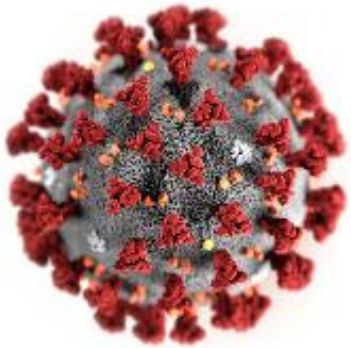
Instituto de Inmunología Clínica
y Enfermedades Infecciosas

GEVIG
Grupo de Estudio de la Infección, Inmunidad y Vacunación en el paciente Inmunocomprometido y Geriátrico

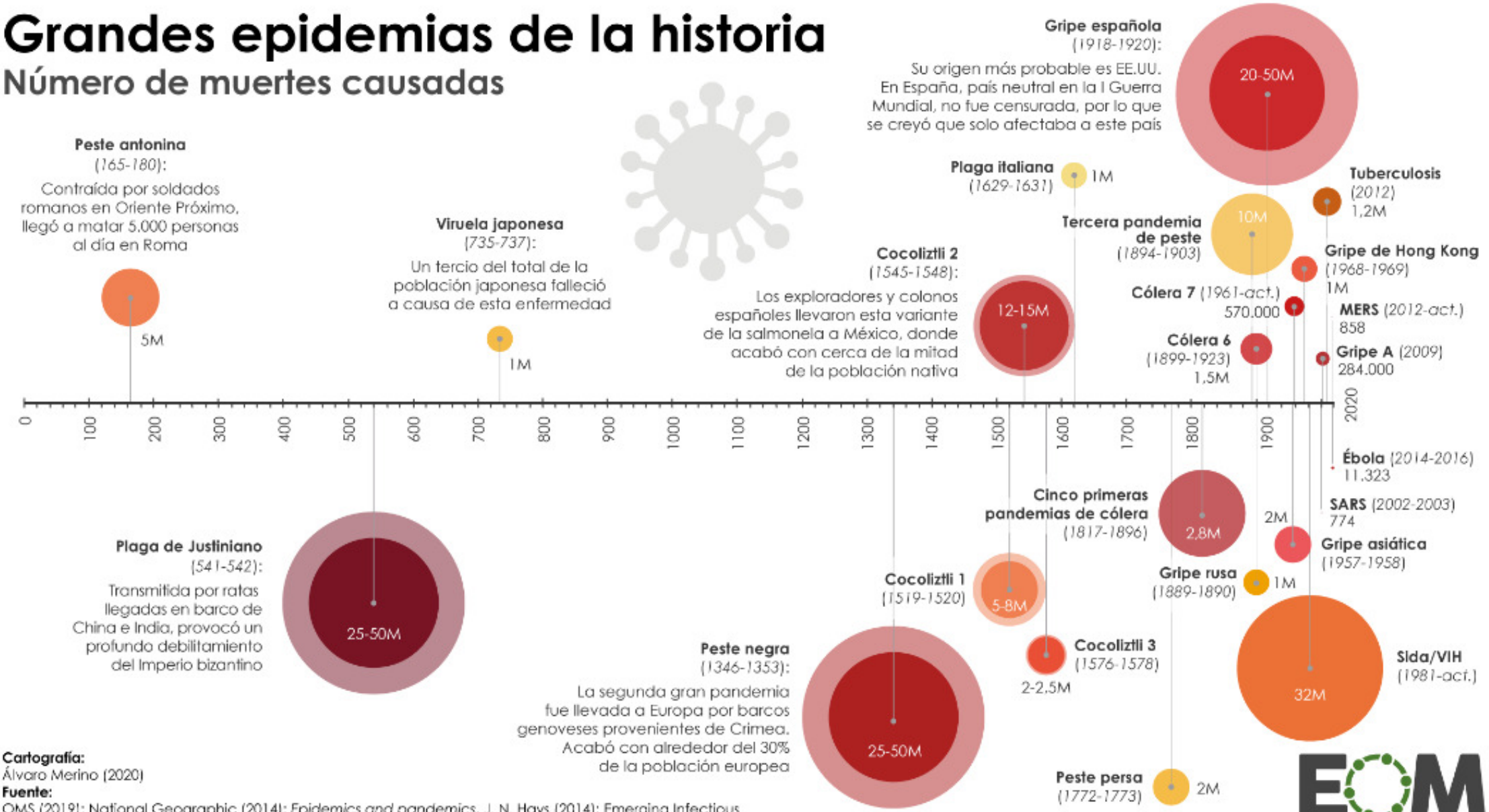
MURCIÉLAGOS: ¿BENEFICIO ECOLÓGICO O RIESGO PARA LA SALUD PÚBLICA?

Dr. Fernando Fariñas Guerrero



Grandes epidemias de la historia

Número de muertes causadas



Cartografía:
Álvaro Merino (2020)
Fuente:
OMS (2019); National Geographic (2014); *Epidemics and pandemics*, J. N. Hays (2014); Emerging Infectious Deseases (2002);Marseille City of Culture (2020); *History of the human plague in Iran*, F. Azizi (2010); Encyclopedia Britannica (2020)

elordenmundial.com

60%

de las enfermedades humanas infecciosas son zoonóticas

Al menos un 75%

de los agentes patógenos de las enfermedades infecciosas emergentes del ser humano (incluido el Ébola, el VIH o la influenza) son de origen animal

5

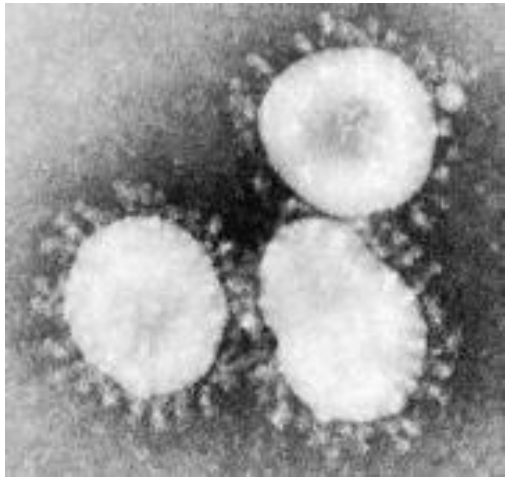
nuevas enfermedades humanas aparecen cada año, tres de las cuales son de origen animal

80%

de los agentes patógenos que pueden utilizarse con fines de bioterrorismo son zoonóticos





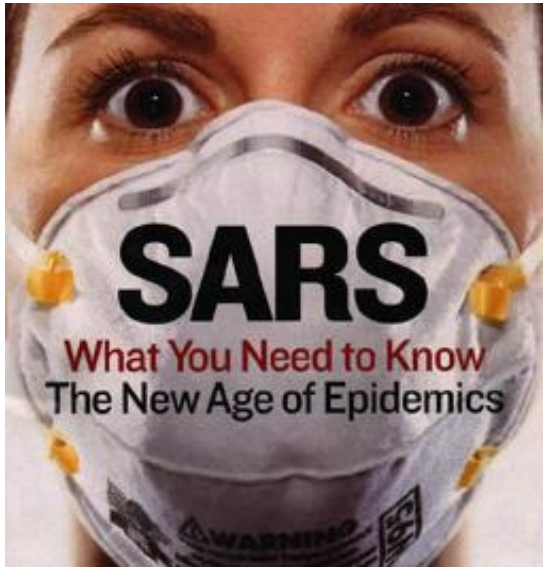




ELLIOT FRANK
LA PESTE NEGRA
LA PANDEMIA MÁS DEVASTADORA EN LA HISTORIA DE LA HUMANIDAD
VENIT

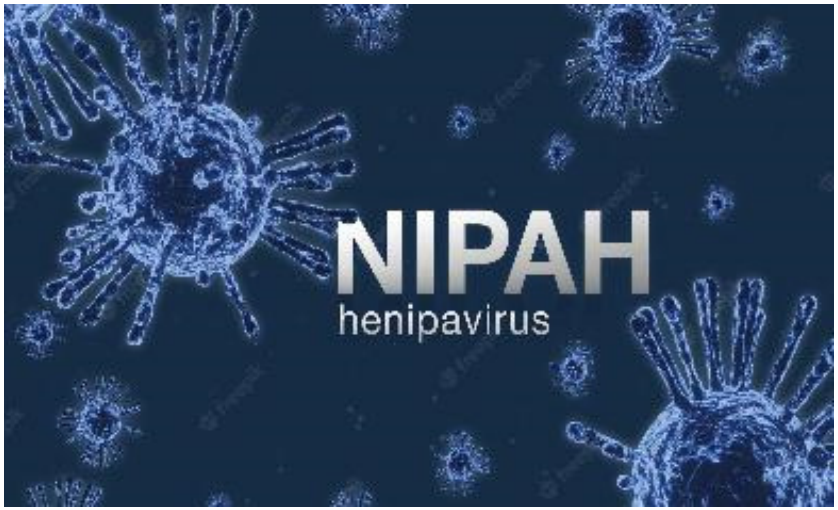

500 µm


MERS

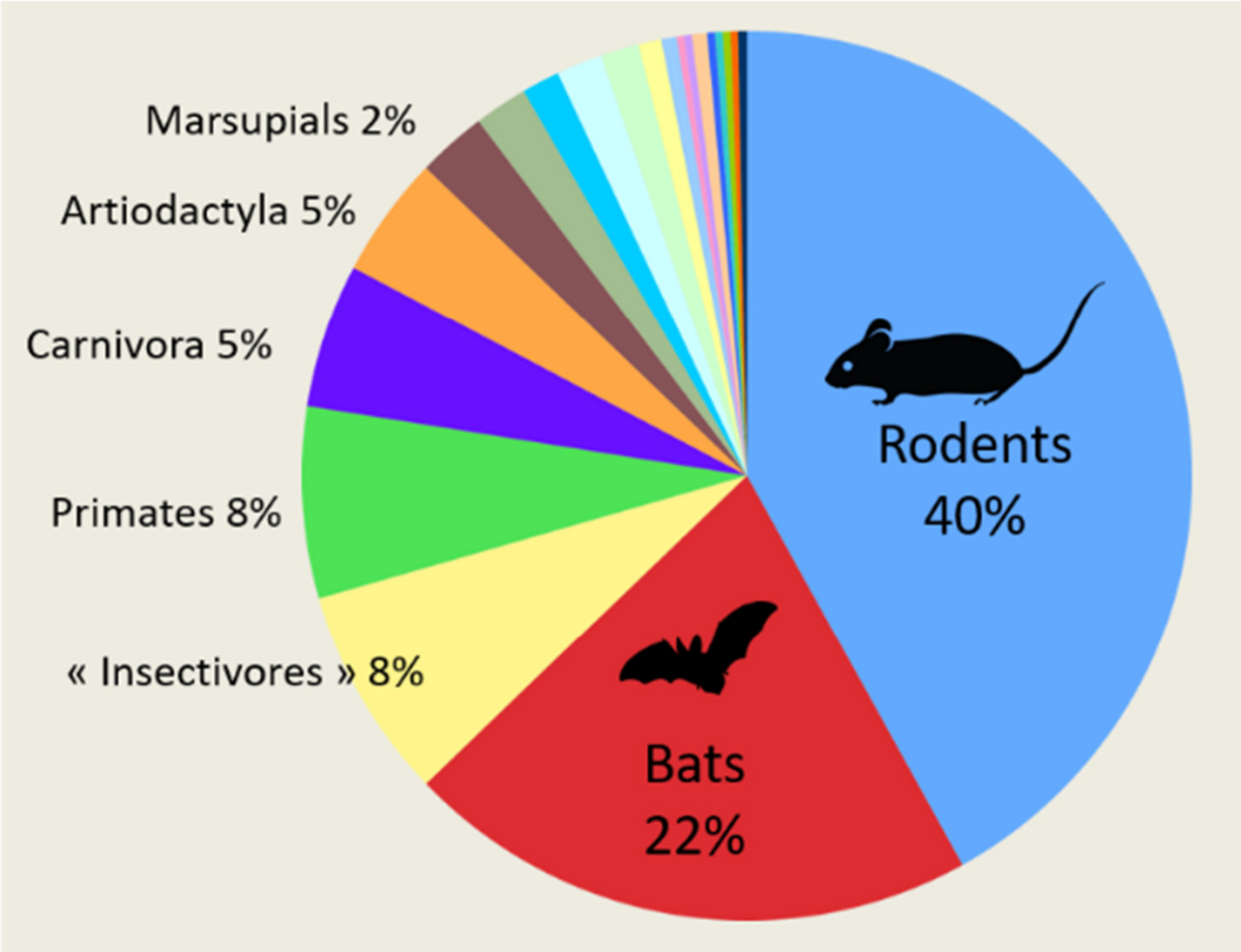

SARS
What You Need to Know
The New Age of Epidemics


COVID-19
CORONAVIRUS DISEASE 2019


WARNING
RABIES


NIPAH
henipavirus


WARNING
EBOLA
VIRUS ALERT

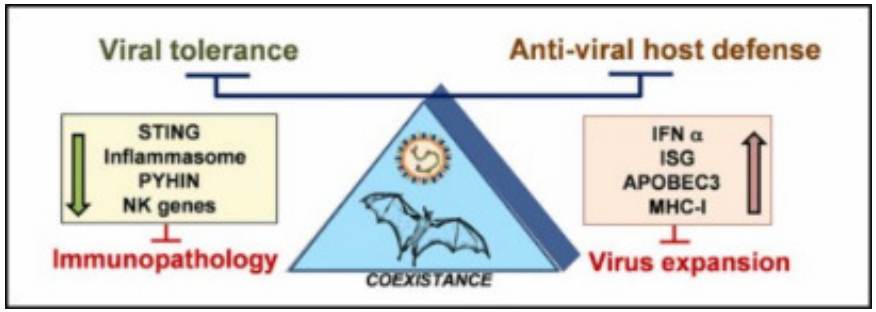

Marsupials 2%
Artiodactyla 5%
Carnivora 5%
Primates 8%
« Insectivores » 8%
Rodents
40%
Bats
22%

