	L. (V.) lainsoni	ZCL	Rodent	Brazil, French Guiana
	L. (V.) lindenbergi	ZCL	Unknown	South America
	L. (V.) peruviana	ZCL, MCL	Dog, Opossum, Rodent	Brazil
	L. (M.) martiniquensis	CL	Unknown	Peru
	Endotrypanum colombiensis	ZCL	Sloth	French Guiana
				Colombia, Venezuela, Panama

ACL, anthroponotic cutaneous leishmaniasis; AVL, anthroponotic visceral leishmaniasis; CL, cutaneous leishmaniasis; DL, disseminated cutaneous leishmaniasis; DCL, diffuse (anergic) cutaneous leishmaniasis; MCL, mucocutaneous leishmaniasis; ML, mucosal leishmaniasis; PKDL, post-kala-azar dermal leishmaniasis; VL, visceral leishmaniasis; ZCL, zoonotic cutaneous leishmaniasis; ZVL, zoonotic visceral leishmaniasis.

Hong A. et al., 2020

Leishmania life cycle (Kumar and Engwerda, 2014)



Healthy infected as reservoirs

Both infected and sick dogs are considered the main domestic animal reservoirs for *Leishmania infantum* parasite

Clinical manifestations of Leishmaniases

Humans

- **Visceral leishmaniasis** (VL)
- Localized Leishmanial Lymphadenopathy
- Post-Kala-Azar dermal leishmaniasis (PKDL)
- **Cutaneous leishmaniasis** (CL)
- Diffuse and Disseminated CL
- **Mucocutaneous leishmaniasis** (MCL)
- Localized mucosal leishmaniasis
- Diffuse mucosal leishmaniasis

Domestic animals (dog and cat)

- **Generalized leishmaniasis** (ZVL)
- **Cutaneous form**(s)
- Localized mucosal/mucocutaneous form(s)

L. infantum

Figure 6. Geographical distribution of reported human and/or animal leishmaniasis cases, European Union and neighbouring countries, 2009–2020

