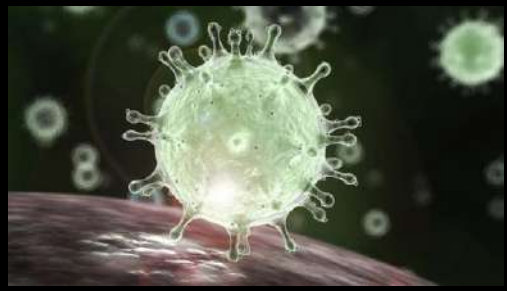


The PRAGMATICK mobile app

Gábor Földvári

INSTITUTE OF EVOLUTION

HUN REN CENTRE FOR ECOLOGICAL RESEARCH

Thanks to:

National
Laboratory
for Health Security
HUNGARY

PRAGMATICK

PREPARE-TID
THE NETWORK FOR RAPID DIAGNOSTICS

cost
EUROPEAN COOPERATION
IN SCIENCE & TECHNOLOGY

WORKING GROUPS

WORKING GROUP 1

NON-TYPICAL AND ELUSIVE TICK-BORNE PATHOGENS

Leader: Dr. Natalie RUDENKO

Co-leader: Dr. Vaclav Hönig

WORKING GROUP 2

URBAN TICK AND TICK-BORNE DISEASE HOTSPOTS, EFFECT OF ANTHROPOGENIC PRESSURE

Leader: Dr. Jolyon Medlock

Co-leader: Dr Kayleigh Hansford

WORKING GROUP 3

SPREAD AND ESTABLISHMENT OF TICKS AND TICK-BORNE PATHOGENS UNDER CHANGING CLIMATE

Leader: Dr. Georg DUSCHER

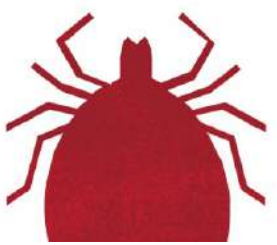
Co-leader: Dr. Laura Tomassone

WORKING GROUP 4

CITIZEN SCIENCE INVOLVEMENT IN THE DAMA PROTOCOL