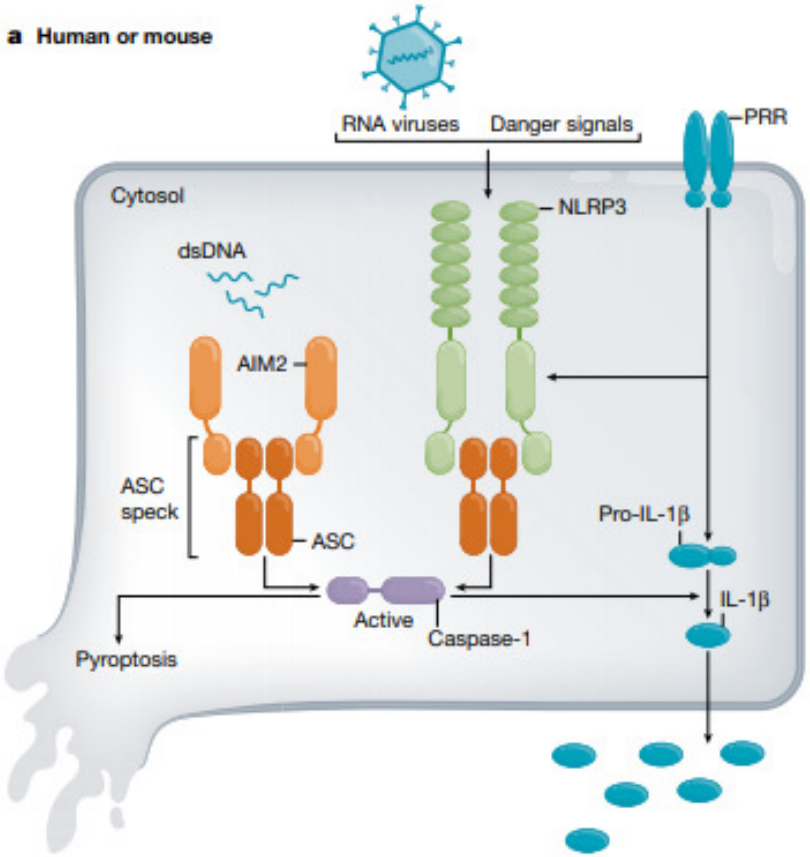
ABUNDANCIA DE ESPECIES QUIRÓPTERAS

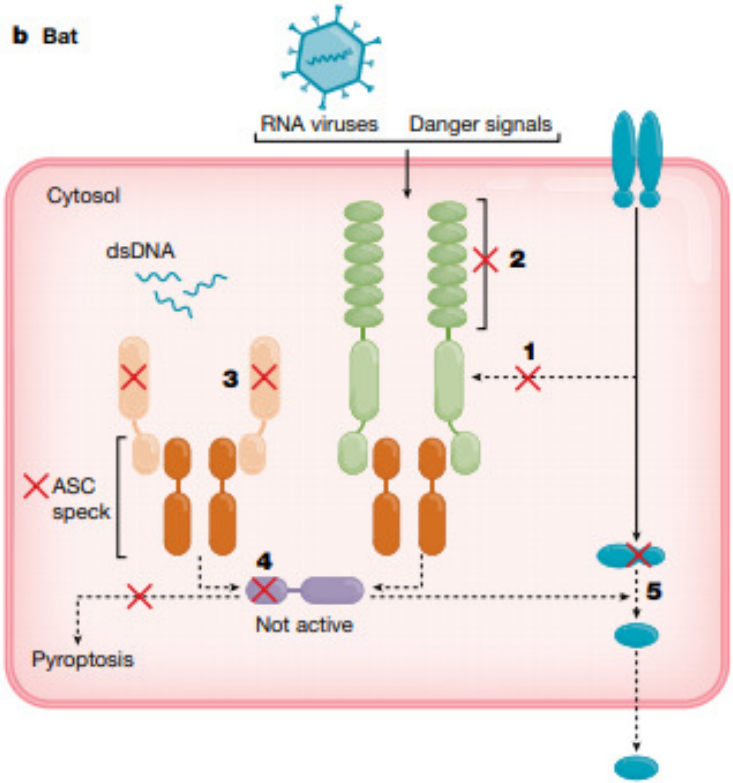
-**1.423 de las 6.400** especies mamíferas conocidas

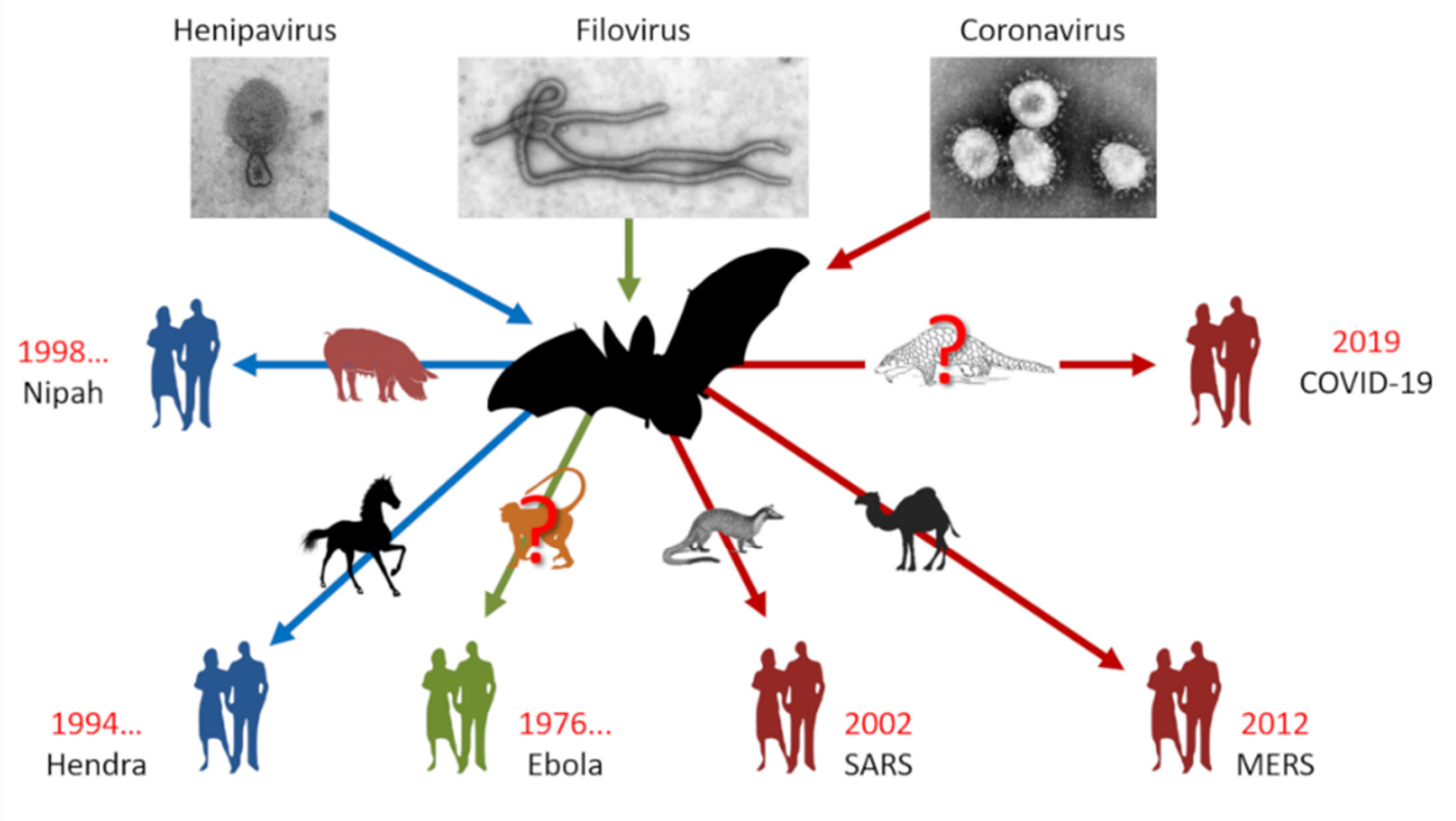
-Modo de vida en **espacios cerrados con una alta densidad de población** y contacto estrecho entre individuos (facilita la transmisión).

-Inmunidad **“peculiar y tolerante”** a muchos agentes infecciosos.

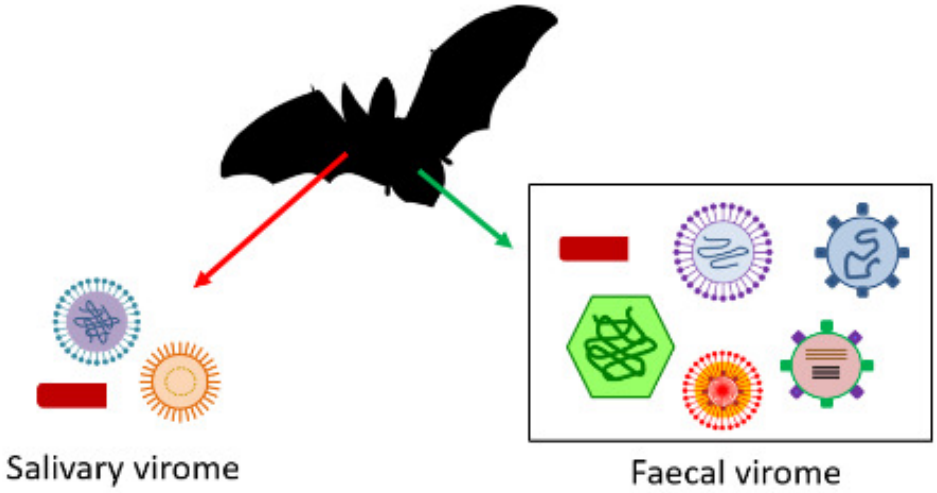

Viral tolerance
Anti-viral host defense
STING
Inflammasome
PYHIN
NK genes
IFN α
ISG
APOBEC3
MHC-I
Immunopathology
Virus expansion
COEXISTANCE

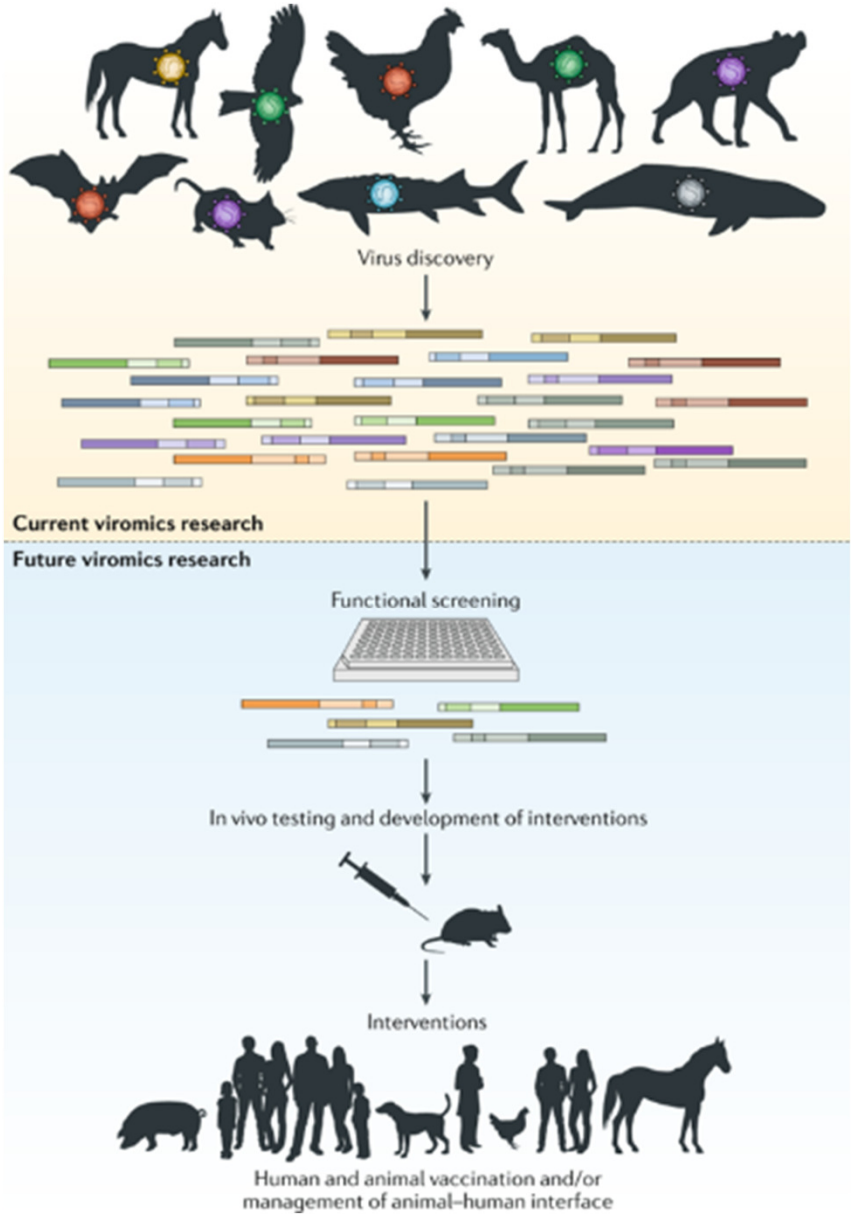

a Human or mouse
RNA viruses
Danger signals
PRR
Cytosol
NLRP3
dsDNA
AIM2
ASC
speck
ASC
Pro-IL-1β
IL-1β
Active
Caspase-1
Pyroptosis