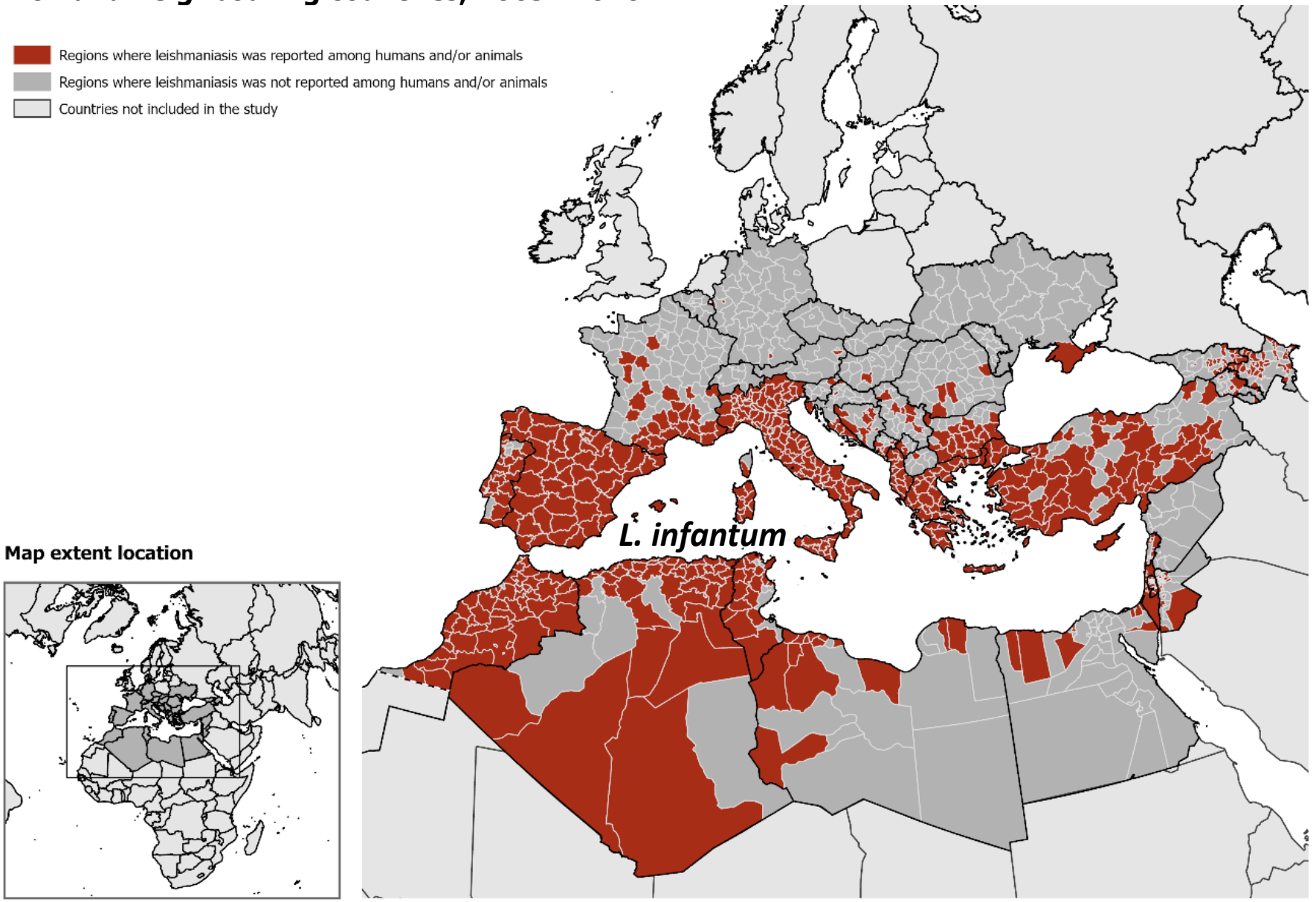


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Figure 9. Geographical distribution of reported human and/or animal cases of leishmaniasis due to *Leishmania tropica*, European Union and neighbouring countries, 2009–2020