Leader: Dr. Gábor FÖLDVÁRI

Co-leader: Dr. Sara Savic



HUN REN INSTITUTE OF EVOLUTION

Emerging Pathogen Ecology Research Group

Dan Brooks, PhD

Lajos Rózsa, DSc

Éva Szabó, MSc

Flóra Kulin, MSc

Kriszta Szabadi, MSc

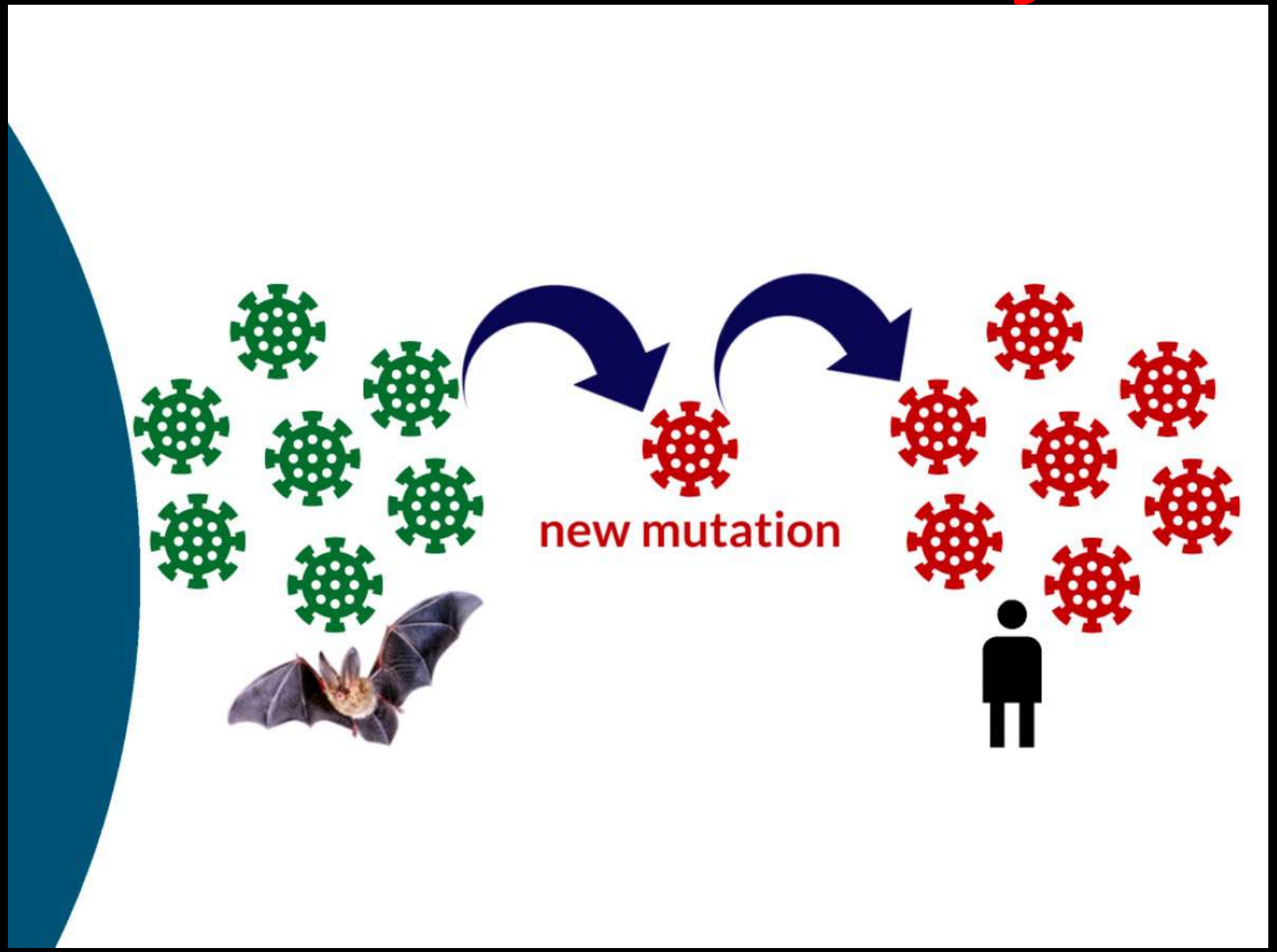
Dorottya Győrössy, MSc

Máté Miklós, PhD

Domonkos Köves, BSc

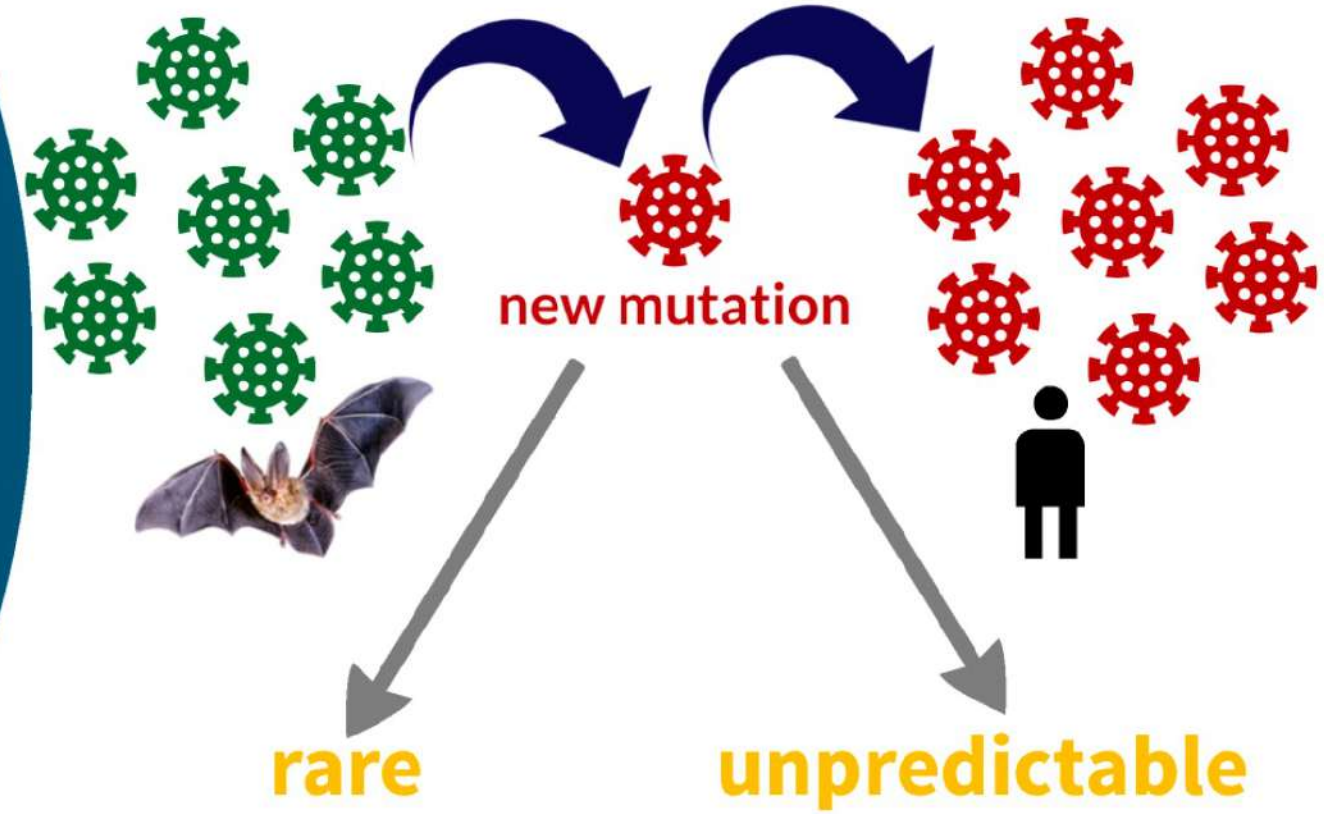
Gábor Földvári, PhD

Classical co-evolutionary model



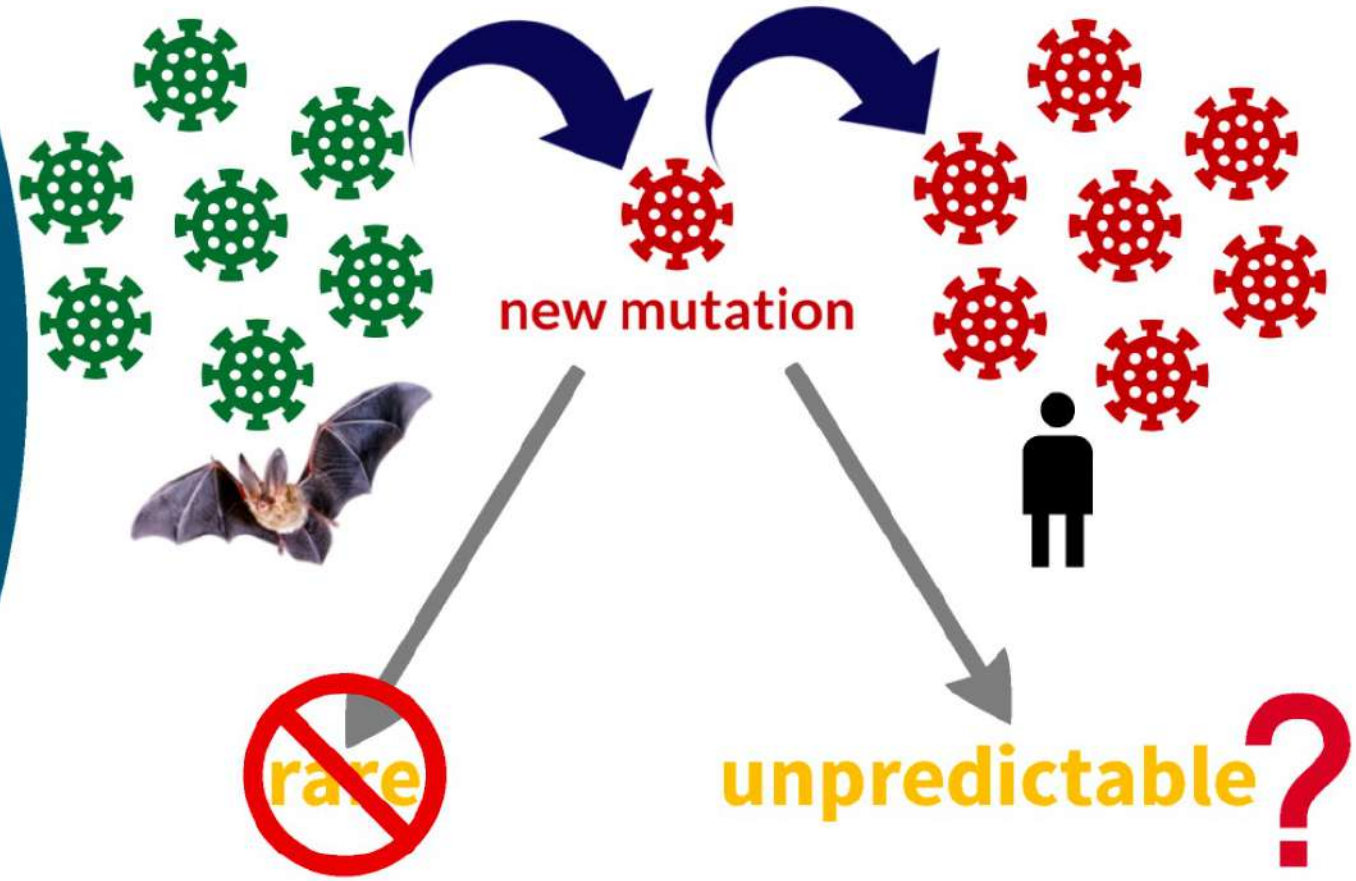
Molnár et al. *2022*

Emerging Infectious Diseases

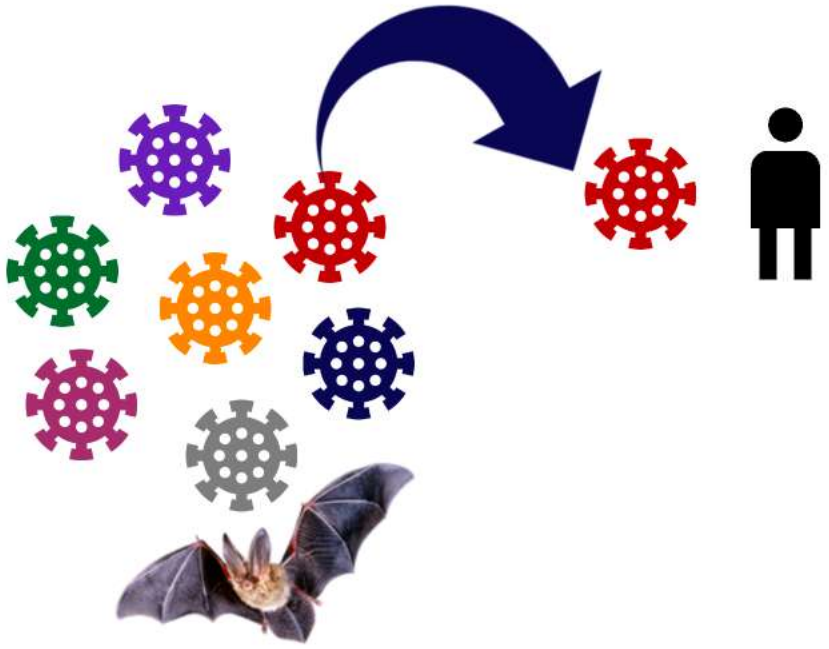


HOST- PARASITE COEVOLUTION

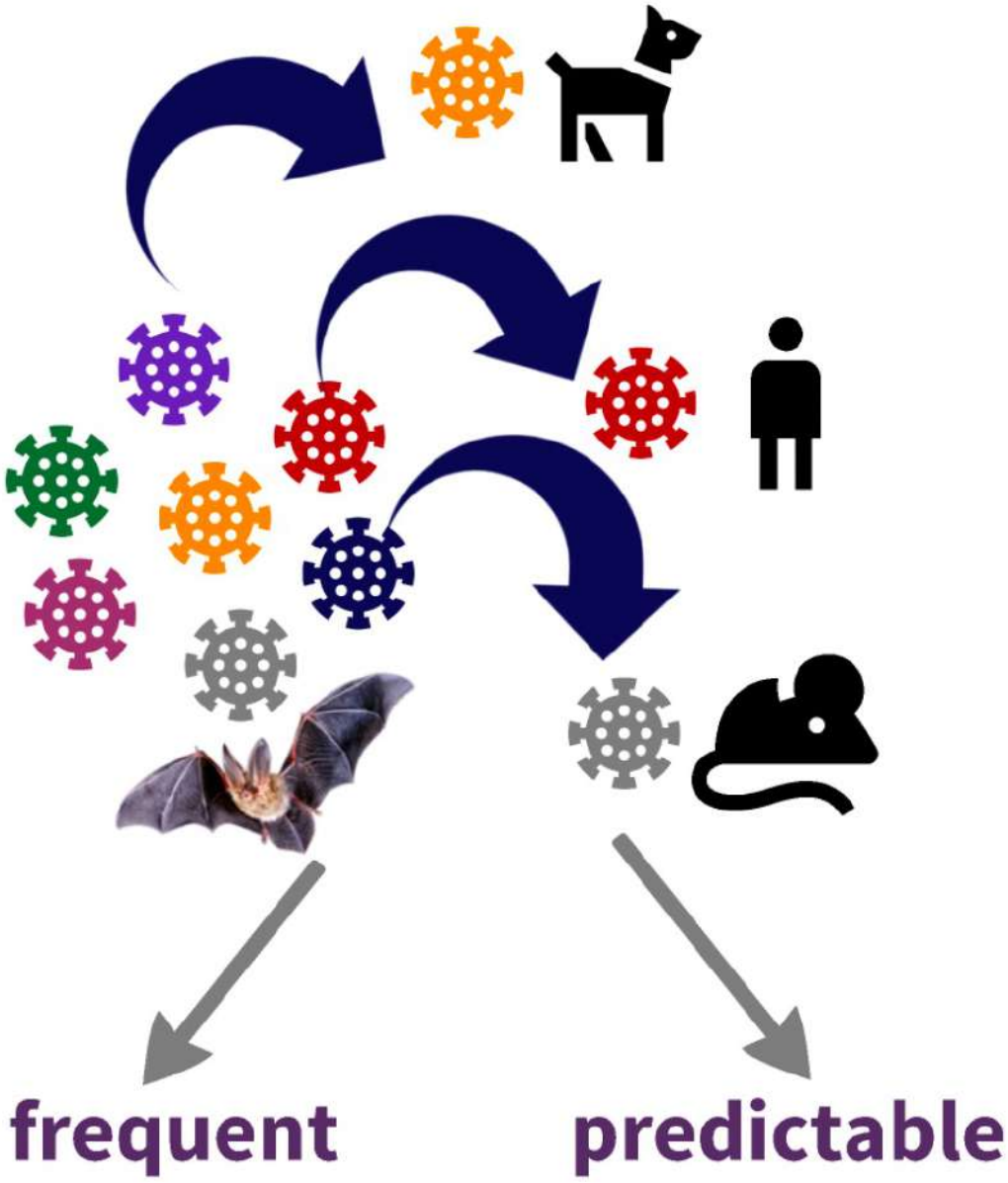
Emerging Infectious Diseases



HOST- PARASITE COEVOLUTION



STOCKHOLM PARADIGM



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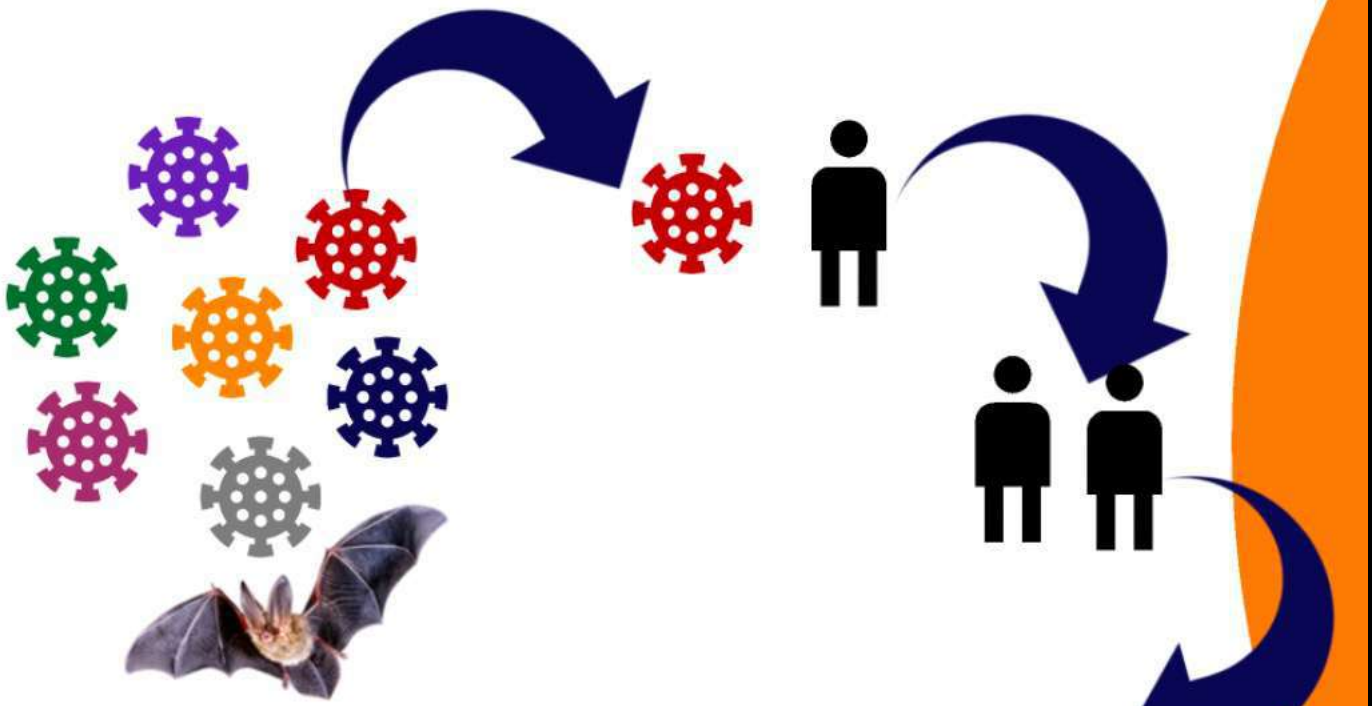
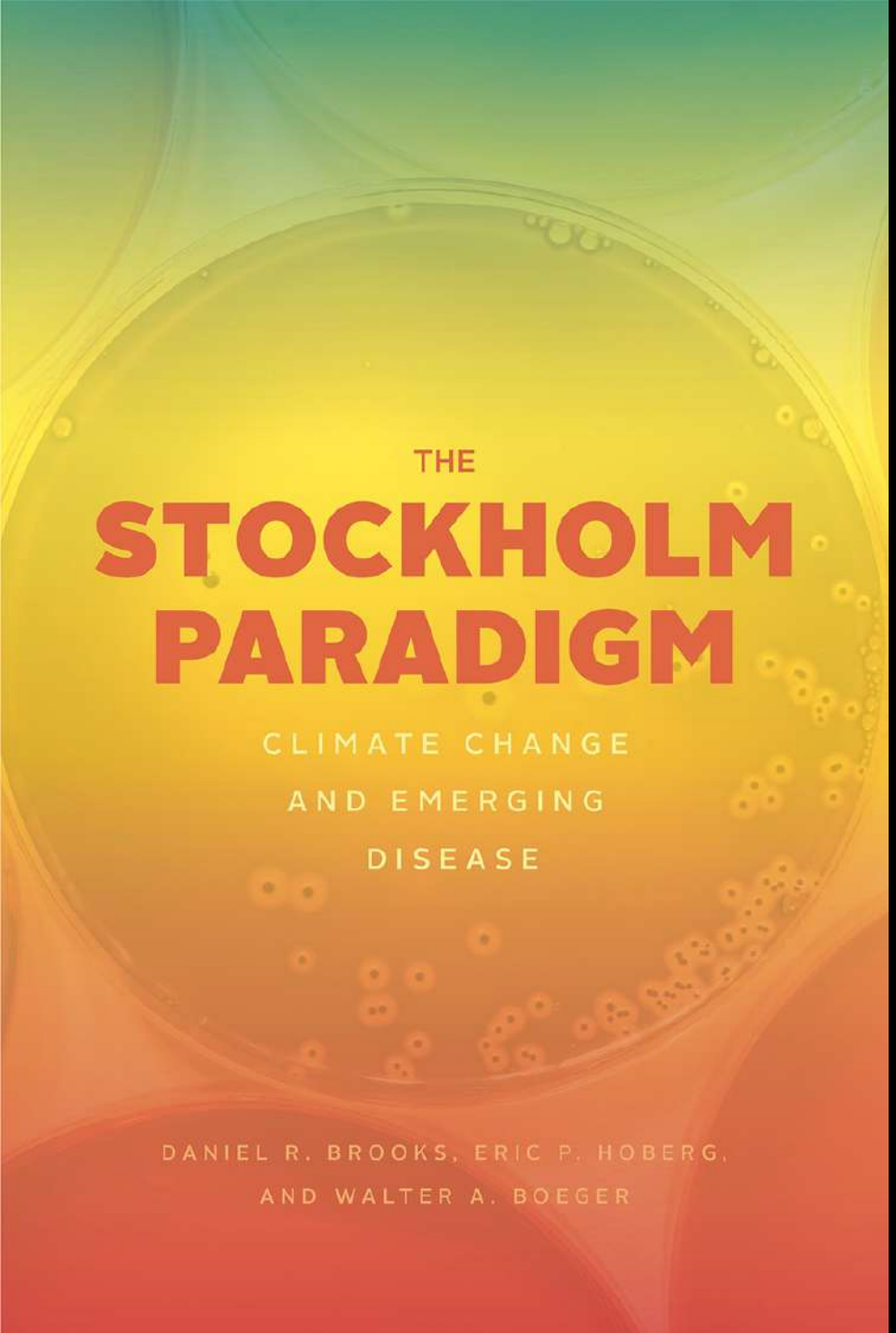
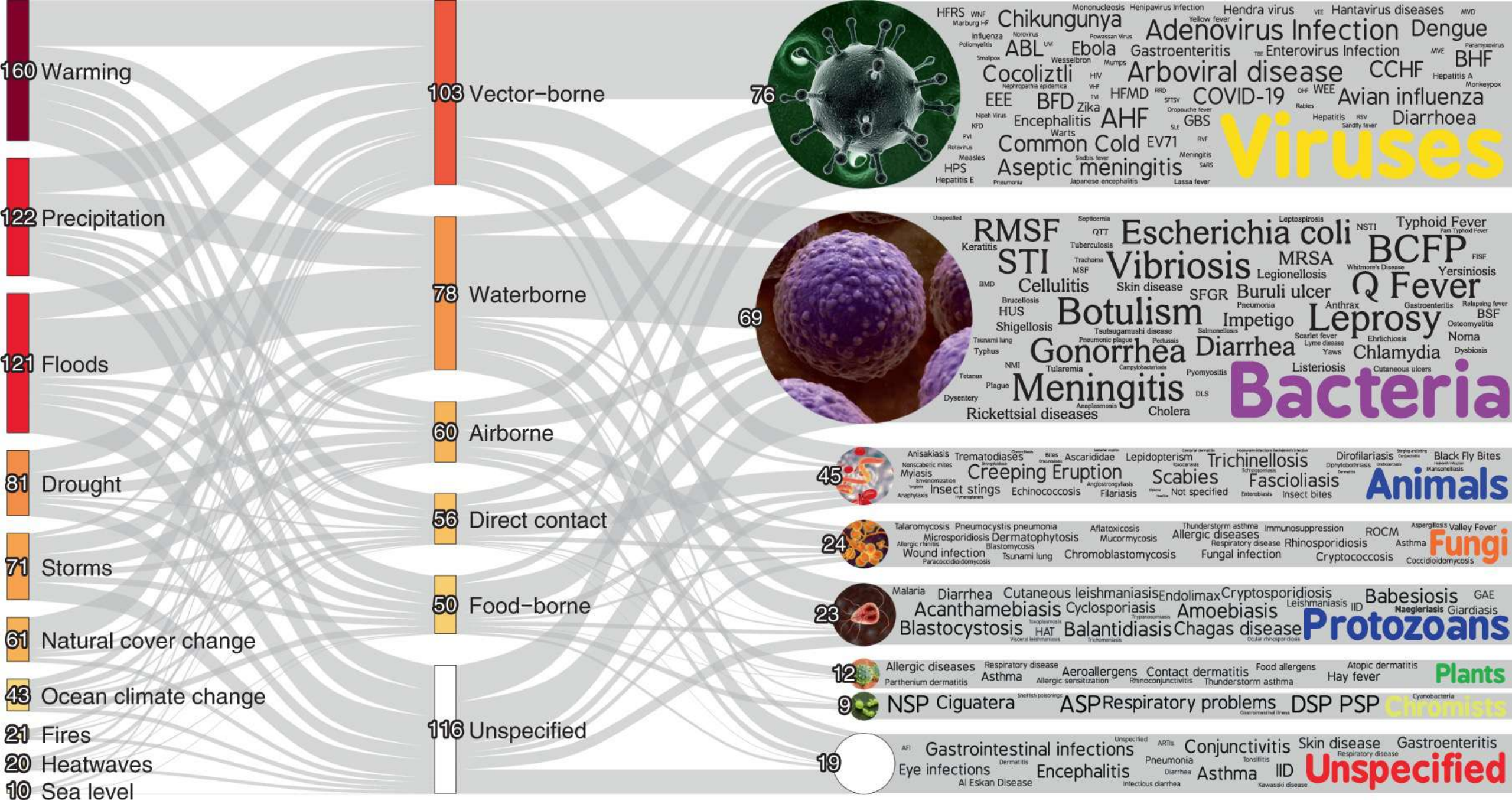


STOCKHOLM PARADIGM



- ✓ **Ecological fitting** (Janzen, 1985) ensures that there is no need for mutations for host colonization
- ✓ Climate change and habitat loss will increase migration in vectors, hosts and pathogens
- ✓ This leads to new opportunities and new EIDs
- ✓ **Emerging Infectious Diseases are the rule and not the exception**



Mora et al. **2022** *Nature Climate Change*

We can be proactive about coping with EIDs based on the Stockholm Paradigm

- ✓ Colonization of a new host requires new **opportunities** given specific pre-existing capacities
- ✓ Those pre-existing capacities are predictable, allowing us to anticipate disease emergence

DAMA protocol: *Finding them before they find us*

Document
Assess
Monitor
Act

Brooks et al. (2014) Finding them before they find us: informatics, parasites, and environments in accelerating climate change. *Comparative Parasitology* 81:155-164.