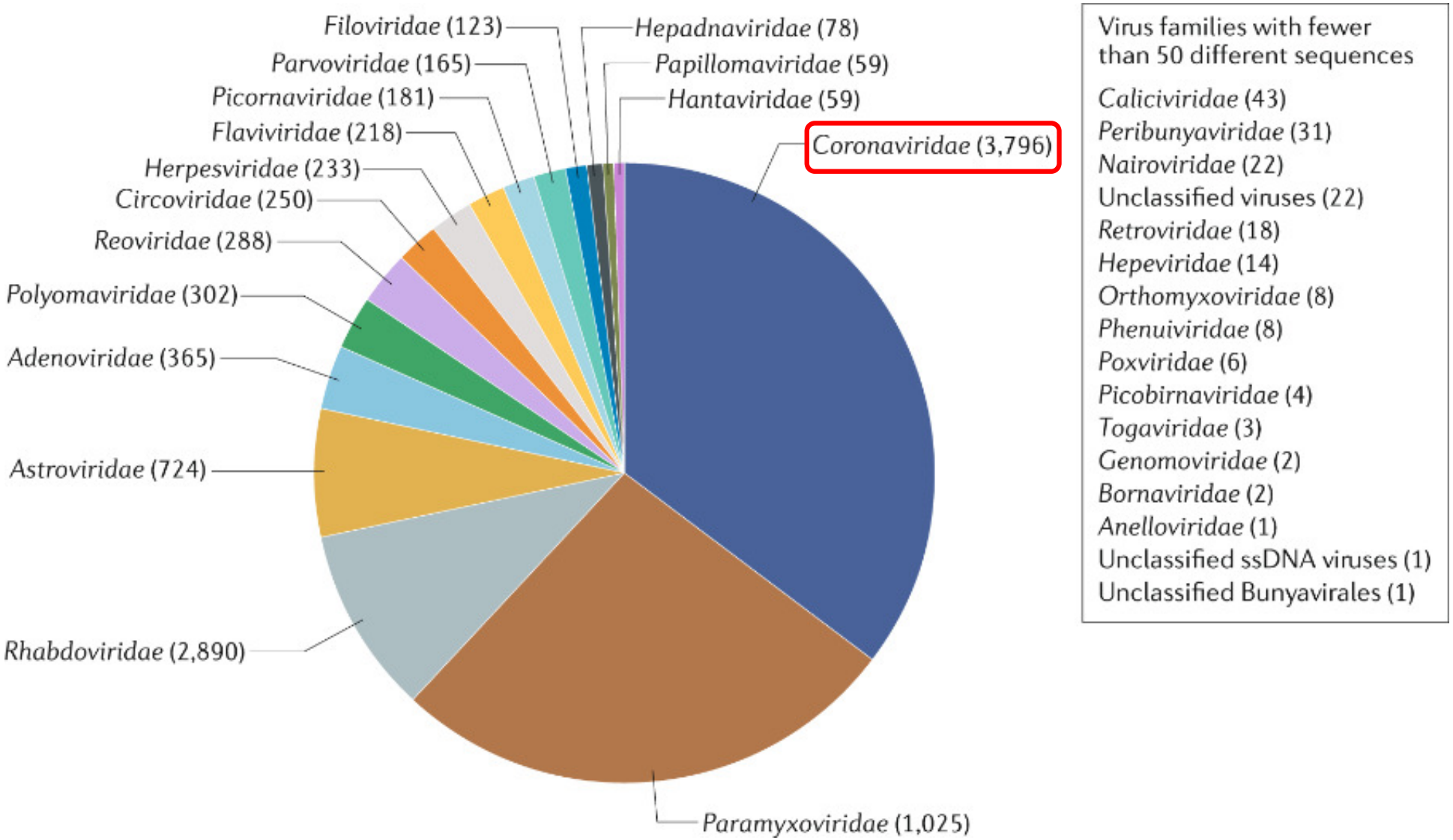

b Bat
RNA viruses
Danger signals
Cytosol
dsDNA
2
1
3
ASC
speck
4
5
Not active
Pyroptosis


Henipavirus
Filovirus
Coronavirus
1998...
Nipah
2019
COVID-19
1994...
Hendra
1976...
Ebola
2002
SARS
2012
MERS

VIROMA DE MURCIÉLAGOS






Filoviridae (123)
Hepadnaviridae (78)
Parvoviridae (165)
Papillomaviridae (59)
Picornaviridae (181)
Hantaviridae (59)
Flaviviridae (218)
Coronaviridae (3,796)
Herpesviridae (233)
Circoviridae (250)
Reoviridae (288)
Polyomaviridae (302)
Adenoviridae (365)
Astroviridae (724)
Rhabdoviridae (2,890)
Paramyxoviridae (1,025)
Virus families with fewer than 50 different sequences
Caliciviridae (43)
Peribunyaviridae (31)
Nairoviridae (22)
Unclassified viruses (22)
Retroviridae (18)
Hepeviridae (14)
Orthomyxoviridae (8)
Phenuiviridae (8)
Poxviridae (6)
Picobirnaviridae (4)
Togaviridae (3)
Genomoviridae (2)
Bornaviridae (2)
Anelloviridae (1)
Unclassified ssDNA viruses (1)
Unclassified Bunyavirales (1)

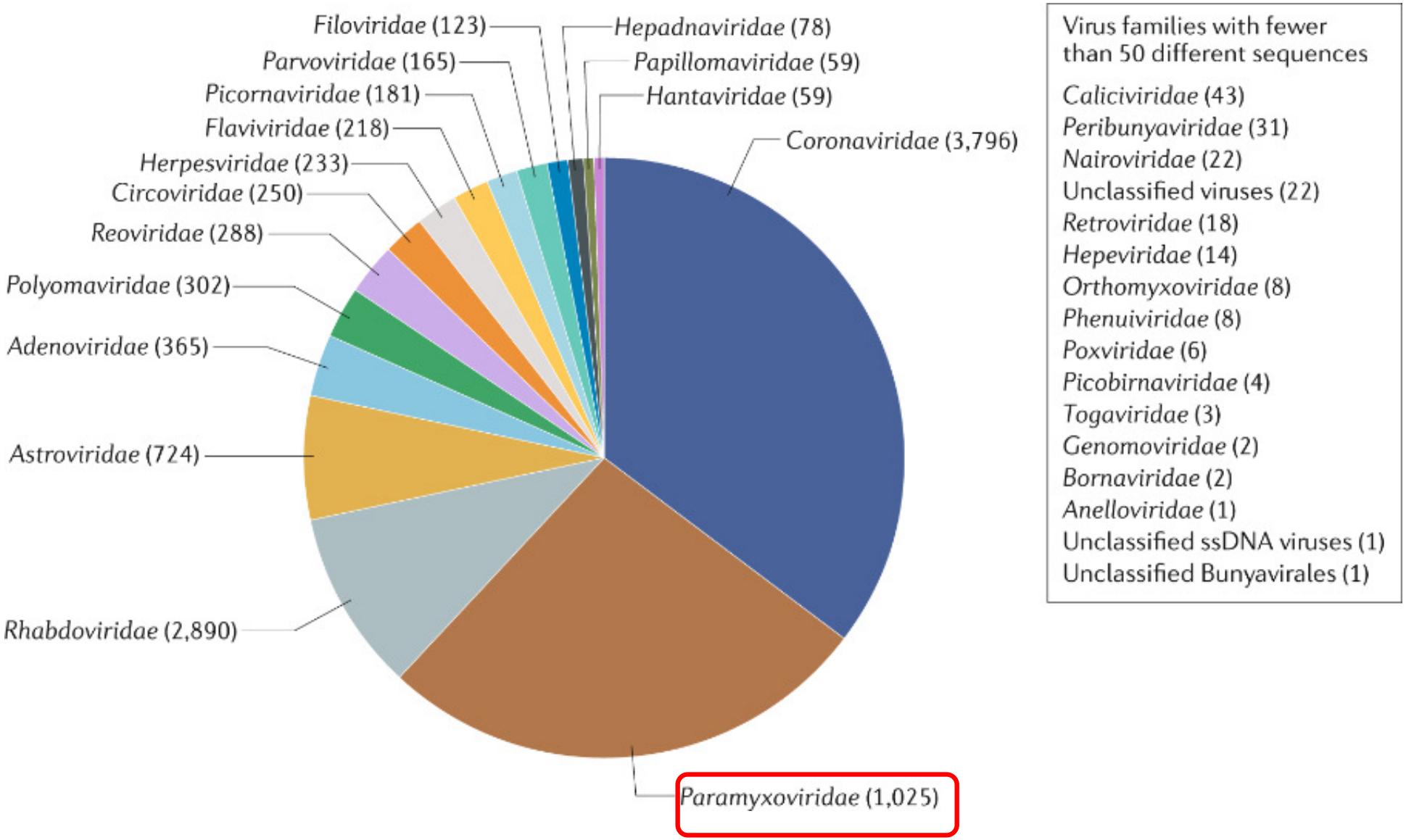
CLINICAL MICROBIOLOGY REVIEWS, Oct. 2007, p. 660–694 Vol. 20, No. 4
0893-8512/07/$08.00+0 doi:10.1128/CMR.00023-07

Severe Acute Respiratory Syndrome Coronavirus as an Agent of Emerging and Reemerging Infection

Vincent C. C. Cheng, Susanna K. P. Lau, Patrick C. Y. Woo, and Kwok Yung Yuen*

State Key Laboratory of Emerging Infectious Diseases, Department of Microbiology, Research Centre of Infection and Immunology, The University of Hong Kong, Hong Kong Special Administrative Region, China

to new genotypes and outbreaks. The presence of a large reservoir of SARS-CoV-like viruses in horseshoe bats, together with the culture of eating exotic mammals in southern China, is a time bomb. The possibility of the reemergence of SARS and other novel viruses from animals or laboratories and therefore the need for preparedness should not be ignored.


Filoviridae (123)
Hepadnaviridae (78)
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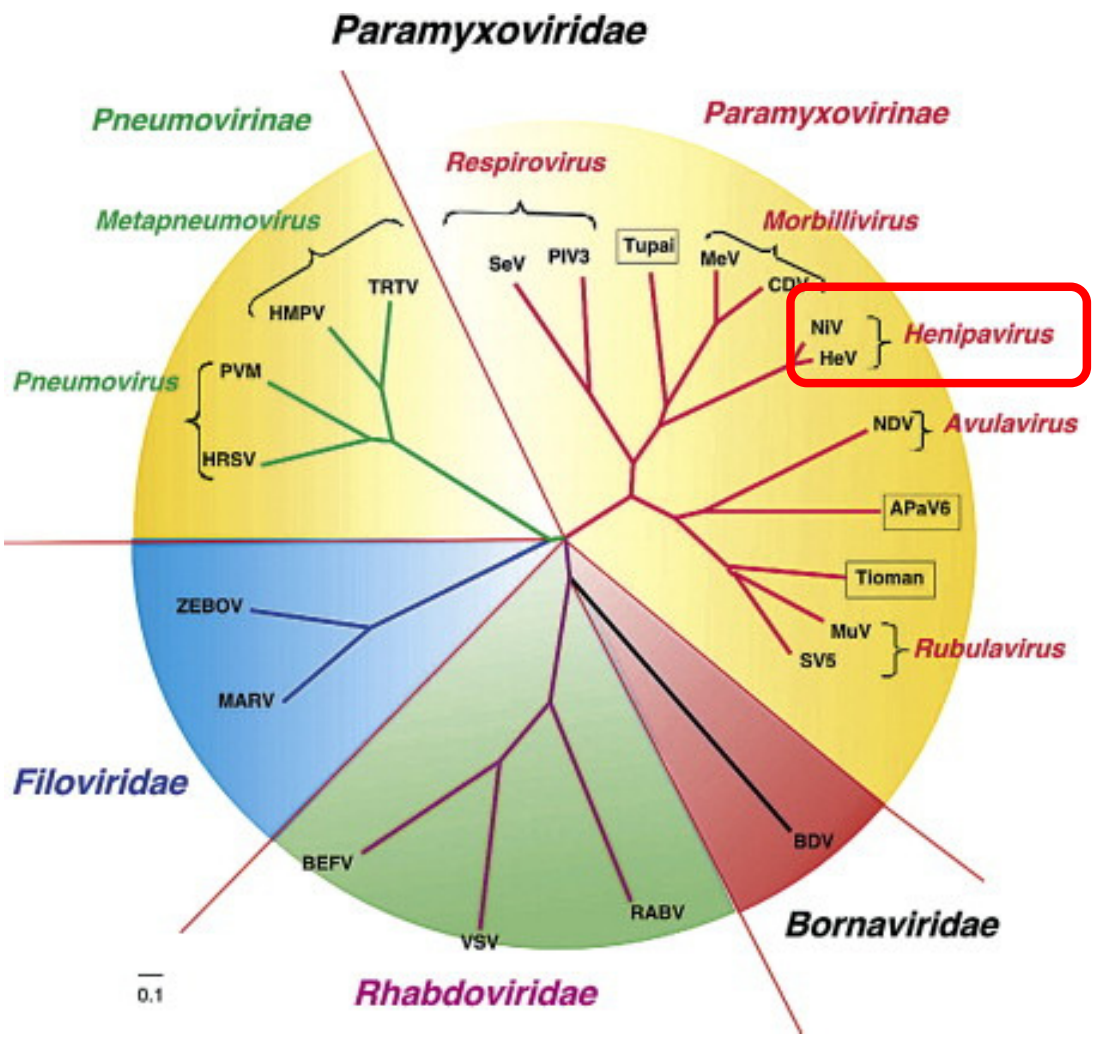
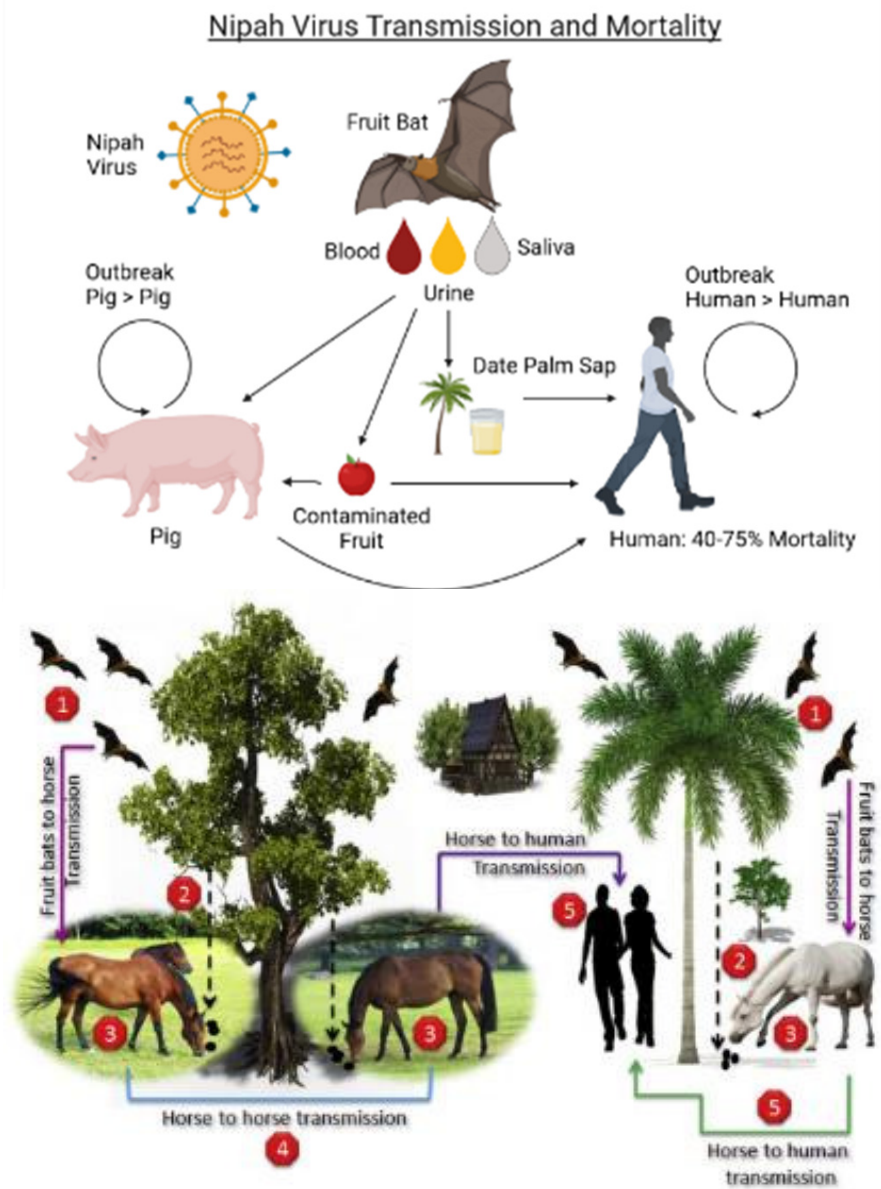
Togaviridae (3)
Genomoviridae (2)
Bornaviridae (2)
Anelloviridae (1)
Unclassified ssDNA viruses (1)
Unclassified Bunyavirales (1)