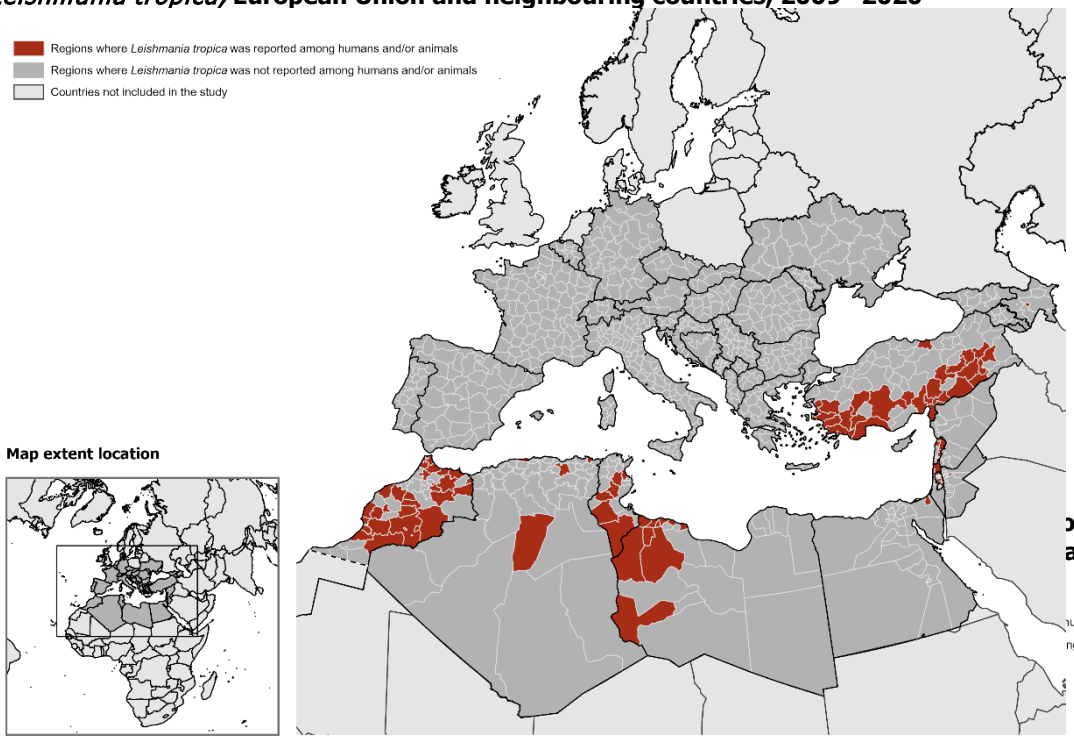

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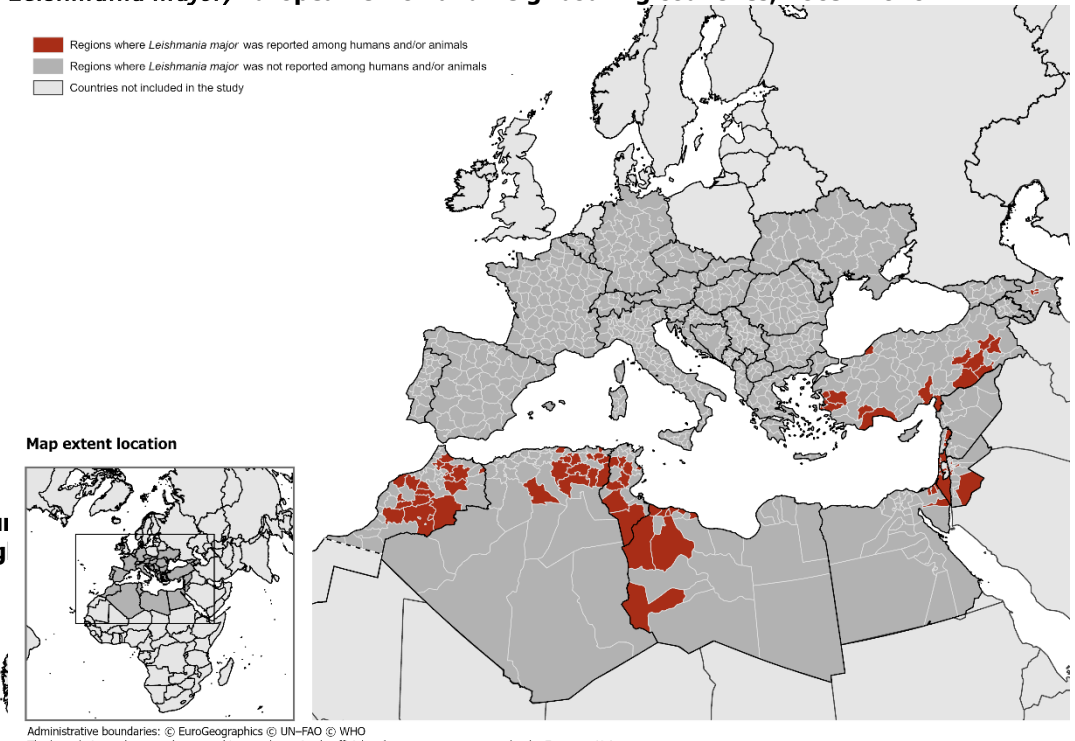
Figure 8. Geographical distribution of reported human and/or animal cases of leishmaniasis due to *Leishmania major*, European Union and neighbouring countries, 2009–2020



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One Health approach and NTDs

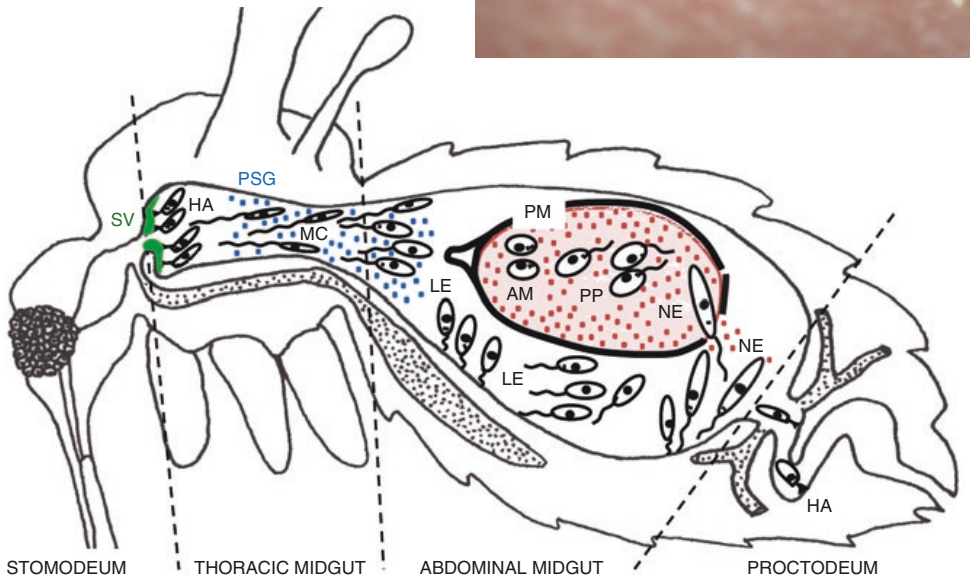
- All aspects of human, animal, and ecology to recognizing their interconnectedness