DOCUMENT

D

A

M

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A SSESS

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A

D OCUMENT

A SSESS

M ONITOR

A

DOCUMENT

ASSESS

MONITOR

ACT

MANTER: Journal of Parasite Biodiversity (ISSN 2470-8224)
Occasional Papers, Number 21, November 3, 2022
doi: 10.32873/unl.dc.manter21
https://digitalcommons.unl.edu/manter/

MANTER: Journal of Parasite Biodiversity

The DAMA Protocol, an Introduction: Finding Pathogens before They Find Us

Eric P. Hoberg,[1] Walter A. Boeger,[2] Orsolya Molnár,[3] Gábor Földvári,[4] Scott L. Gardner,[5] Alicia Juarrero,[6] Vitaliy Kharchenko,[7] Eloy Ortiz,[8] Valeria Trivellone,[9] and Daniel R. Brooks[10]

DOCUMENT

„Disease X”

A WHO tool distinguishes which diseases pose the greatest public health risk due to their epidemic potential and/or whether there is no or insufficient countermeasures.

At present, the priority diseases are:

- COVID-19
- Crimean-Congo haemorrhagic fever
- Ebola virus disease and Marburg virus disease
- Lassa fever
- Middle East respiratory syndrome coronavirus (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS)
- Nipah and henipaviral diseases
- Rift Valley fever
- Zika
- “Disease X”

World Health Organization

Assess the risk

ASSESS (the threat): phylogenetic triage

Is this a known pathogen?
Is this closely related to a known pathogen?

If NO to both, ignore but archive

If YES to either, gather or infer information about its transmission dynamics, microhabitat preferences and natural history

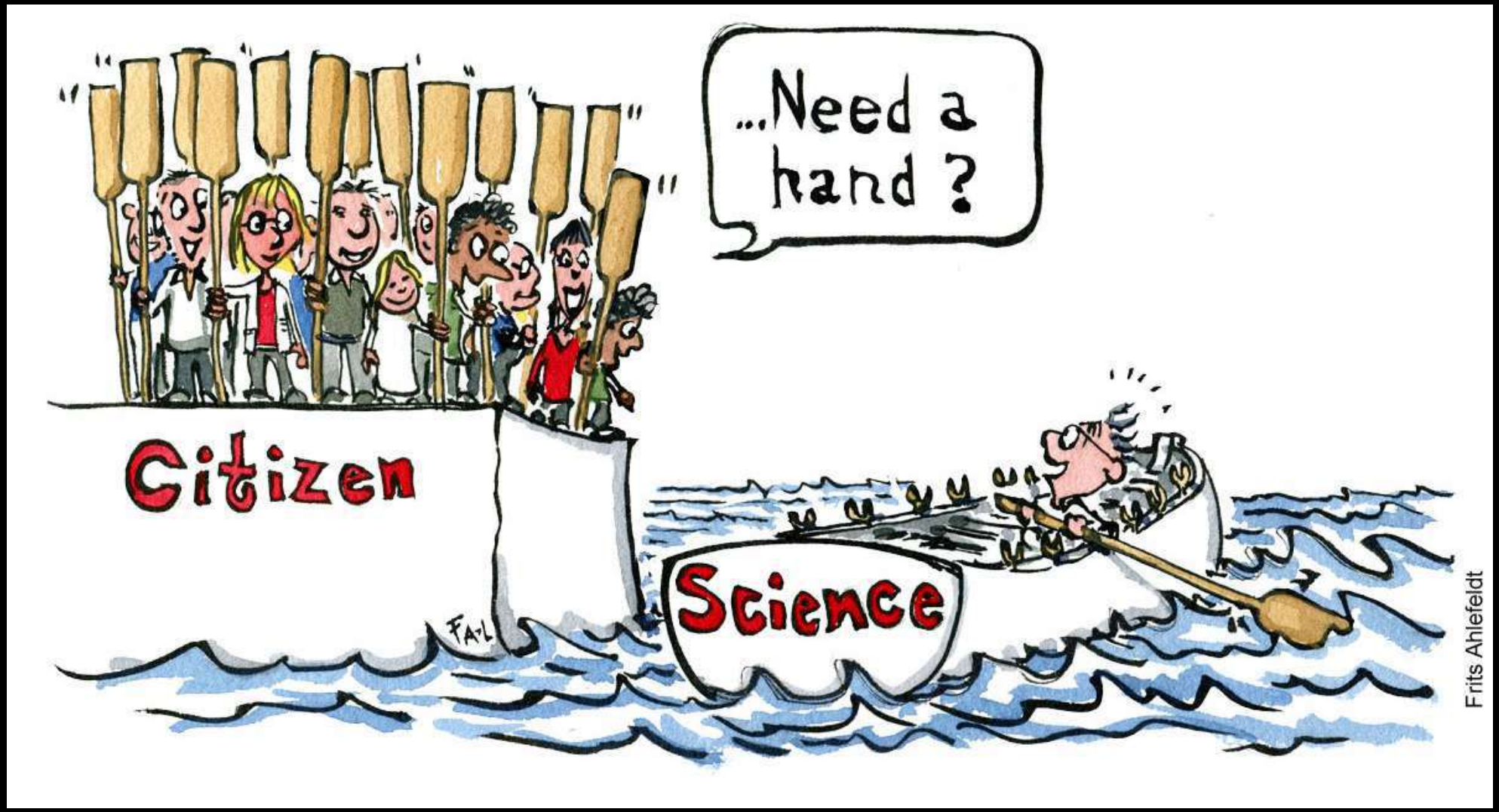
MONITOR

ACT: Coping and Cooperating

- Teach citizen scientists how to reduce chances of establishment
- Reduce risk of exposure, recognize new arrivals rapidly
- Mobilize universities, governmental agencies and NGOs
- **Provide proactive suggestions to decision makers**