Paramyxoviridae
Pneumovirinae
Paramyxovirinae
Respirovirus
Metapneumovirus
Morbillivirus
Tupai
SeV
PIV3
MeV
CDV
HMPV
TRTV
NiV
HeV
Henipavirus
Pneumovirus
PVM
HRSV
NDV
Avulavirus
APaV6
Tioman
ZEBOV
MuV
SV5
Rubulavirus
MARV
Filoviridae
BDV
BEFV
RABV
VSV
Bornaviridae
0.1
Rhabdoviridae


Nipah Virus Transmission and Mortality
Nipah Virus
Fruit Bat
Blood
Saliva
Urine
Outbreak Pig > Pig
Outbreak Human > Human
Date Palm Sap
Pig
Contaminated Fruit
Human: 40-75% Mortality
Fruit bats to horse Transmission
Horse to human Transmission
Fruit bats to horse Transmission
Horse to horse transmission
Horse to human transmission

MURCIÉLAGOS Y ENFERMEDAD EN HUMANOS

Table 1. Summary of outbreaks in humans and results of testing for NiV in bats.

Location	Human outbreaks	Results of testing for NiV in bats		Bat species tested
Bangladesh	[41–43,82]	Antibodies	[42,49]	*Pteropus giganteus*
India	[46,83]	Antibodies	[84]	*P. giganteus*,
		RNA, Antibodies	[66]	*P. giganteus*
Malaysia	[33]	Antibodies, Virus isolation	[62]	*P. vampyrus*
		Antibodies	[36]	*P. hypomelanus*, *E. spelaea*, *C. brachyotis*, *S. kuhlii*, *P. vampyrus*
		Virus isolation	[35]	*P. hypomelanus*
		Antibodies & RNA	[85]	*P. hypomelanus* (Antibodies only), *P. vampyrus*
Singapore	[86]	-		-
Indonesia	-	RNA, antibodies	[64]	*P. vampyrus*
Thailand	-	Antibodies	[87]	*P. hypomelanus*, *P. vampyrus*, *P. lylei*, *H. larvatus*,
		RNA	[65,87]	*P. lylei*, *H. larvatus*
Viet Nam	-	Antibodies	[88]	*R. leschenaultia*, *Cynopterus sphinx*
Cambodia	-	Antibodies, virus isolation	[63]	*P. lylei*
China	-	Antibodies	[67]	*R. leschenaultia*, *H. armiger*, *H. Pomona*, *Miniopterus spp.*, *M. daubentonii*, *M. ricketti*, *R. affinis* , *R. sinicus*
Papua New Guinea	-	Antibodies	[89,90]	*D. magna*, *P. alecto*, *P. conspicillatus*
East Timor		RNA	[58]	*P. vampyrus*, *R. amplexicaudatus*
Madagascar	-	Antibodies	[70]	*E. dupreanum*, *P. rufus*,
Ghana		Antibodies	[91]	*E. helvum*, *Epomophorus gambianus*, *Hypsignathus monstrosus*
Africa	-	Antibodies	[60,71]	*E. helvum*

MURCIÉLAGOS Y ENFERMEDAD EN HUMANOS

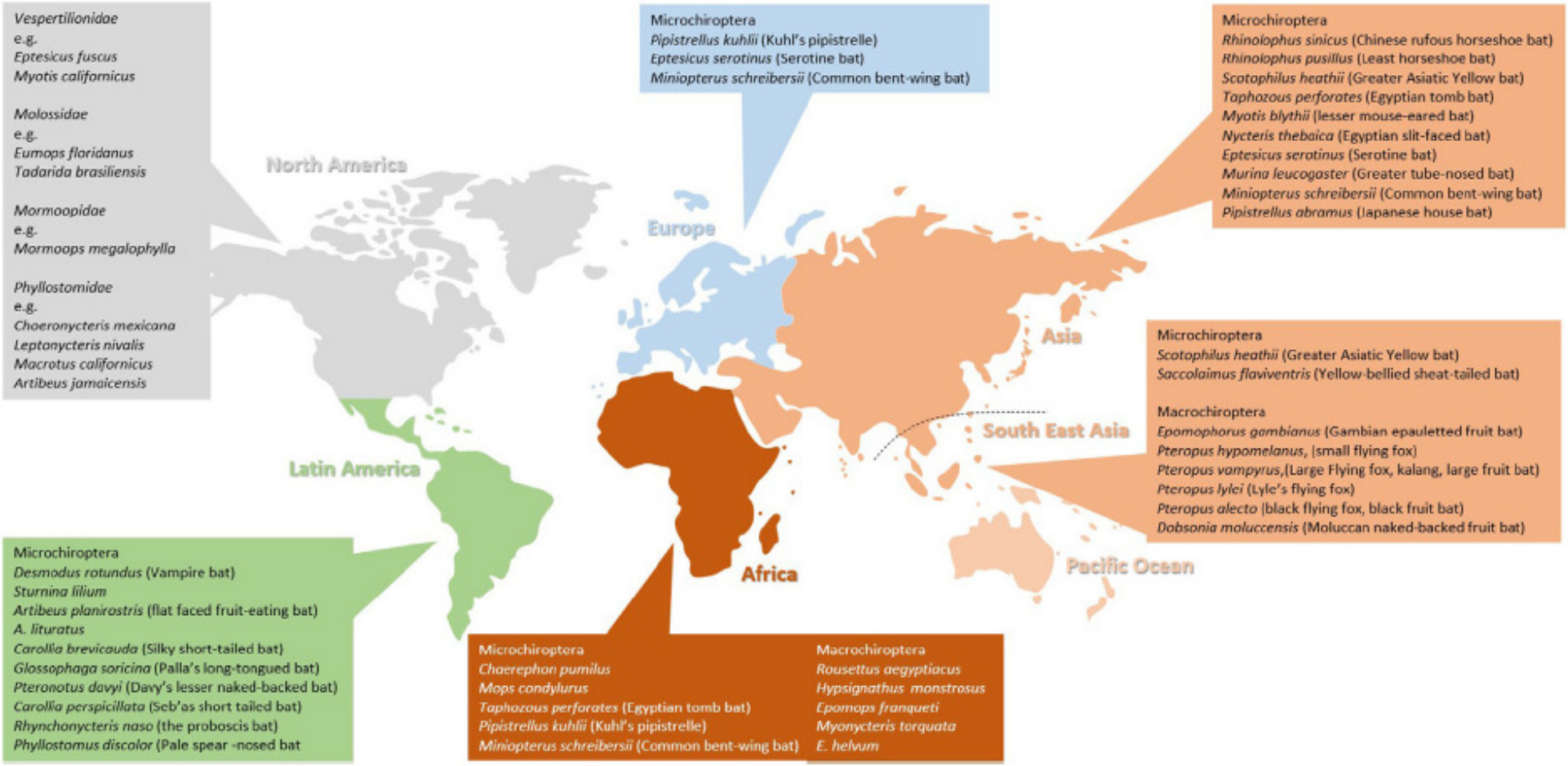


Figure 1. Geographic distribution of bats associated with human disease.

MURCIÉLAGOS Y ENFERMEDAD EN HUMANOS

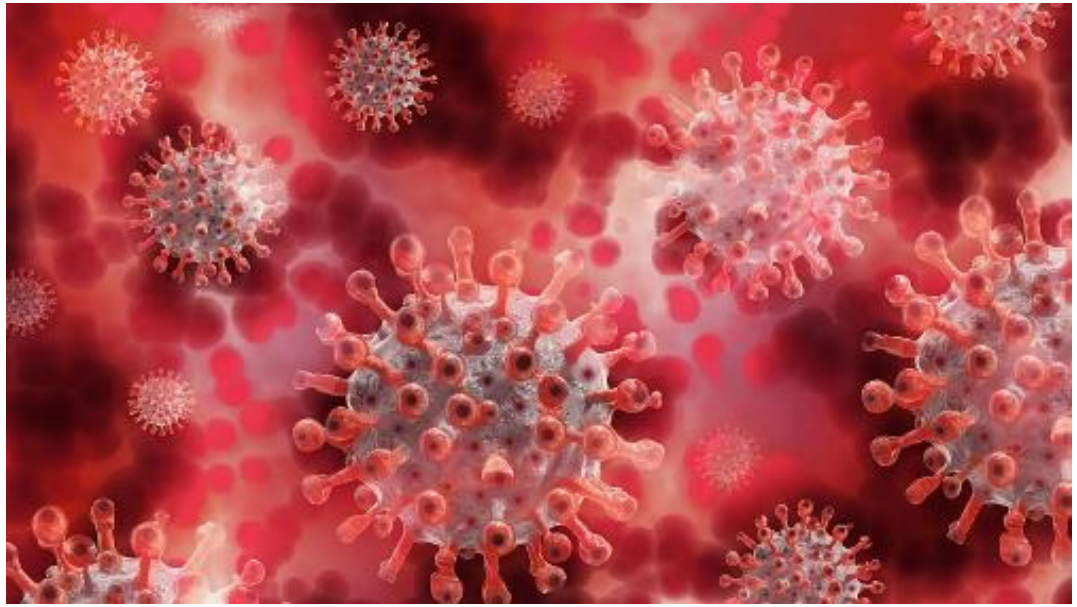
Table 1
Bat species carrying different emerging and reemerging viruses.

Virus	Bats
Marburg	*Rousettus aegyptiacus*
Ebolavirus	*Hypsignathus monstrosus, Epomops franqueti, Myonycteris torquata.; Chaerephon pumilus, Mops condylurus; E. helvum; Epomophorus gambianus, Nanonycteris veldkampii, Epomops buettikoferi*
Nipah	*Pteropus hypomelanus, Pteropus vampyrus, Pteropus lylei*
Influenza A	*Sturnina lilium, Artibeus planirostris, A. lituratus, Artibeus jamaicensis,Rousettus aegyptiacus*
SARS	*Rhinolophus sinicus, Hipposideros, Chaerophon, Rhinolophus pusillus, R. pearsoni, R. macrotis, R. ferrumequinum, Pteropus alecto, Dobsonia moluccensis, Scotophilus heathii*
MERS	*Taphozous perforatus, Rhinopoma hardwickii, Pipistrellus kuhlii*
Hendra	*Pteropus alecto, P. conspicillatus*
Lyssavirus	*Desmodus rotundus, Myotis blythii, Pteropus spp, Saccolaimus flaviventris, Myotis nattereri, Nycteris thebaica, Eptesicus serotinus, Myotis daubentonii, Myotis dasycneme, Pteropus medius, Murina leucogaster, Myotis mystacinus, Myotis brandtii, Epomophorus wahlbergi, Rousettus aegyptiacus, Eidolon helvum, Miniopterus schreibersii, Hipposideros vittatus, Miniopterus schreibersii, Pipistrellus abramus*
Rabies	*Desmodus rotundus, Diaemus youngi, Diphylla ecaudata*
Dengue	*Desmodus rotundus, Artibeus jamaicensis, Carollia brevicauda, Myotis nigricans, Glossophaga soricina, Artibeus literatus, Artibeus planirostris, Carollia perspicillata, Myotis lucifugus, Artibeus intermedius, Molossus sinaloae, Molossus pretiosus, Rhogeessa bickhami, Molossus rufus, Eumops glaucinus, Myotis nigricans, Pteronotus parnellii, Natalus stramineus, Artibejus jamaicensis, Artibeus spp., Uroderma spp., Molossus spp., Chaerephon pumilus, Mops condylurus, Anoura geoffroyi, Artibeus cinereus, Artibeus literatus, Carollia perspicillata, Molossus ater, Molossus molossus, Phyllostomus hastatus, Pteronotus davyi, Pteronotus parnellii, Sturnira spp., Pteropus gouldii, Pteropus giganteus, Glossophaga soricina, Artibeus intermedius, Molossus sinaloae, Rhogeessa io, Molossus pretiosus, Balantiopteryx plicata, Molossus rufus, Rhogeessa bickhami, Epomophorus labiatus.*
Equine Encephalitis	*Artibeus intermedius, Artibeus jamaicensis, Artibeus literatus, Artibeus turpis, Glossophaga soricina, Rhynchonycteris naso, Sturnira lilium, Carollia perspicillata, Phyllostomus hastatus, Vampyrops helleri, Eptesicus fuscus, Myotis lucifugus, Myotis keenii*
Madariaga	*Carollia castanea, Phyllostomus discolor, Carollia perspicillata, Phyllostomus hastatus*

Table 1. Viruses of European Bats.