- **Socio-economic factors**: higher risk for impoverished communities

- **Political and migratory influences**: high infection rates occurring in war zones and densely populated areas such as refugee camps

- **Environmental Risk Factors**: the warming climate can affect the movement of vectors and reservoir animals. Mass deforestation may influence the increase of Leishmaniases

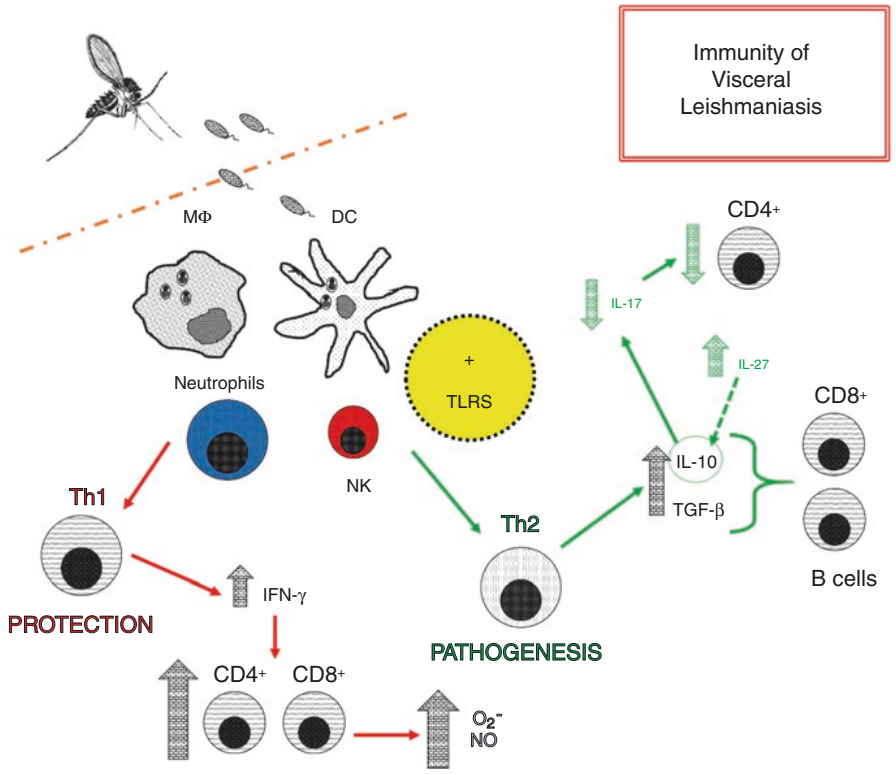
The main actor: Phlebotomine sand flies



Sadlova J and Wolf P., 2018

PM: Peritrophyc Matrix
AM: Amastigotes
PP: Procyclic Promastigotes
NE: Neptomonas
LE: Leptomonas
HA: Haptomonads
MC: Metacyclics
PSG: Promastigote Secretory Gel
SV: Stomodeal Valve

Immunological unbalance during VL (ZVL)



Immunocompromised patients:

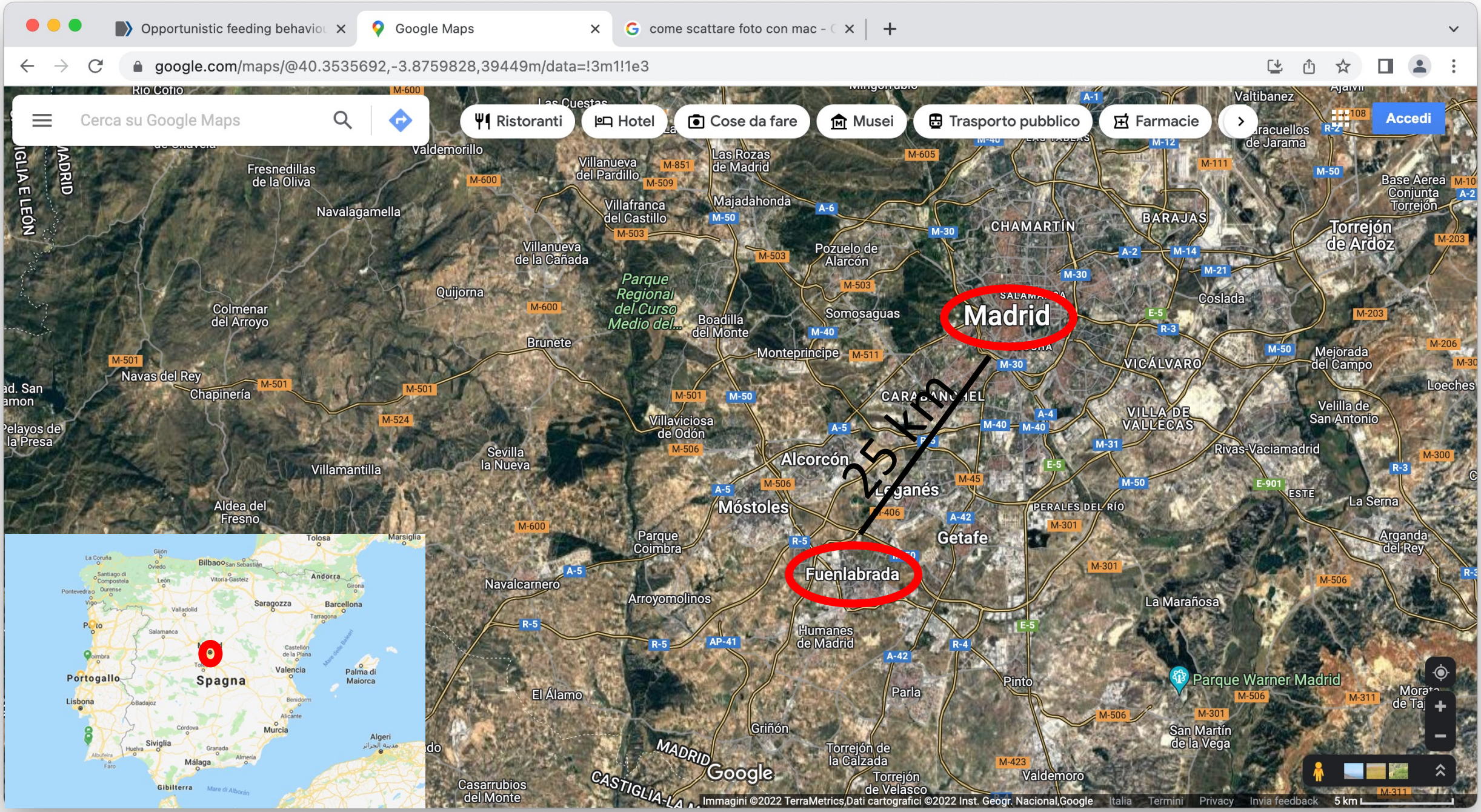
- HIV +
- Long-term immune-suppressive treatment
- Chronic diseases
- Co-infections

- <u>IMMUNOCOMPETENT PATIENTS</u>

Lauthier and Korenaga, 2018

The Fuenlabrada (Spain, Europe) case

- In Spain, more than 8,000 hospitalizations related to leishmaniasis have been registered between 1997 and 2011
- The only species present, *Leishmania infantum*, is hypoendemic and causes both cutaneous and visceral leishmaniasis (CL and VL)
- In 2009, a significant increase of cases was identified in southwestern of the Community of Madrid. Until June 2020, 479 cases of CL and 303 of VL have been registered, with a peak of 197 cases in 2011