INTERNATIONAL SCIENTFIC COOPERATION

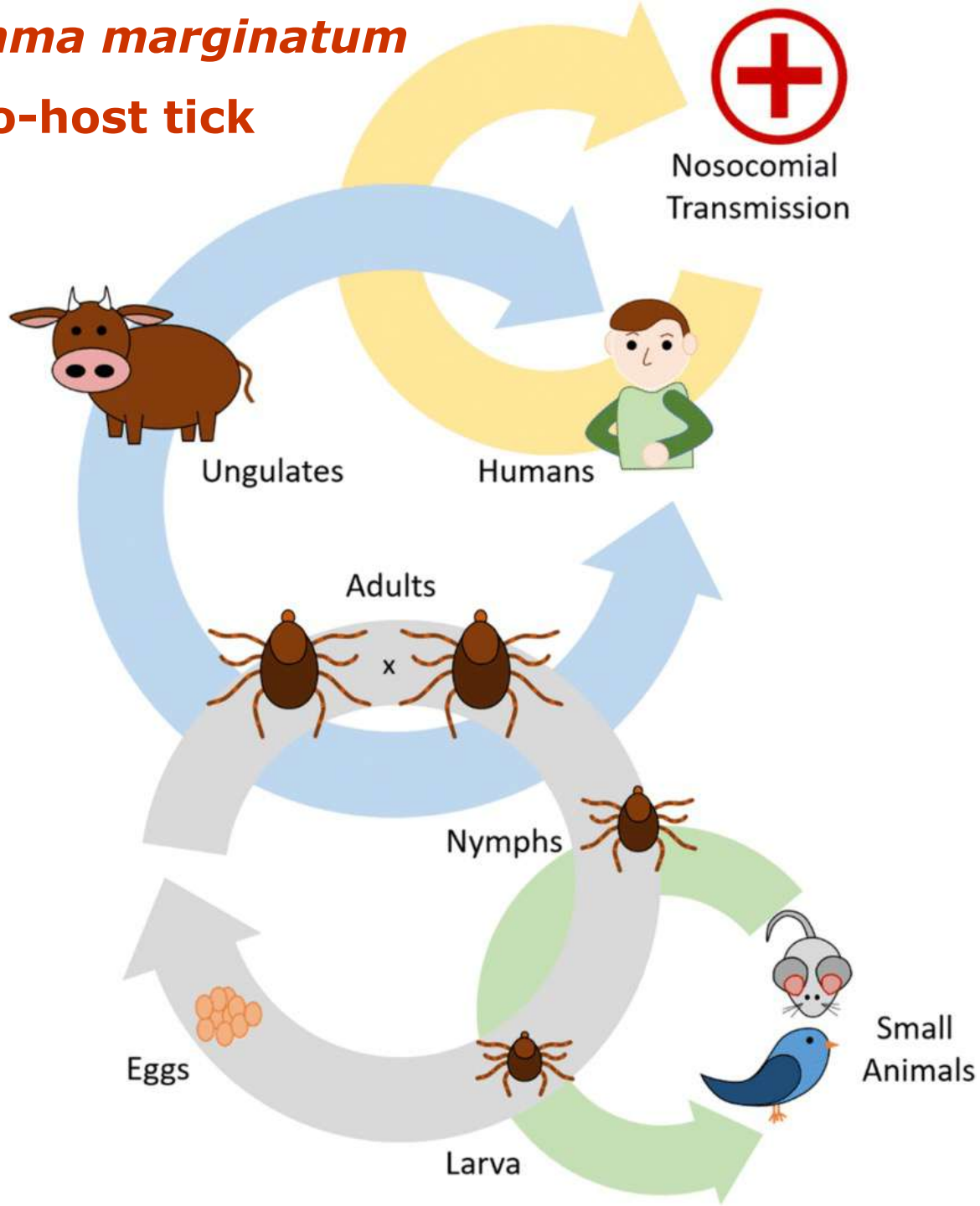
ACT


...Need a hand ?
Citizen
Science
FA-L
Frits Ahlefeldt

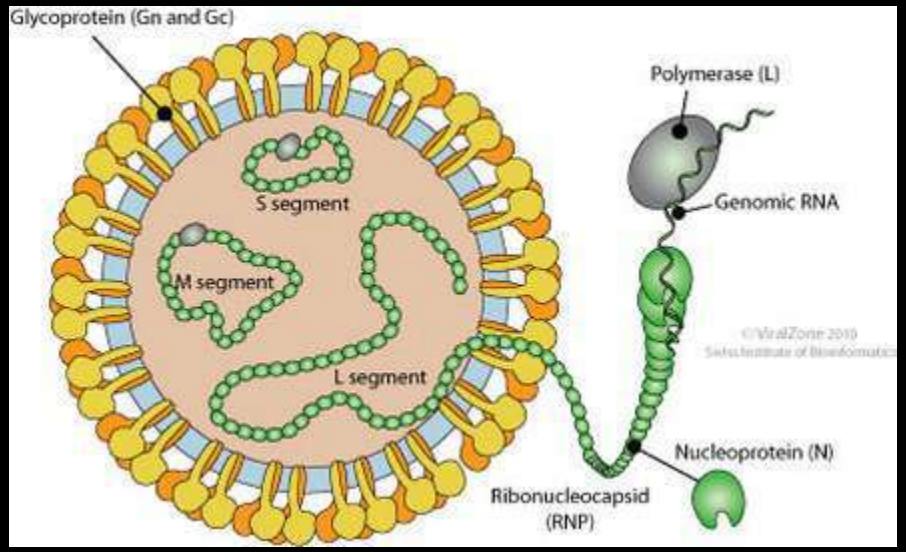
Hyalomma marginatum

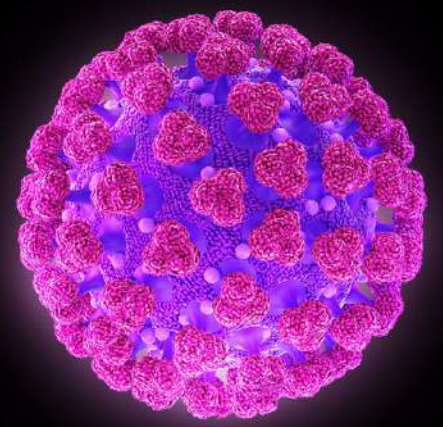
Hyalomma marginatum

is a two-host tick



Crimean-Congo Haemorrhagic Fever Virus (CCHFV)





HU EN

HUN REN CENTRE FOR ECOLOGICAL RESEARCH

How to Contribute | Good to Know | FAQ | Results | Media Appearances

I FOUND A TICK

I WOULD COLLECT TICKS

Visible size difference between **HYALOMMA IXODES** and **DERMACENTOR** ticks

WHAT CAN IT BE CONFUSED WITH?

There are 20 to 23 species of ticks in Hungary, some of which parasitize on hosts that are also favored by the *Hyalomma* species. The distinction may not be easy at first, but the following images help with the difficulties:

Perhaps the most characteristic feature of the *Hyalomma* species is the clear, ring-like banding of the legs. Upon closer observation, small, longitudinal furrows on the upper border can be observed. The shape of the animal also helps to distinguish it, the individuals are oval-shaped before sucking blood and are widest in the middle of their

HYALOMMA

5.5-6.5 mm


SEGÍTSÉG, KULLANCS!

LEGYEN ÖN IS

KULLANCSFIGYELŐ!

HA CSÍKOS LÁBÚ HYALOMMA KULLANCCSAL TALÁLKOZIK, KÉRJÜK KÜLDJE EL NEKÜNK!

HYALOMMA

DERMACENTOR

IXODES

EMAIL:
kullancs@ecolres.hu

POSTACÍM:
DR. FÖLDVÁRI GÁBOR, PhD

Ökológiai Kutatóközpont
Evolúciótudományi Intézet

1121 Budapest,
Konkoly-Thege Miklós út 29-33.

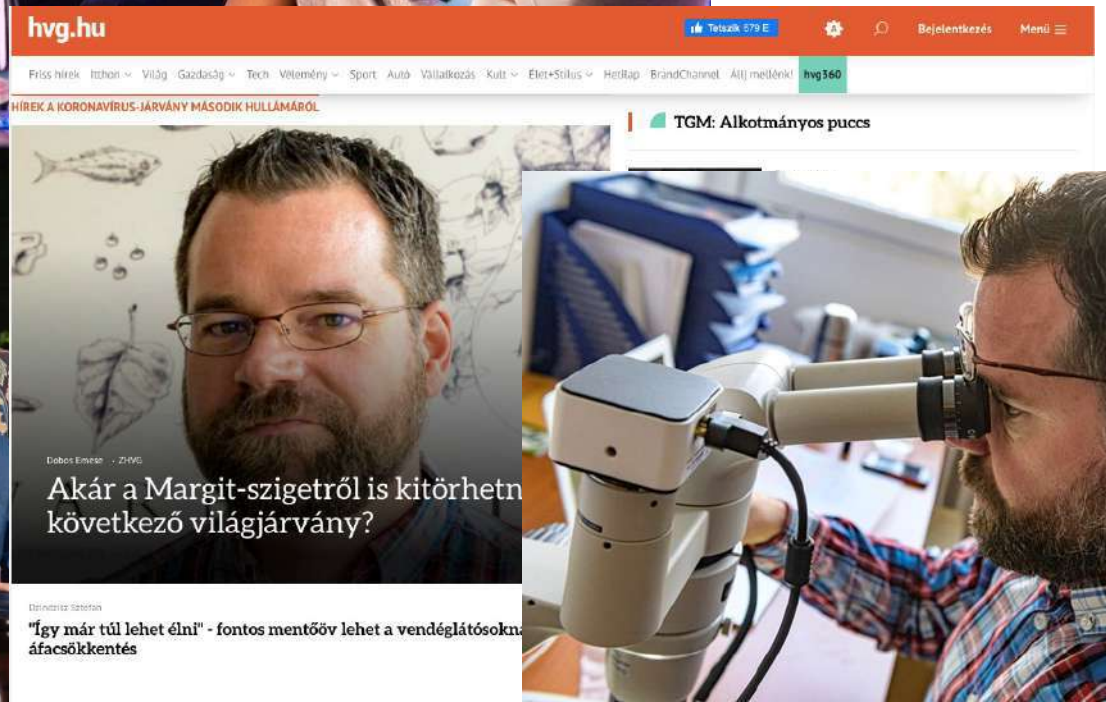
További információ:


BEWARE OF TICKS
REMOVE CAREFULLY


OLYMPUS


HETI
VÁLASZ
podcast 72

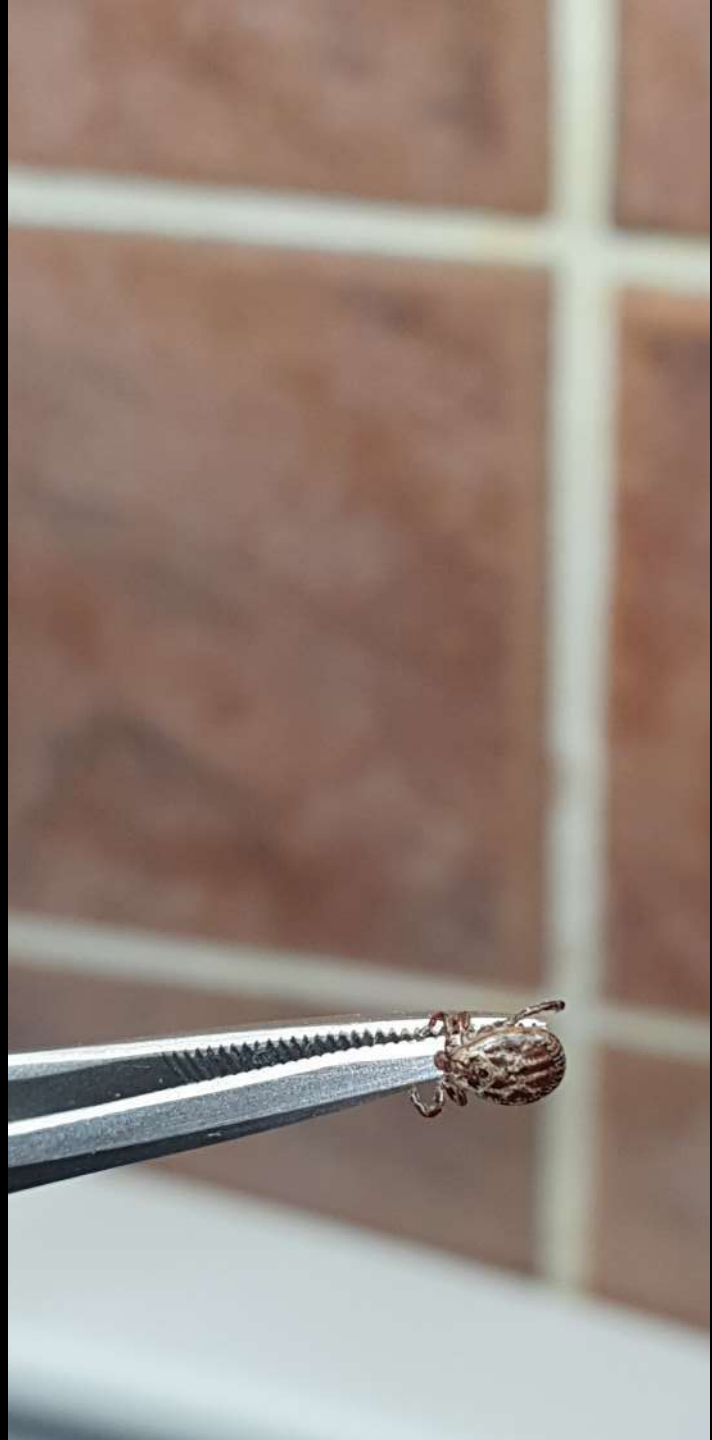

TUDOMÁNYOK FŐVÁROSA
ELKH


hvg.hu
Bejelentkezés
Menü
Friss hírek
Itthon
Világ
Gazdaság
Tech
Vélemény
Sport
Autó
Vállalkozás
Kult
Élet+Stílus
HetiRap
BrandChannel
hvg360
HÍREK A KORONAVÍRUS-JÁRVÁNY MÁSODIK HULLÁMÁRÓL
TGM: Alkotmányos puccs
Dobos Emese · ZHVG
Akár a Margit-szigetről is kitörhetn
következő világjárvány?
"Így már túl lehet élni" - fontos mentőöv lehet a vendéglátósokna
áfacsökkentés