Virus Family	Genus	Bat Species	Origin	Detection
Adenoviridae	Mastadenovirus	*Pipistrellus nathusii* *Pipistrellus pipistrellus*	Germany	Isolation PCR
		Nyctalus noctula *Rhinolophus ferrumequinum*	Hungary	PCR
		Myotis myotis	Germany	PCR
Astroviridae	Mamastrovirus	*Myotis myotis*	Germany	PCR
	Mamastrovirus	*Myotis daubentonii* *Myotis bechsteinii* *Plecotus auritus*	Hungary	PCR
Borna-viridae	unclassified	*Myotis nattereri* *Pipistrellus pipistrellus*	France	Metagenomics
Bunyaviridae	Phlebovirus Toscana virus	*Pipistrellus kuhlii*	Italy	Isolation
	Nairovirus	*Myotis mystacinus*	France	Metagenomics

Virus Family	Genus	Bat Species	Origin	Detection
Coronaviridae	Alphacoronavirus	*Myotis bechsteinii*	Germany	PCR
		Myotis dasycneme		
		Myotis daubentonii		
		Pipistrellus nathusii		
		Pipistrellus pygmaeus		
		Myotis blythii	Spain	PCR
		Myotis daubentonii		
		Myotis myotis		
		Miniopterus schreibersii		
		Nyctalus lasiopterus		
		Pipistrellus kuhlii		
		Pipistrellus sp.		
		Hypsugo savii	Italy	PCR
		Nyctalus noctula		
		Pipistrellus kuhlii		
		Pipistrellus spp.		
		Rhinolophus hipposideros		
		Miniopterus schreibersii	Germany	PCR
		Nyctalus leisleri		
		Rhinolophus euryale		
		Rhinolophus blasii		
		Rhinolophus ferrumequinum		
		Rhinolophus mehelyi		
		Myotis daubentonii	United Kingdom	PCR
		Myotis nattereri		
		Miniopterus schreibersii	Bulgaria Germany	PCR
		Nyctalus leisleri		
		Myotis daubentonii		
		Rhinolophus euryale		
		Rhinolophus blasii		
		Rhinolophus ferrumequinum		



BATS CAN HAVE RABIES
NEVER TOUCH A BAT

Did you know…

- Rabies is a deadly disease transmitted through the saliva of an infected animal
- Not all bats have rabies but most human cases of rabies in the US are caused by bats
- Bat bites often leave small minor wounds but still require prompt medical attention

Rabies is a preventable disease

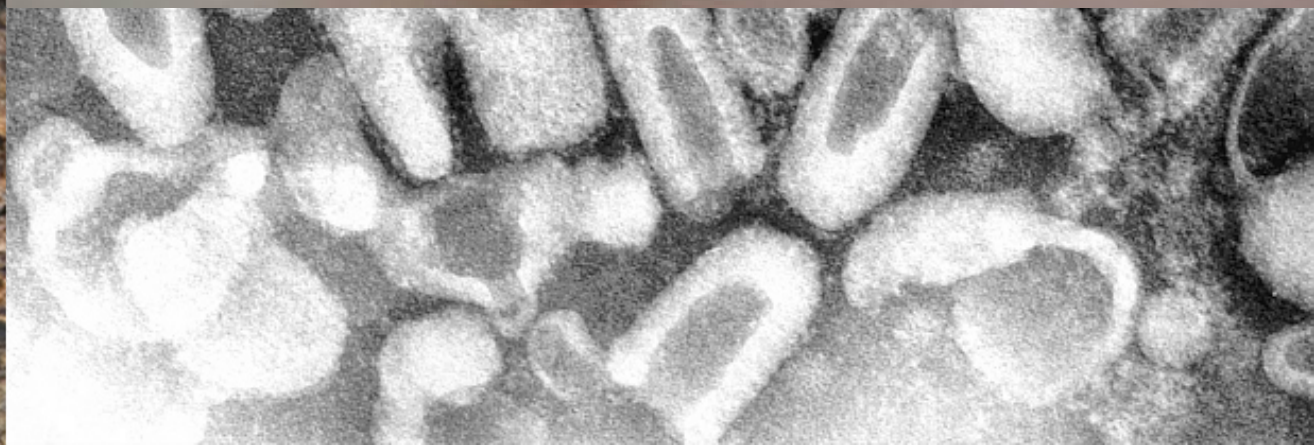
- Bat-proof homes and buildings by eliminating open areas where bats may enter
- If you find a bat in your home call the health department so it may be tested for rabies
- If bitten, wash the wound with soap and water and seek medical care immediately

For more information, visit: www.cdc.gov/rabies/bats

ZACH JONES MEMORIAL FUND

WORLD RABIES DAY SEPTEMBER 28

WorldRabiesDay.Org



Cuatro niños mueren en Brasil por el virus de la rabia tras ser mordidos por murciélagos

Investigan la causa de la **muerte** de cuatro menores de edad que fueron mordidos por murciélagos. Hay diez casos sospechosos de **rabia**. Todos presentan cuadros similares: fiebre, ahogo, dolores de cabeza, convulsiones y dificultad al tragar entre otros.

PUBLIC HEALTH

Bats In The Bedroom Can Spread Rabies Without An Obvious Bite

LA VANGUARDIA

Muere el hombre que contrajo la rabia por un mordisco de murciélago

Muere canadiense infectado de virus de la rabia por un murciélago

Por Paloma Martínez |
@PaLoMartinezzz
amlat@rcinet.ca
Publicado el martes 16 de julio de 2019 a las 10:48
Actualizado el martes 16 de julio de 2019 a las 12:19

Un hombre de 21 años de la provincia de Columbia-Británica murió de una infección por el virus de la rabia, contraída al entrar en contacto con un murciélago en la isla de Vancouver confirmaron el lunes las autoridades sanitarias.

SALUD PÚBLICA ›

Atendidas dos personas en Huelva y Valladolid tras ser mordidas por murciélagos con la rabia

La enfermedad, mortal cuando se desarrolla, es evitable si se acude al sistema sanitario tras los ataques

ORIOL GÜELL

Barcelona - 13 SEP 2018 - 20:24 CEST

VIRUS DE LA RABIA

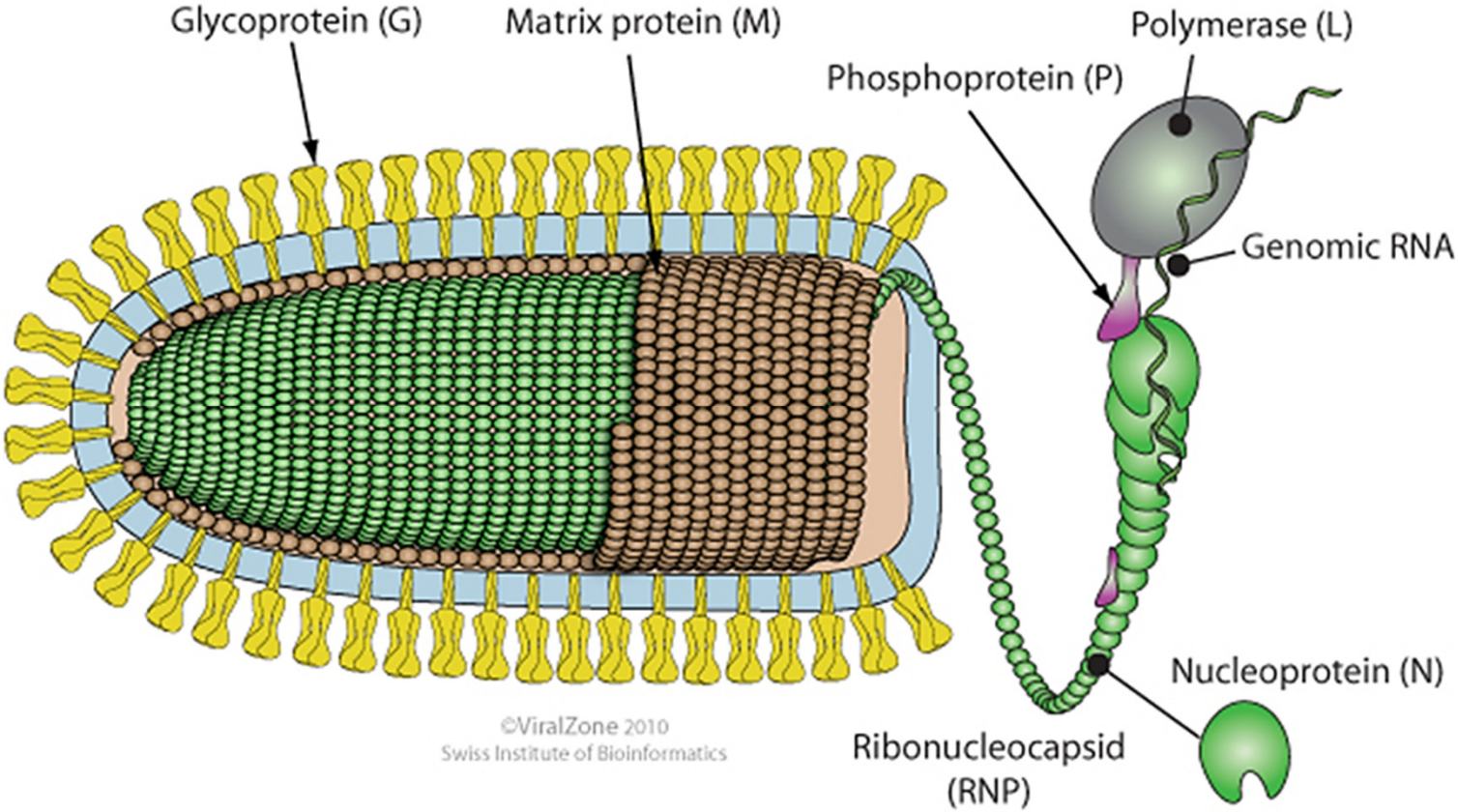
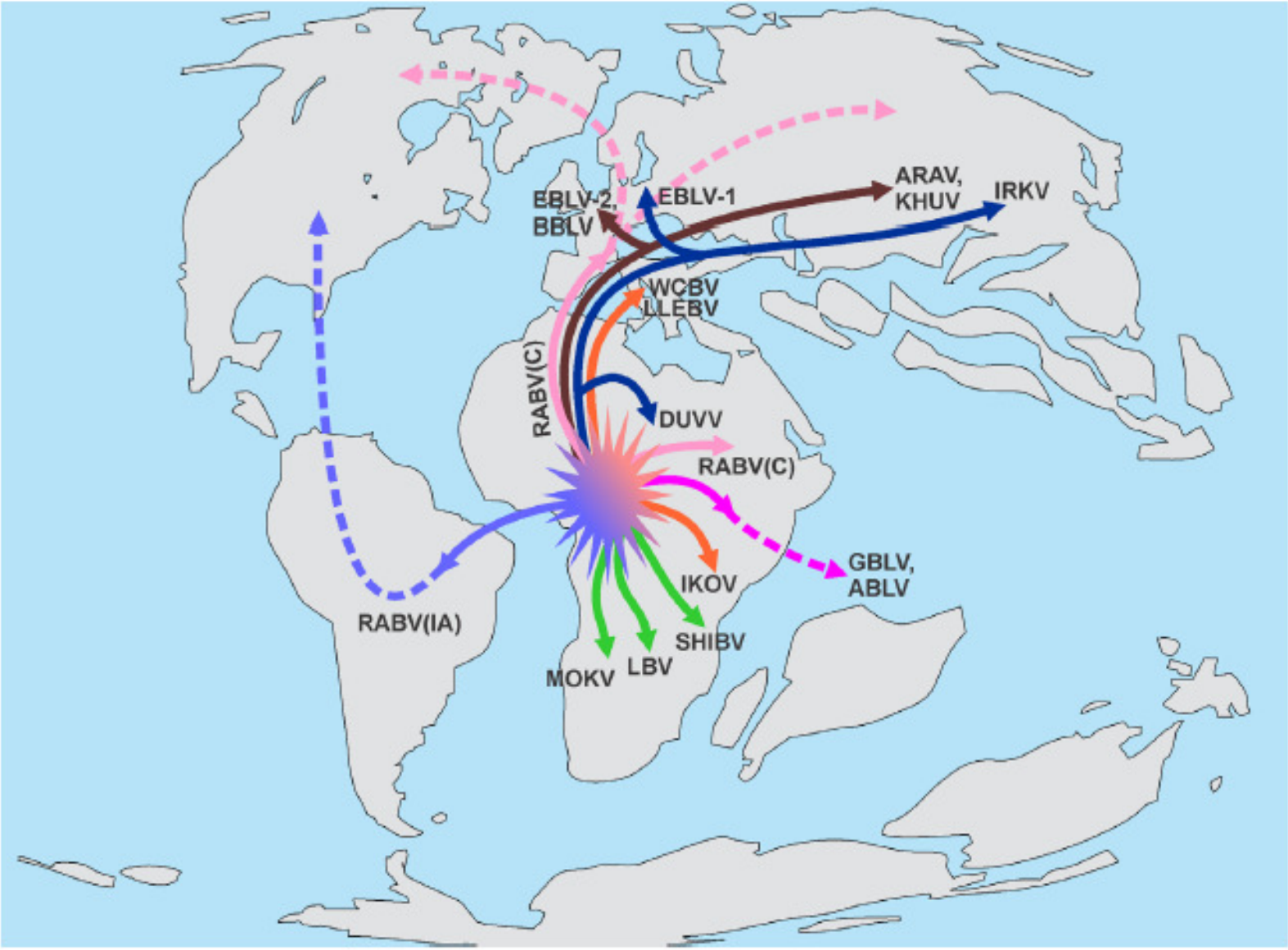
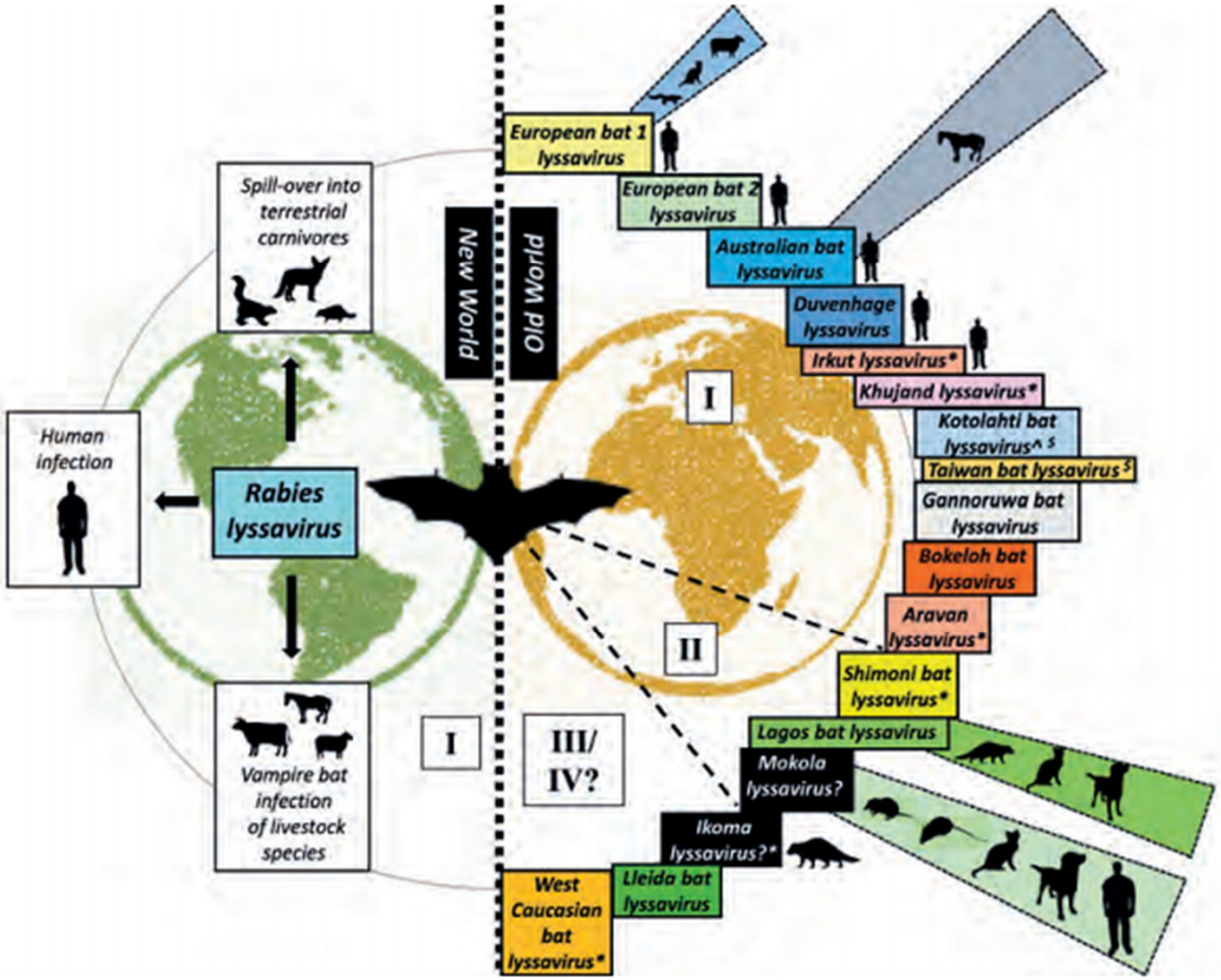