Opportunistic feeding behaviou
Google Maps
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google.com/maps/@40.3535692,-3.8759828,39449m/data=!3m1!1e3
Cerca su Google Maps
Ristoranti
Hotel
Cose da fare
Musei
Trasporto pubblico
Farmacie
Accedi
Madrid
25 km
Fuenlabrada
Getafe
Leganés
Alcorcón
Móstoles
Parque Warner Madrid
Parque Regional del Curso Medio del...
Portogallo
Spagna
Immagini ©2022 TerraMetrics,Dati cartografici ©2022 Inst. Geogr. Nacional,Google
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Invia feedback
5 km









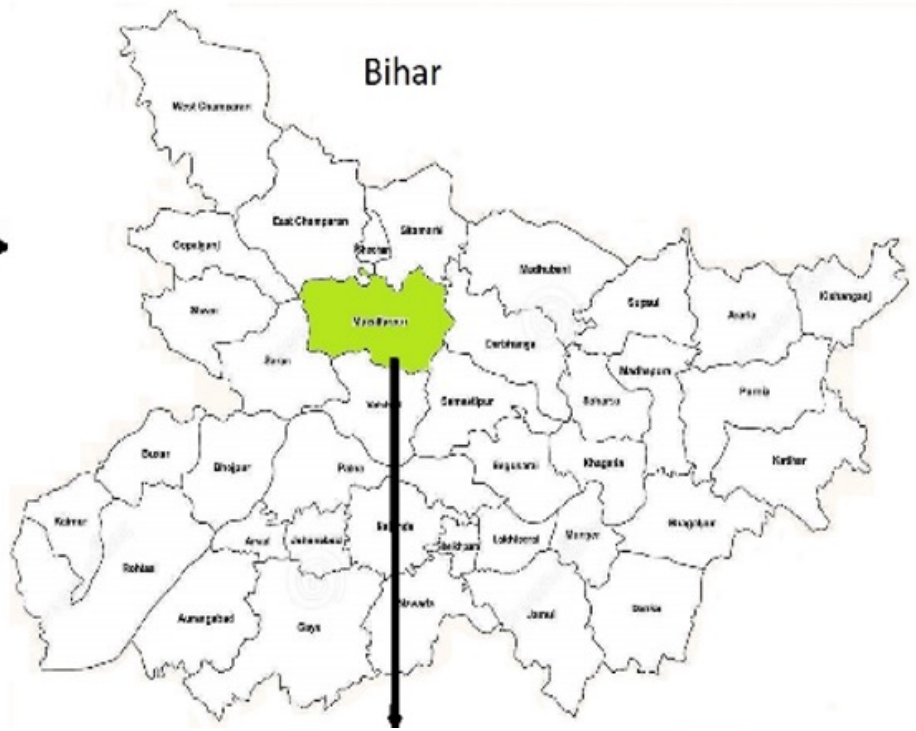


Peripheral parks

NEW STUDIES ON

- The role of dog in maintaining and transmitting *Leishmania species* different from *L. infantum*


India
Bihar


Bihar


Spagna
Valencia
Maiorca
Grecia
Palermo
Atene
Αθήνα
Algeri
مدينة الجزائر
Tunisi
تونس
Malta
Mar
Mediterraneo
Tunisia
Tripoli
طرابلس

Xenodiagnosis

MAIN VARIABLES

- ✓ The number of sand flies employed for dog biting
- ✓ The nature and extension of the body surface exposed to their bite (whole body *vs* limeted areas)
- ✓ The time of exposure

We need more information on

- Vertical transmission
- Venereal transmission
- Organ(s) transplant transmission
- Blood derivatives transmission

PREVENTION/TREATMENT

NOT INFECTED:

Repellents (Pyrethroids)