SHOT ON REDMI 9
AI QUAD CAMERA


16:13
73%

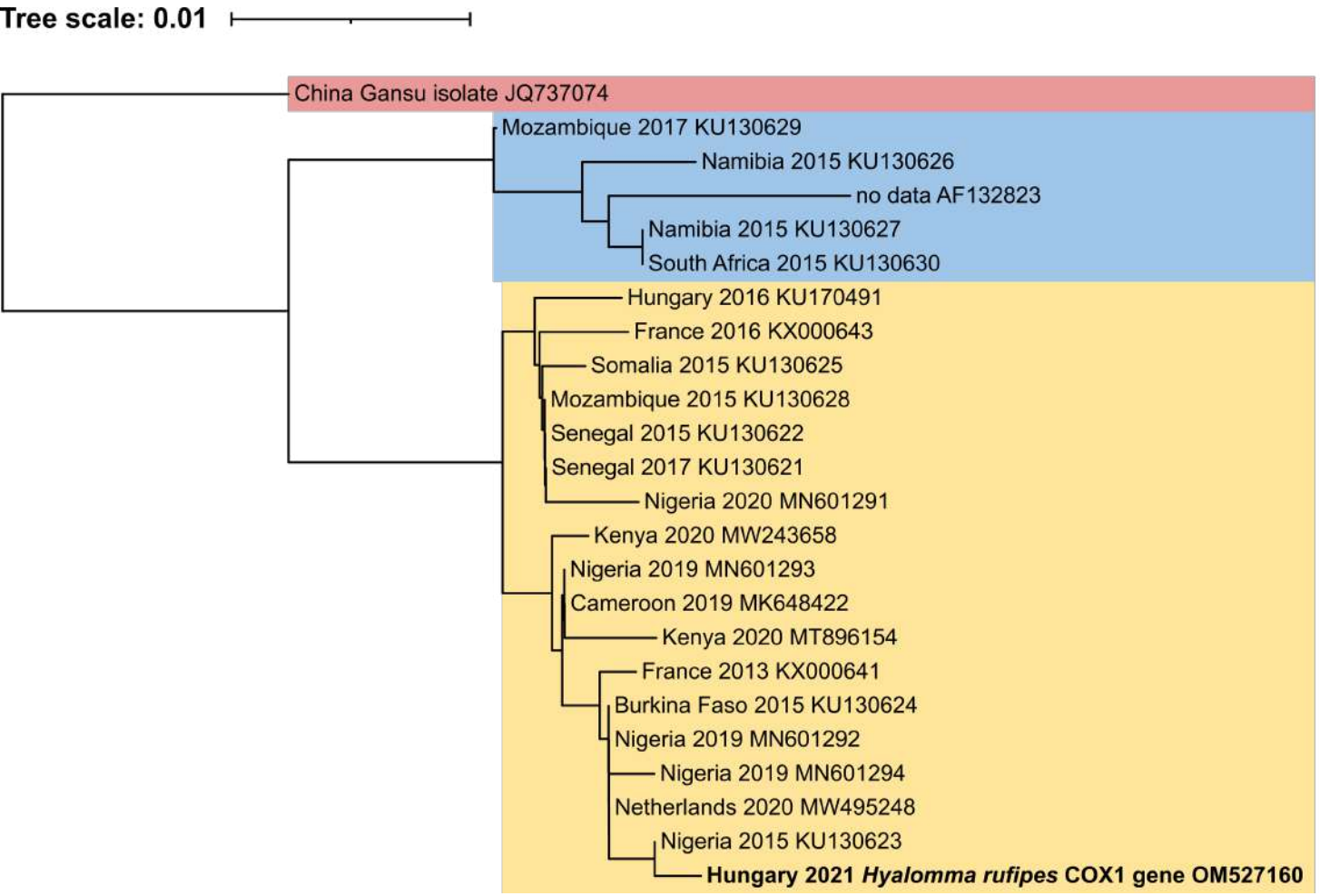


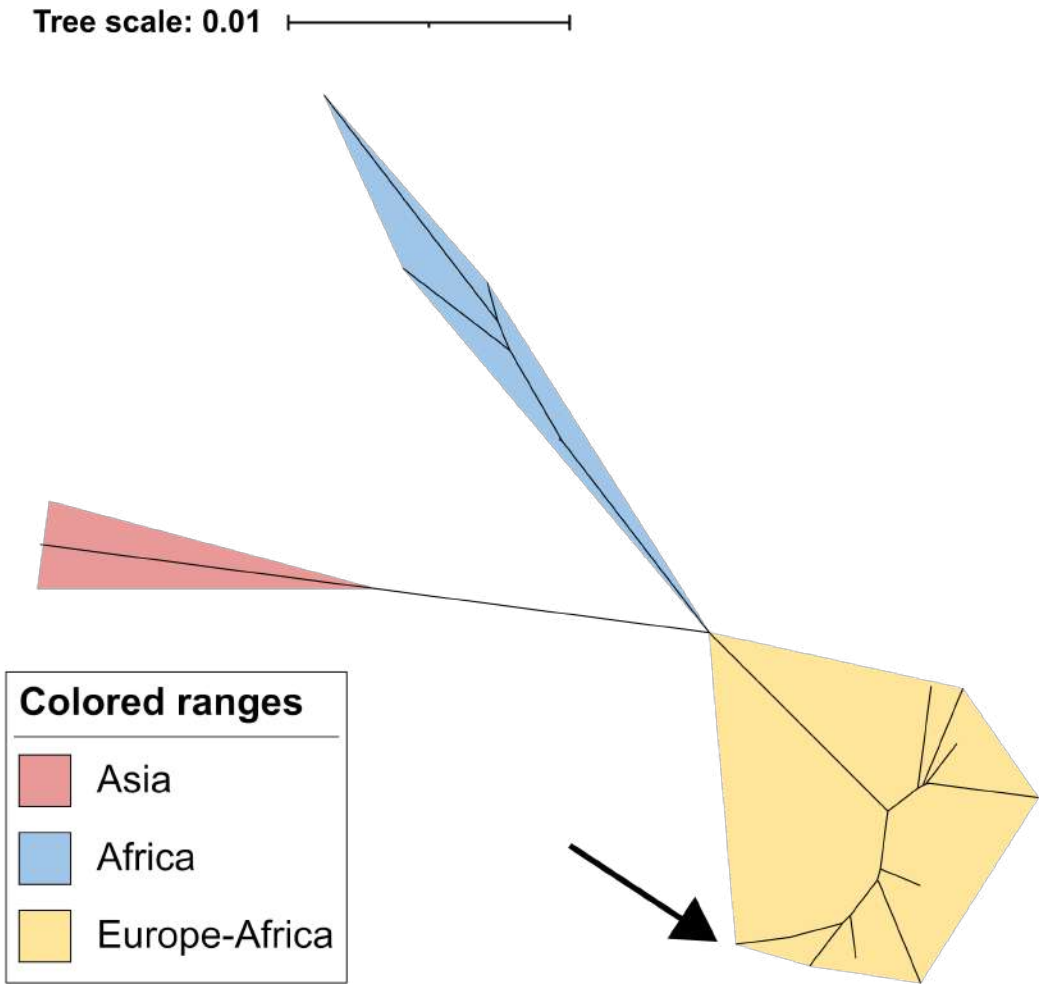
Media presence:
necessary but risky...