Tabla 1. Clasificación taxonómica actual de los *Lyssavirus*.

Release	Level
2017	Genus Mononegavirales->Rhabdoviridae->Lyssavirus
2017	Species Mononegavirales->Rhabdoviridae->Lyssavirus->Aravan lyssavirus
2017	Species Mononegavirales->Rhabdoviridae->Lyssavirus->Australian bat lyssavirus
2017	Species Mononegavirales->Rhabdoviridae->Lyssavirus->Bokeloh bat lyssavirus
2017	Species Mononegavirales->Rhabdoviridae->Lyssavirus->Duvenhage lyssavirus
2017	Species Mononegavirales->Rhabdoviridae->Lyssavirus->European bat 1 lyssavirus
2017	Species Mononegavirales->Rhabdoviridae->Lyssavirus->European bat 2 lyssavirus
2017	Species Mononegavirales->Rhabdoviridae->Lyssavirus->Gannoruwa bat lyssavirus
2017	Species Mononegavirales->Rhabdoviridae->Lyssavirus->Ikoma lyssavirus
2017	Species Mononegavirales->Rhabdoviridae->Lyssavirus->Irkut lyssavirus
2017	Species Mononegavirales->Rhabdoviridae->Lyssavirus->Khujand lyssavirus
2017	Species Mononegavirales->Rhabdoviridae->Lyssavirus->Lagos bat lyssavirus
2017	Species Mononegavirales->Rhabdoviridae->Lyssavirus->Lleida bat lyssavirus
2017	Species Mononegavirales->Rhabdoviridae->Lyssavirus->Mokola lyssavirus
2017	Species Mononegavirales->Rhabdoviridae->Lyssavirus->Rabies lyssavirus
2017	Species Mononegavirales->Rhabdoviridae->Lyssavirus->Shimoni bat lyssavirus
2017	Species Mononegavirales->Rhabdoviridae->Lyssavirus->West Caucasian bat lyssavirus


EBLV-2,
BBLV
EBLV-1
ARAV,
KHUV
IRKV
WCBV
LLEBV
RABV(C)
DUVV
RABV(C)
GBLV,
ABLV
IKOV
SHIBV
LBV
MOKV
RABV(IA)

Diversity of bat associated lyssaviruses



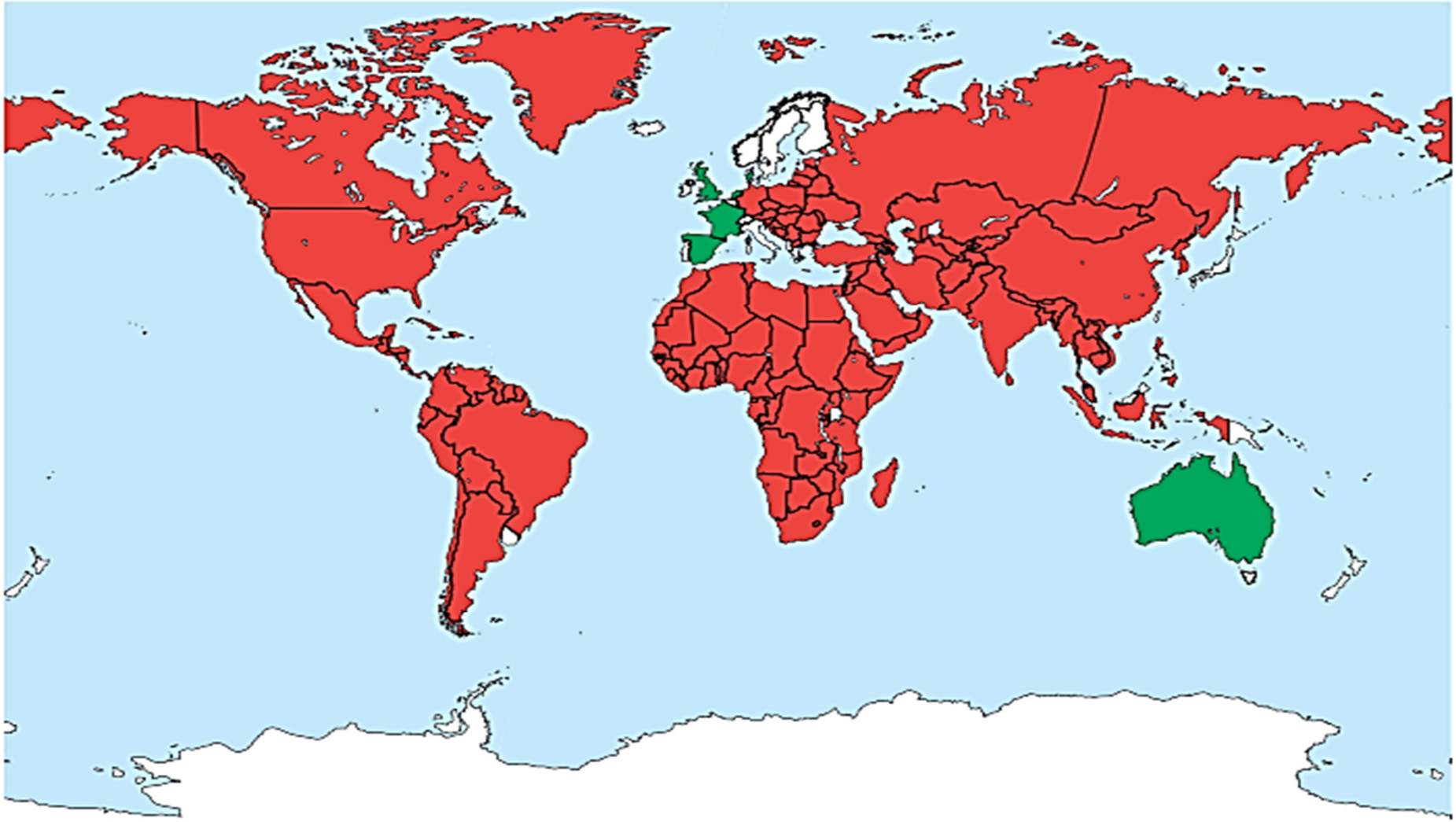


Figure 1: **Global distribution of lyssaviruses**

Distribution of rabies virus (red). Areas where rabies-related viruses only, not classic rabies genotype 1, are documented are classified by the WHO as "rabies-free" (green). White=rabies-free.

FILOGRUPOS

Table 1 | **The *Lyssavirus* genus**

Species	Virus	Countries of virus isolation*	Most common reservoir based on virus detection
Phylogroup I			
Rabies lyssavirus	Rabies virus (RABV)‡	Global	All mammals
Aravan lyssavirus	Aravan virus (ARAV)	Kyrgyzstan	Bats
Australian bat lyssavirus	Australian bat lyssavirus (ABLV)‡	Australia	Bats
Bokeloh bat lyssavirus	Bokeloh bat lyssavirus (BBLV)	France and Germany	Bats
Duvenhage lyssavirus	Duvenhage virus (DUVV)‡	Kenya and South Africa	Bats
European bat 1 lyssavirus	European bat lyssavirus 1 (EBLV-1)‡	Belgium, Denmark, France, Germany, the Netherlands, Poland, Russia, Slovakia, Spain and Ukraine	Bats
European bat 2 lyssavirus	European bat lyssavirus 2 (EBLV-2)‡	Denmark, Finland, France, Germany, the Netherlands, Norway, Switzerland and the United Kingdom	Bats
Gannoruwa bat lyssavirus	Gannoruwa bat lyssavirus (GBLV)	Sri Lanka	Bats
Irkut lyssavirus	Irkut virus (IRKV)‡	China and Russia	Bats
Khujand lyssavirus	Khujand virus (KHUV)	Tajikistan	Bats
Phylogroup II			
Lagos bat lyssavirus	Lagos bat virus (LBV)	Central African Republic, Ethiopia, France§, Ghana, Nigeria, Senegal, South Africa and Zimbabwe	Bats
Mokola lyssavirus	Mokola virus (MOKV)‡	Cameroon, Central African Republic, Ethiopia, Nigeria, South Africa and Zimbabwe	Rodents and domestic animals
Shimoni bat lyssavirus	Shimoni bat virus (SHIBV)	Kenya	Bats
Phylogroup III			
Ikoma lyssavirus	Ikoma lyssavirus (IKOV)‖	Tanzania	African civet
Lleida bat lyssavirus	Lleida bat lyssavirus (LLEBV)‖	Spain	Bats
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LLEBV