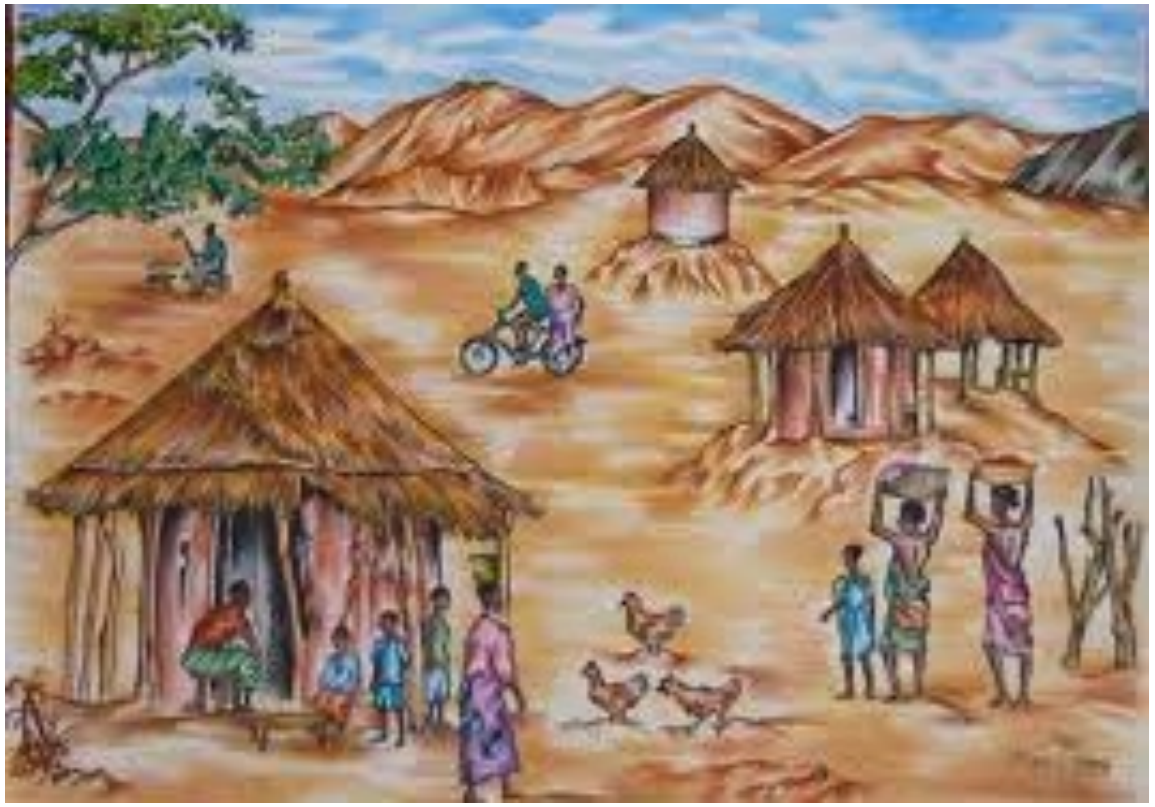
Vaccine (limits severe disease)

Avoiding breeding/transfusion

- INFECTED/SICK:

- **Repellents**
- **Anti-*Leishmania* drugs**
- Immune-potentiating drugs
- Avoiding breeding/transfusion

PREVENTION/TREATMENT



HEALTHY PEOPLE:

Repellents (Pyrethroids)
Indoor/Outdoor spray

Vaccine not available !!!

- SICK:

- **Anti-*Leishmania* drugs (L AmPh B)**

- Immune-potentiating drugs

CLIMOS

Climate Monitoring and Decision Support Framework for Sand Fly-borne Diseases Detection and Mitigation with Cost-benefit and Climate-policy Measures

Providing a better knowledge and comprehension of climate and environmental drivers of sand fly-borne diseases

– The CLIMOS project –

Carla Maia

17th Symposium of the CVBD World Forum, September 24-25, 2023, Lisbon, Portugal

climate-health cluster

The six Horizon Europe projects, **BlueAdapt, CATALYSE, CLIMOS, HIGH Horizons, IDAlert, and TRIGGER,** form the climate change and health cluster

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UK Research and Innovation

UK Research and Innovation, Horizon Europe Guarantee.

Take home messages

- Leishmaniases control must be conceived as an integrated approach
- Control the vectors the main strategy

- Fight the poverty, fight against global worming (and globalization) fight against the deforestation, do everything to save the environment. These are the best strategies to fight against Leishmaniases

- Companion animals are in the loop as innocent bystander