TARTÓSÍTÓSZERT ÉS

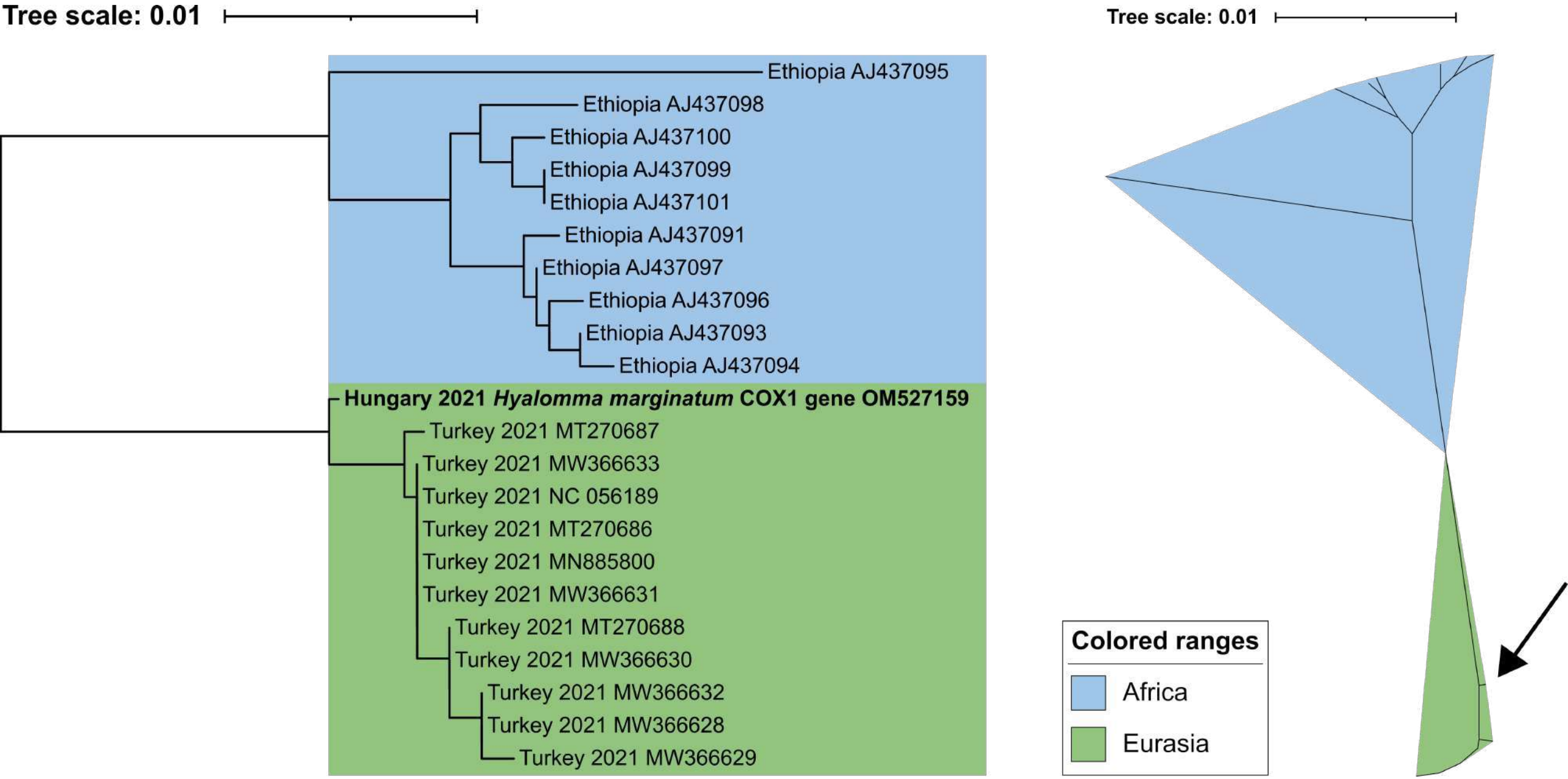

SZAMOCA
ÉS MESTERSÉGES SZÍNEZÉKET

Hyalomma rufipes
adult from a cattle


Tree scale: 0.01
China Gansu isolate JQ737074
Mozambique 2017 KU130629
Namibia 2015 KU130626
no data AF132823
Namibia 2015 KU130627
South Africa 2015 KU130630
Hungary 2016 KU170491
France 2016 KX000643
Somalia 2015 KU130625
Mozambique 2015 KU130628
Senegal 2015 KU130622
Senegal 2017 KU130621
Nigeria 2020 MN601291
Kenya 2020 MW243658
Nigeria 2019 MN601293
Cameroon 2019 MK648422
Kenya 2020 MT896154
France 2013 KX000641
Burkina Faso 2015 KU130624
Nigeria 2019 MN601292
Nigeria 2019 MN601294
Netherlands 2020 MW495248
Nigeria 2015 KU130623
Hungary 2021 Hyalomma rufipes COX1 gene OM527160

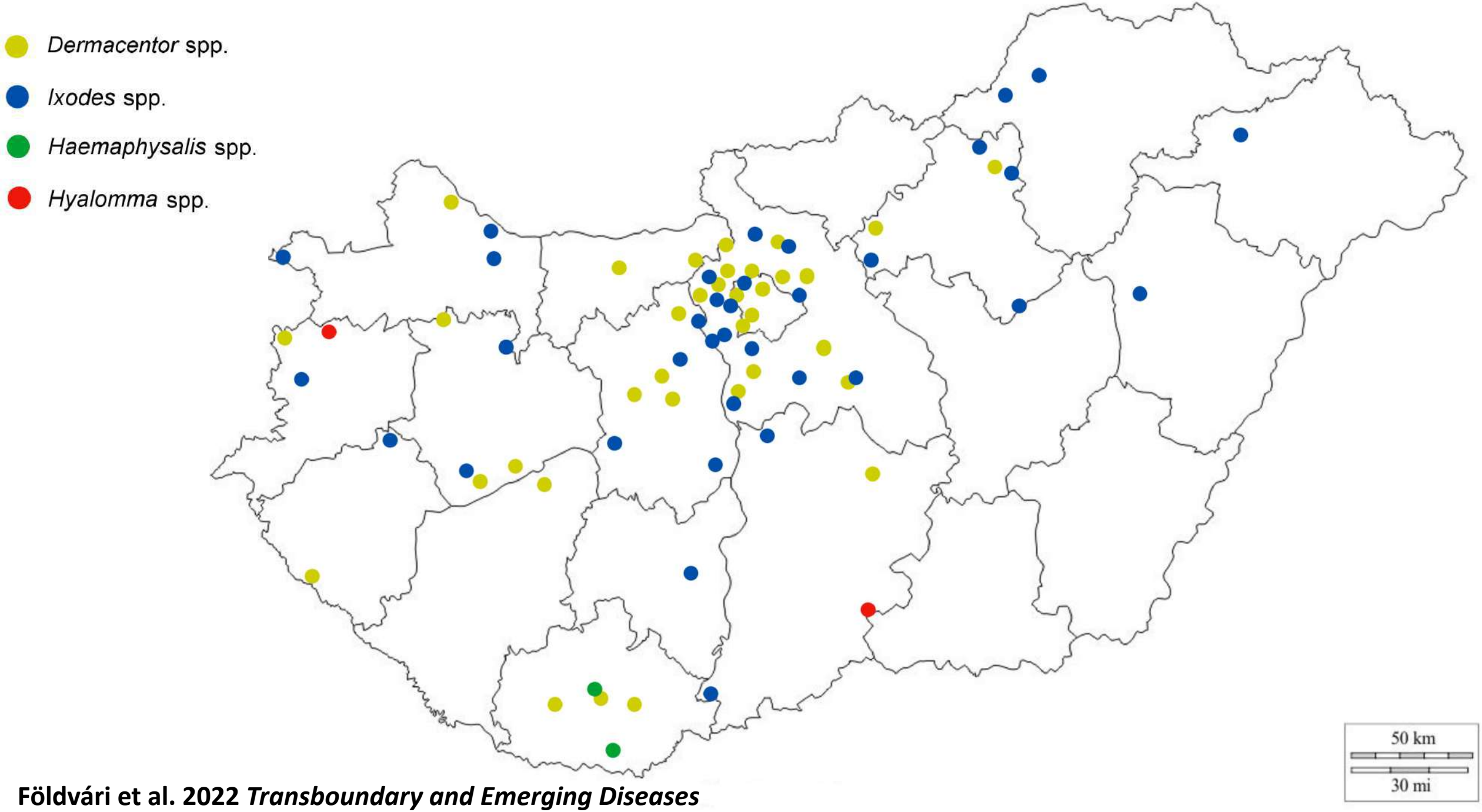

Tree scale: 0.01
Colored ranges
Asia
Africa
Europe-Africa

Hyalomma marginatum
adult from a dog


Tree scale: 0.01
Ethiopia AJ437095
Ethiopia AJ437098
Ethiopia AJ437100
Ethiopia AJ437099
Ethiopia AJ437101
Ethiopia AJ437091
Ethiopia AJ437097
Ethiopia AJ437096
Ethiopia AJ437093
Ethiopia AJ437094
Hungary 2021 Hyalomma marginatum COX1 gene OM527159
Turkey 2021 MT270687
Turkey 2021 MW366633
Turkey 2021 NC 056189
Turkey 2021 MT270686
Turkey 2021 MN885800
Turkey 2021 MW366631
Turkey 2021 MT270688
Turkey 2021 MW366630
Turkey 2021 MW366632
Turkey 2021 MW366628
Turkey 2021 MW366629
Tree scale: 0.01
Colored ranges
Africa
Eurasia