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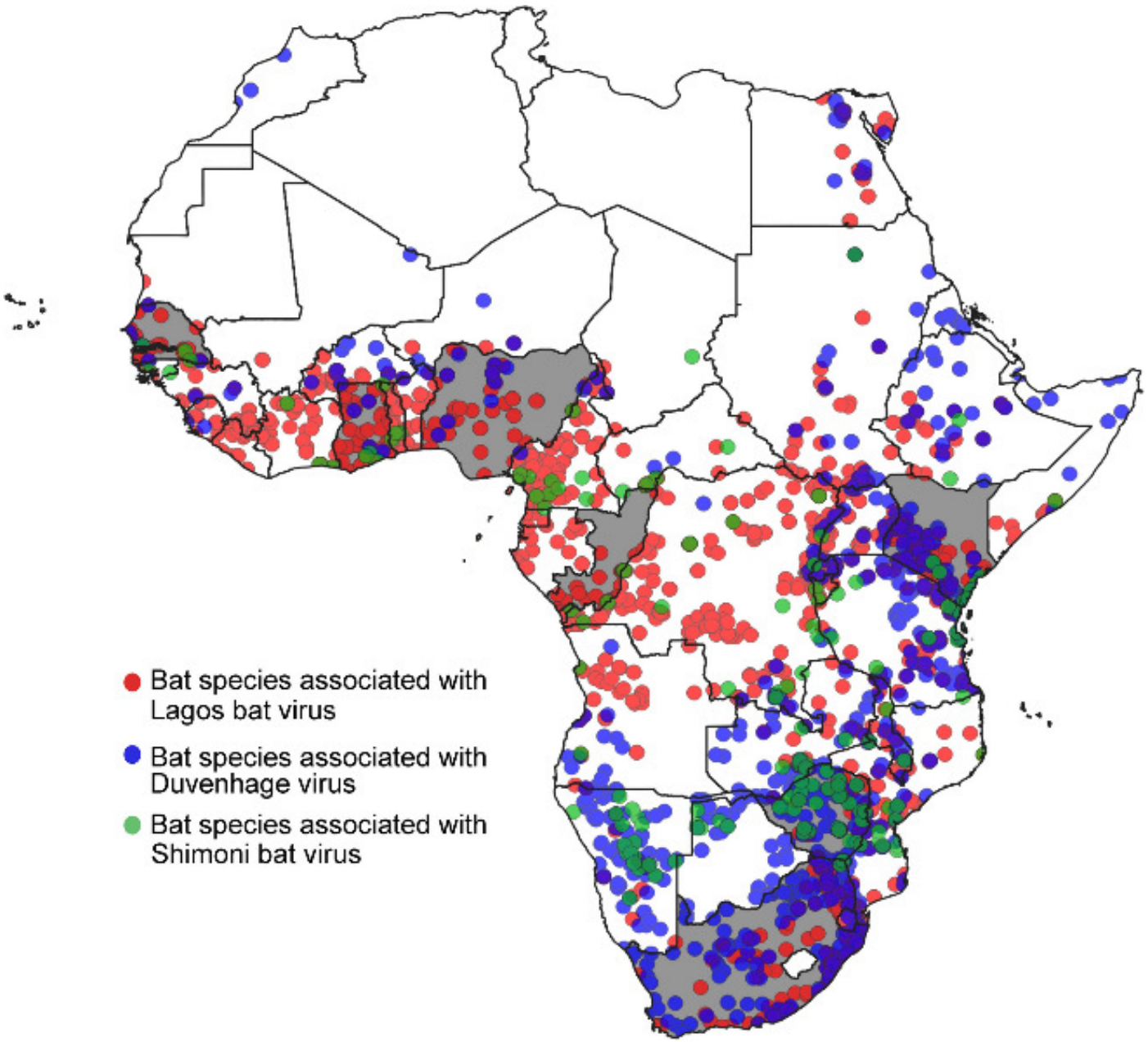
Bat species associated with Lagos bat virus
Bat species associated with Duvenhage virus
Bat species associated with Shimoni bat virus

viruses

MDPI

Perspective

Current Rabies Vaccines Do Not Confer Protective Immunity against Divergent Lyssaviruses Circulating in Europe

Juan E. Echevarría [1,2,*], Ashley C. Banyard [3,4,5], Lorraine M. McElhinney [3] and Anthony R. Fooks [3,4,6]

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2 CIBER de Epidemiología y Salud Pública (CIBERESP), 28029 Madrid, Spain
3 Department of Virology, Animal and Plant Health Agency (APHA), Addlestone, Surrey KT15 3NB, UK; ashley.banyard@apha.gov.uk (A.C.B.); Lorraine.McElhinney@apha.gov.uk (L.M.M.); Tony.Fooks@apha.gov.uk (A.R.F.)
4 Institute for Infection and Immunity, St. George's Hospital Medical School, University of London, London SW17 0RE, UK
5 School of Life Sciences, University of West Sussex, Falmer, West Sussex BN1 9QG, UK
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check for updates

Lyssavirus Europa

EBLV-1

EBLV-2

FILOGRUPOS

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West Caucasian bat lyssavirus	West Caucasian bat virus (WCBV)	Russia	Bats

Species	Females		Males		Total	
	No. of samples collected	No. (%) of positive samples	No. of samples collected	No. (%) of positive samples	No. of samples collected	No. (%) of positive samples
Eptesicus serotinus	109	19 (17.4)	7	0 (0.0)	116	19 (16.4)
Hypsugo savii	6	0 (0.0)	16	5 (31.2)	22	5 (22.7)
Myotis blythii	10	2 (20.0)	56	12 (21.4)	66	14 (21.2)
Myotis capaccinii	97	13 (13.4)	48	6 (12.5)	145	19 (13.1)
Myotis daubentonii	2	0 (0.0)	32	4 (12.5)	34	4 (11.8)
Myotis emarginatus	7	0 (0.0)	1	0 (0.0)	8	0 (0.0)
Myotis escalerai	34	5 (14.7)	9	1 (11.1)	43	6 (13.9)
Myotis myotis	544	225 (41.4)	128	45 (35.1)	672	270 (40.2)
Nyctalus leisleri	0	0 (0.0)	3	0 (0.0)	3	0 (0.0)
Plecotus auritus	0	0 (0.0)	1	0 (0.0)	1	0 (0.0)
Plecotus austriacus	76	12 (15.8)	59	6 (10.2)	135	18 (13)
Pipistrellus kuhlii	7	3 (42.8)	9	0 (0.0)	16	3 (18,8)
Pipistrellus nathusii	0	0 (0.0)	1	0 (0.0)	1	0 (0.0)
Pipistrellus pipistrellus	20	3 (15.0)	25	2 (8.0)	45	5 (11.1)
Pipistrellus pygmaeus	2	0 (0.0)	4	0 (0.0)	6	0 (0.0)
Miniopterus schreibersii	322	41 (12.7)	219	25 (11.4)	541	66 (12.2)
Rhinolophus euryale	0	0 (0.0)	2	0 (0.0)	2	0 (0.0)
Rhinolophus ferrumequinum	217	24 (11.1)	79	10 (12.7)	296	34 (11.5)
Rhinolophus hipposideros	2	0 (0.0)	1	0 (0.0)	3	0 (0.0)
Tadarida teniotis	117	21 (17.9)	121	11 (9.1)	238	32 (13.4)
Total	1,572	368 (23.4)	821	127 (15.5)	2,393	495 (20.7)

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Pipistrellus nathusii	0	[illegible]	[illegible]	[illegible] (0.0)	1	0 (0.0)
Pipistrellus pipistrellus	20	[illegible]	[illegible]	[illegible] (8.0)	45	5 (11.1)
Pipistrellus pygmaeus	2	[illegible]	[illegible]	[illegible] (0.0)	6	0 (0.0)
Miniopterus schreibersii	322	[illegible]	[illegible]	[illegible]5 (11.4)	541	66 (12.2)
Rhinolophus euryale	0	[illegible]	[illegible]	[illegible] (0.0)	2	0 (0.0)
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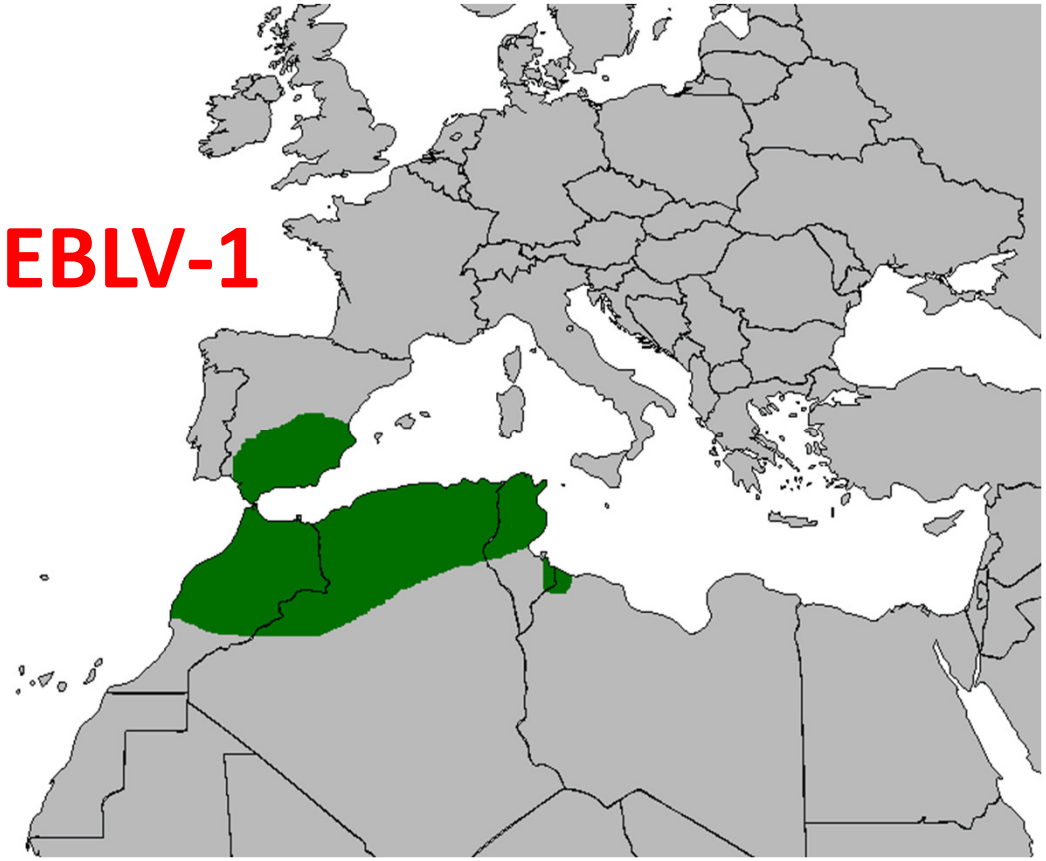
GALICIA
P. de ASTURIAS
CANTABRIA
P. VASCO
NAVARRA
LA RIOJA
CASTILLA Y LEON
ARAGÓN
CATALUÑA
MADRID
CASTILLA - LA MANCHA
EXTREMADURA
COM. VALENCIANA
ISLAS BALEARES
MURCIA
ANDALUCÍA
ISLAS CANARIAS
CEUTA
MELILLA

Eptesicus serotinus

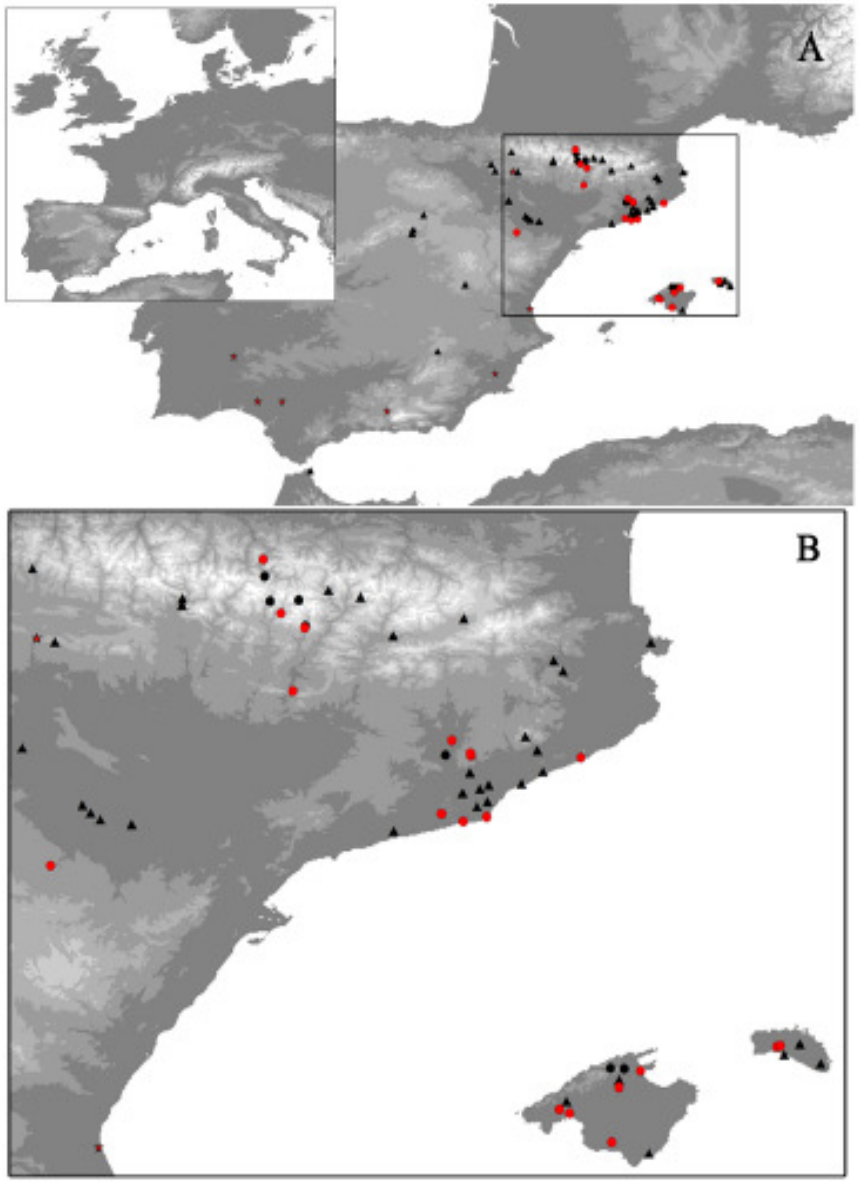
Eptesicus isabellinus

Murciélago hortelano

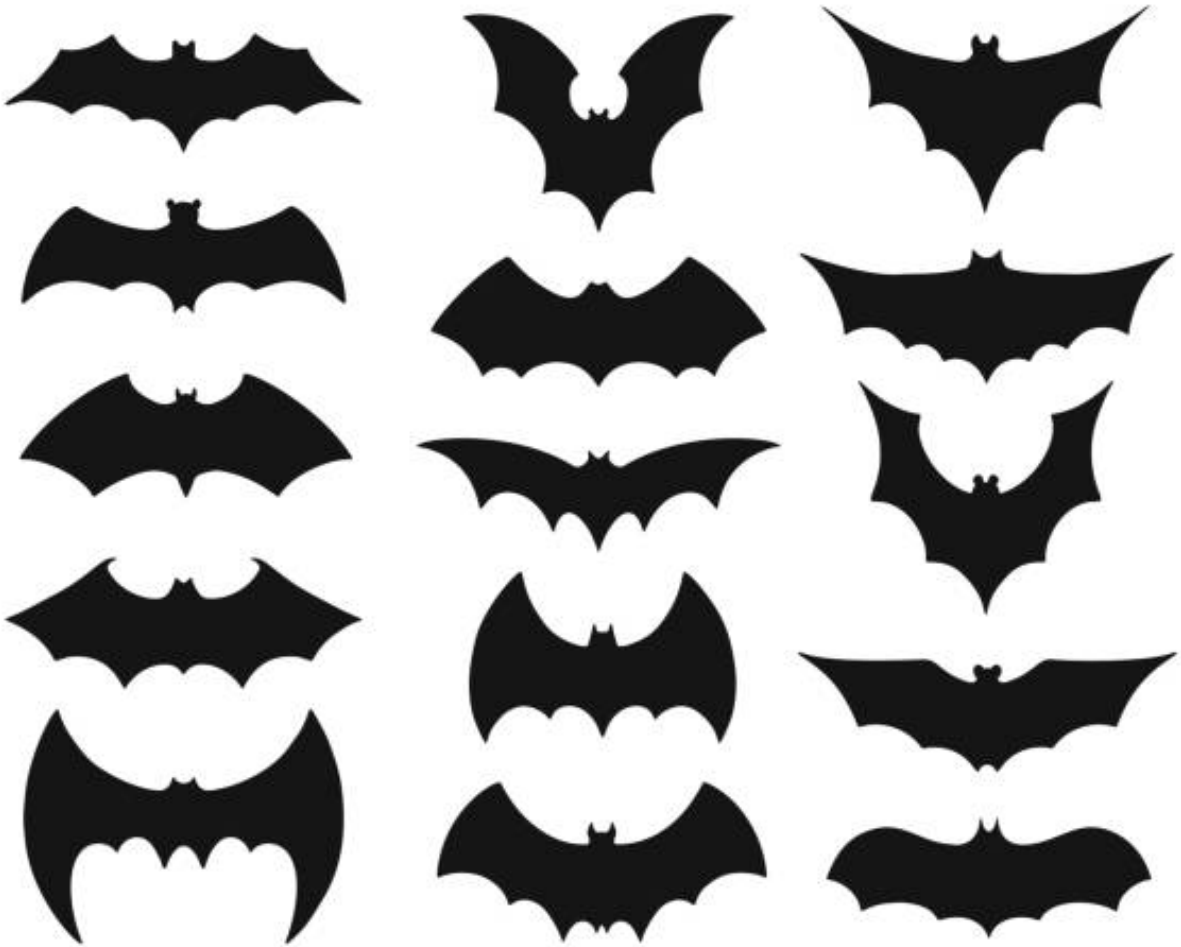
Eptesicus isabellinus
Murciélago hortelano



EBLV-1




JEAN-CLAUDE VAN DAMME
KILL
'EM ALL



Night heroes

Fascinating facts about the only flying mammal

1,300 species of bats exist in the world

70% of all bats are predators of insects and crop pests, directly contributing to enhancing crop productivity

29% of all bats depend on plants for food

141 species of plants depend in nectar-feeding bats for pollination

300 economically important plant species in Asia and Africa rely on bats for pollination and dispersal

5,000 mosquitoes can be consumed in one night by a small bat, which can reduce mosqiuito-borne disease incidence

BITS ON BATS

- Bats are the largest mammalian group after rodents
- They are diverse in their food preferences, foraging on insects, nectar, fruits, seeds, frogs, fish and small mammals
- Their feeding can range up to 20 km from their roosting sites
- They roost in large colonies on trees, tree hollows, caves, rock crevices and abandoned man made structures

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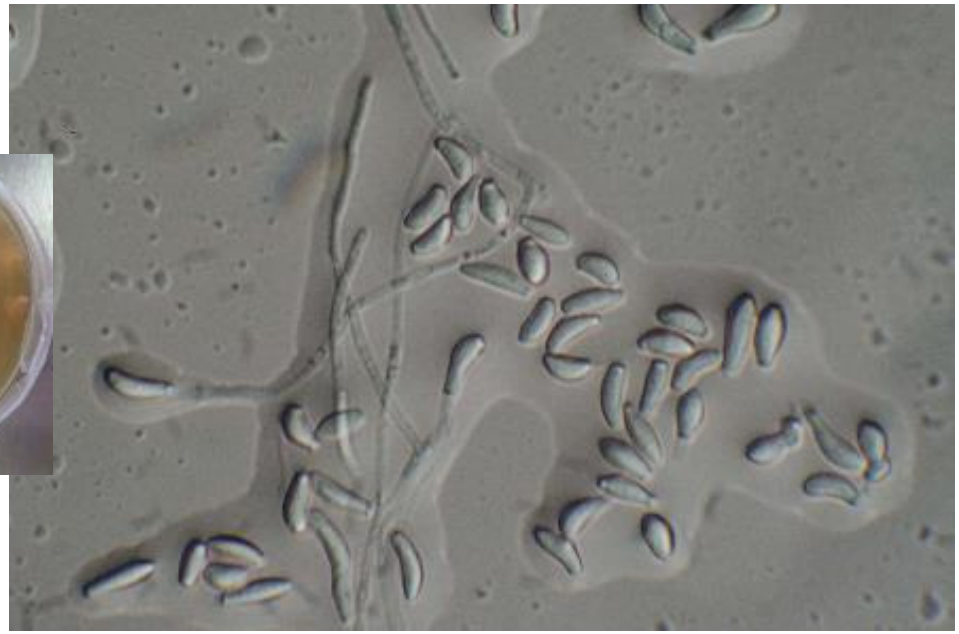
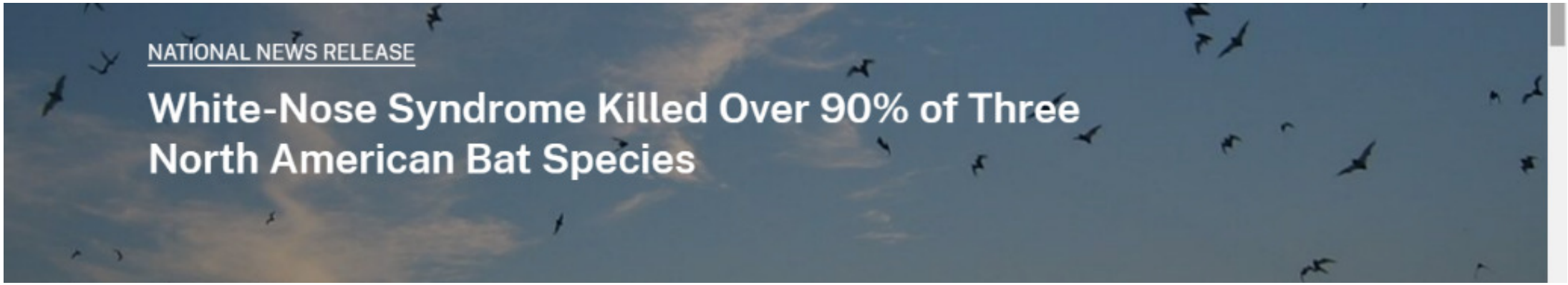
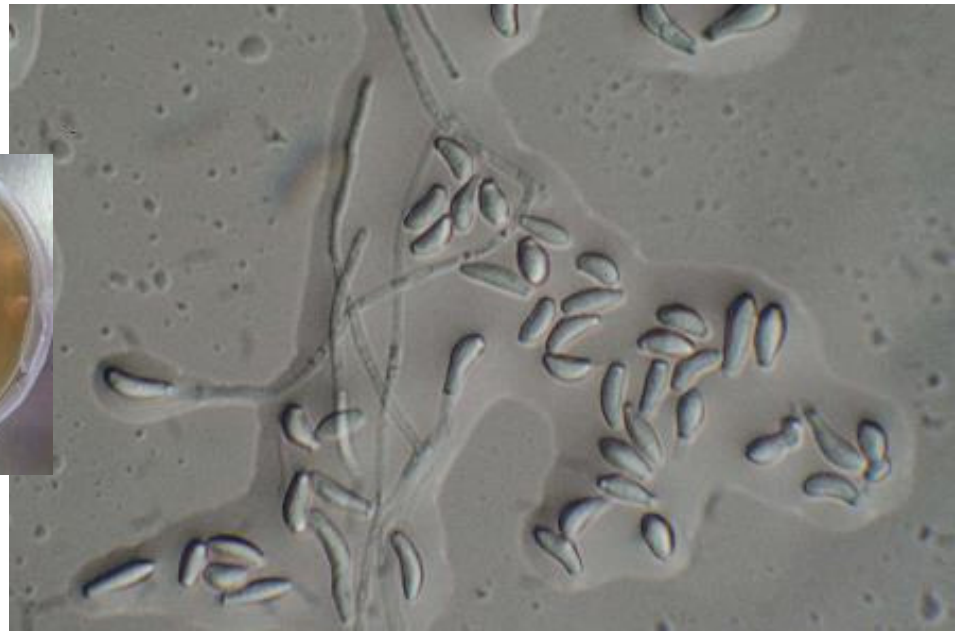



NATIONAL NEWS RELEASE
White-Nose Syndrome Killed Over 90% of Three North American Bat Species

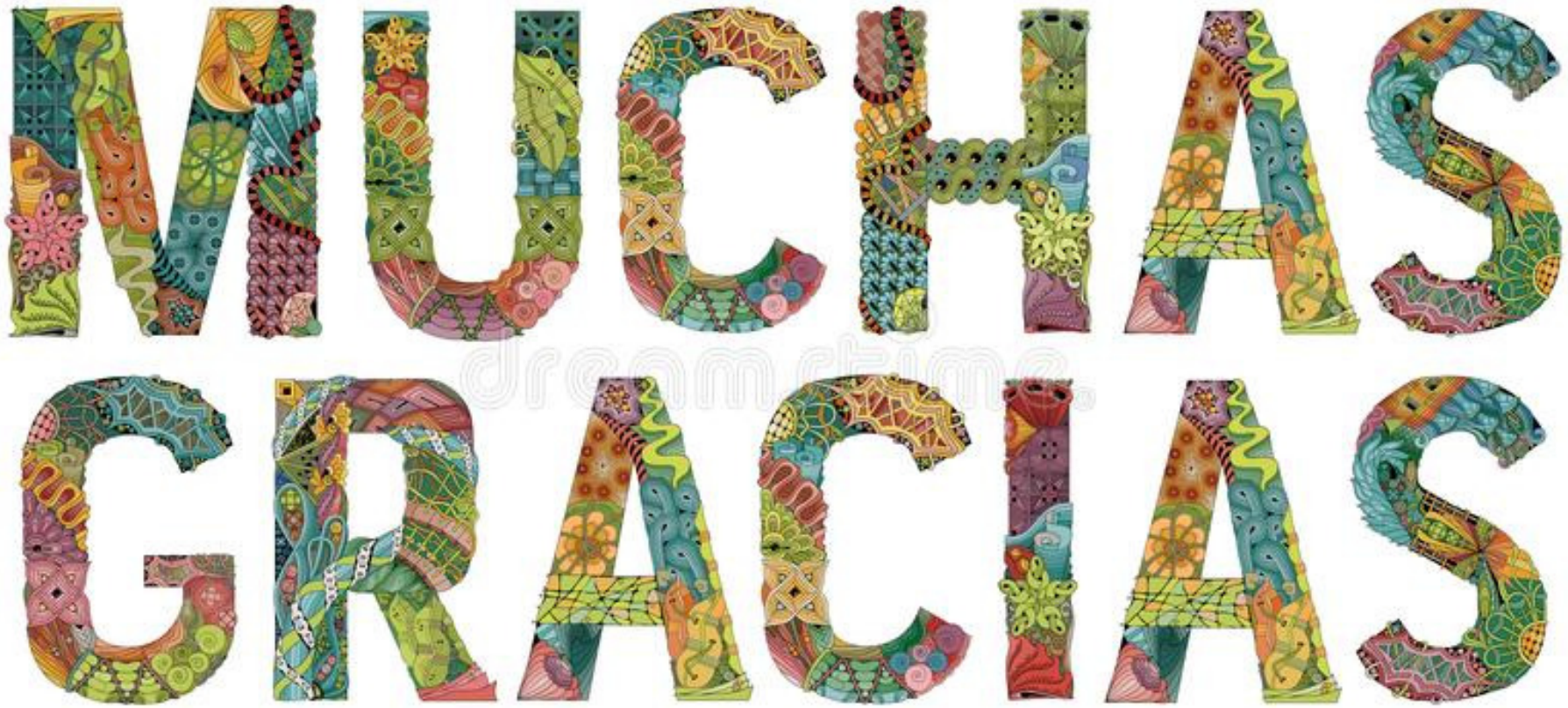


There is no known cure for white-nose syndrome, but scientists worldwide are working together to study the disease and determine how it can be controlled. Bats eat insects and are critical pest controllers. In the United States alone, bats are estimated to save farmers at least $3.7 billion per year in pest control services. The loss of so many nighttime insect predators can have cascading effects on the environment, with potential to affect forestry, agriculture and human health.


Juzguen
ustedes


Juzguen
ustedes


Ten cuidado
al juzgarme, porque
la piedra que
hoy me lanzas,
puede ser la misma
con la que tropieces
mañana.


MUCHAS
GRACIAS