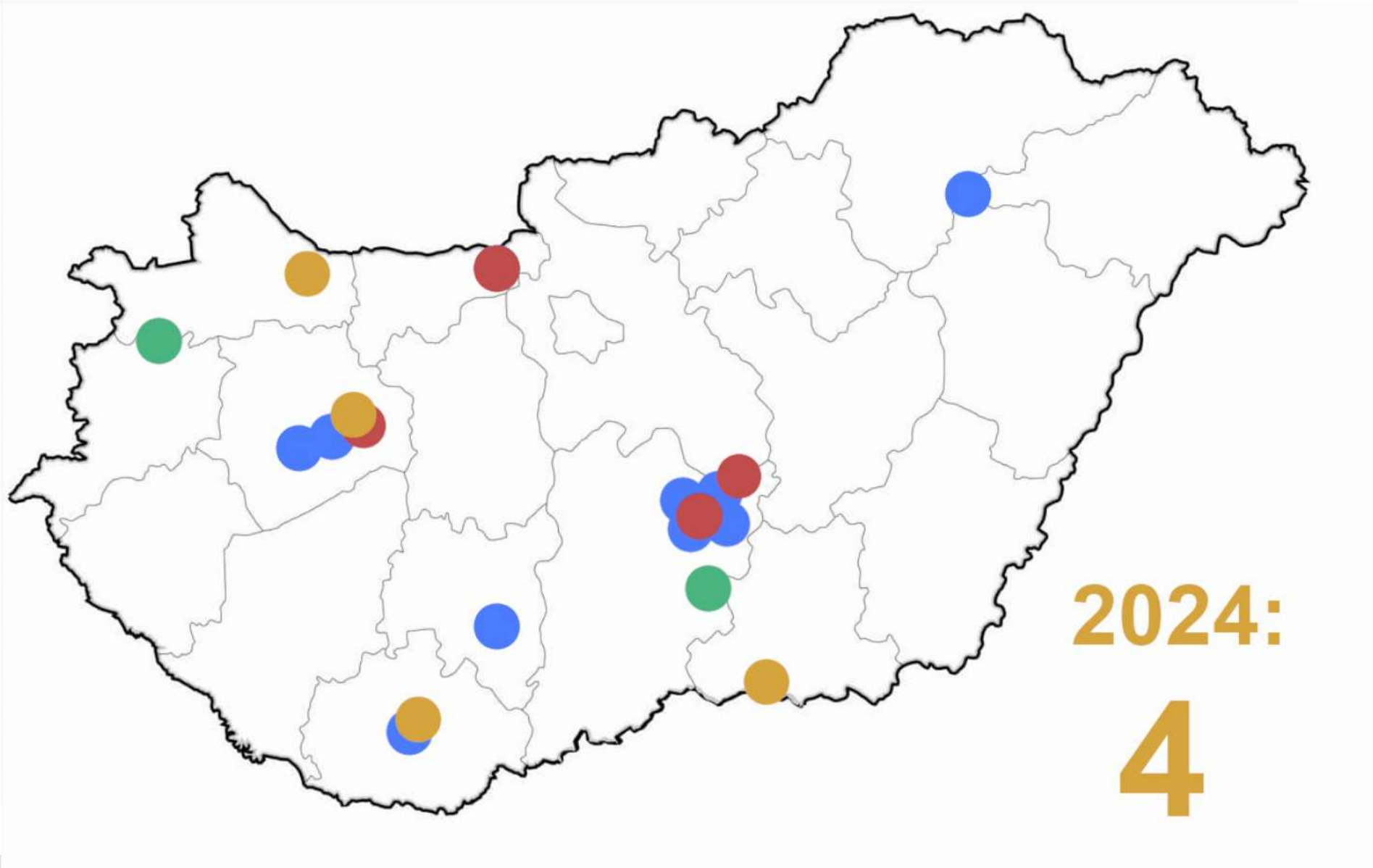
Hyalomma marginatum
adult from a donkey

Hyalomma sp.
adult from a horse



Földvári et al. 2022 *Transboundary and Emerging Diseases*

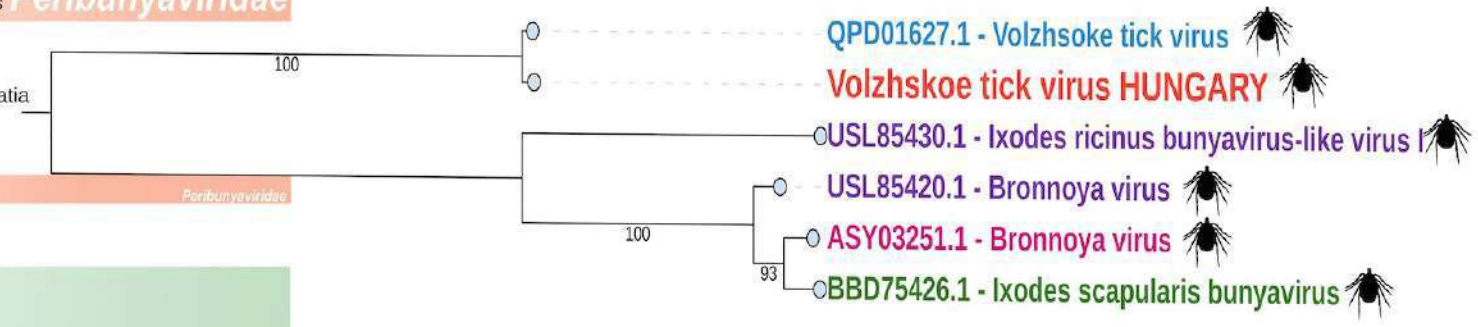
Hyalomma observations through TickWatcher 2021-2024



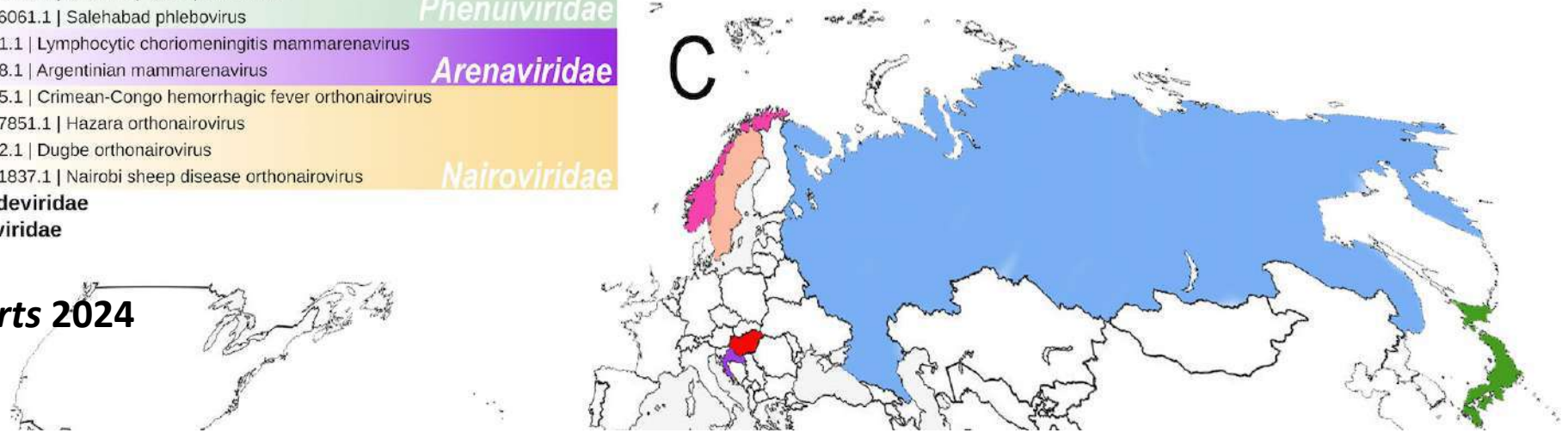
A

◂ Fimoviridae
◂ Leishbuviridae
NP 941987.1 | Hantaan orthohantavirus
NP 942557.1 | Seoul orthohantavirus
NP 942554.1 | Dobrava-Belgrade orthohantavirus
NP 604472.1 | Andes orthohantavirus
NP 941983.1 | Puumala orthohantavirus
NP 942586.1 |Tula orthohantavirus
Hantaviridae
◂ Phasmaviridae
YP 009667046.1 | Tacaiuma orthobunyavirus
YP 001497160.1 | Akabane orthobunyavirus
YP 009667022.1 | Witwatersrand orthobunyavirus
YP 009664558.1 | Turlock orthobunyavirus
YP 009666905.1 | Batai orthobunyavirus
NP 671969.1 | La Crosse orthobunyavirus
YP 010084299.1 | California encephalitis orthobunyavirus
Peribunyaviridae
QPD01627.1 | Volzhskoe tick virus | Russia
Volzhskoe tick virus | Hungary
USL85430.1 | Ixodes ricinus bunyavirus-like virus 1 | Croatia
USL85420.1 | Bronnoya virus | Croatia
ASY03251.1 | Bronnoya virus | Norway
BBD75426.1 | Ixodes scapularis bunyavirus
◂ Cruliviridae
◂ Tospoviridae
YP 009047241.1 | Heartland bandavirus
YP 006504094.1 | Dabie bandavirus
YP 009666938.1 | Guertu bandavirus
YP 009512940.1 | Punta Toro phlebovirus
YP 003848705.1 | Rift Valley fever phlebovirus
YP 010086061.1 | Salehabad phlebovirus
Phenuiviridae
NP 694851.1 | Lymphocytic choriomeningitis mammarenavirus
NP 899218.1 | Argentinian mammarenavirus
Arenaviridae
NP 950235.1 | Crimean-Congo hemorrhagic fever orthonairovirus
YP 009507851.1 | Hazara orthonairovirus
NP 955542.1 | Dugbe orthonairovirus
YP 009361837.1 | Nairobi sheep disease orthonairovirus
Nairoviridae
◂ Wupedeviridae
◂ Mypoviridae

No CCHFV so far but we (metagenomics) found Volzhskoe tick virus



C



Földvári et al. *Scientific Reports* 2024

scientific reports

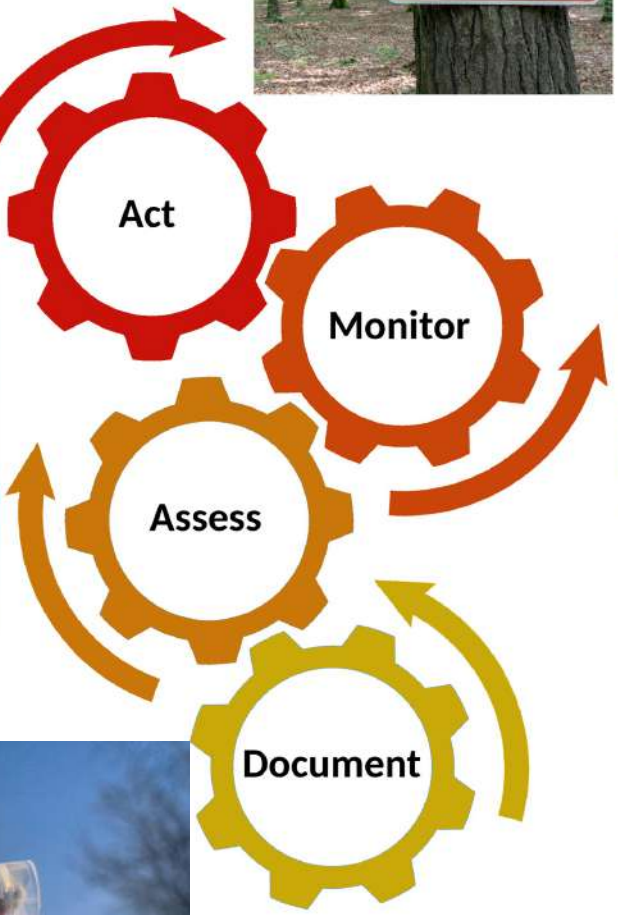
OPEN

Genomic characterization of Volzhskoe tick virus (*Bunyaviricetes*) from a *Hyalomma marginatum* tick, Hungary

Gábor Földvári[1,2,8]✉, Zsófia Tauber[4,7,8], Gábor Endre Tóth[4,5], Dániel Cadar[6], Alexandra Bialonski[6], Balázs Horváth[6], Éva Szabó[1,2,3], Zsófia Lanszki[4,5], Brigitta Zana[4,5], Zsaklin Varga[4,5], Fanni Földes[4,5] & Gábor Kemenesi[4,5]

„Our protocols must be evolvable. There is no static solution for problems involving an evolving Earth and an evolving biosphere."

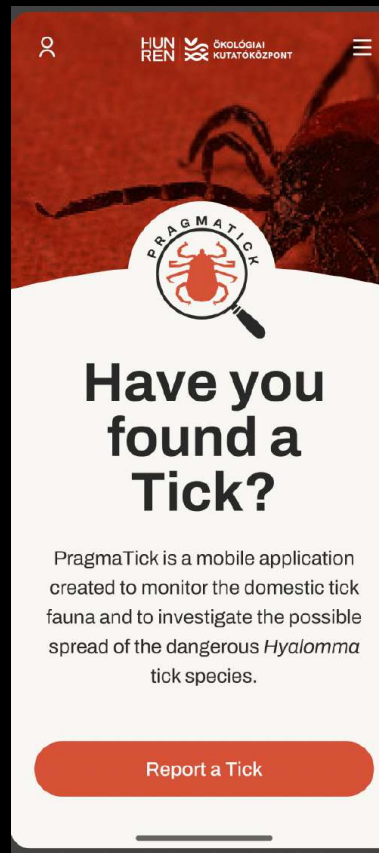
Brooks, Hoberg, and Boeger, 2019



PRAGMATICK mobile app

National Laboratory for Health Security HUNGARY

- ✓ 50,000 EUR, iOS and android
- ✓ Hungarian, English and any other language
- ✓ We educate the public
- ✓ Participants send pictures and ticks
- ✓ Distribution maps
- ✓ Expert morphological ID
- ✓ Machine learning algorithm for genus ID
- ✓ Gamification



Kullancsfigyelő

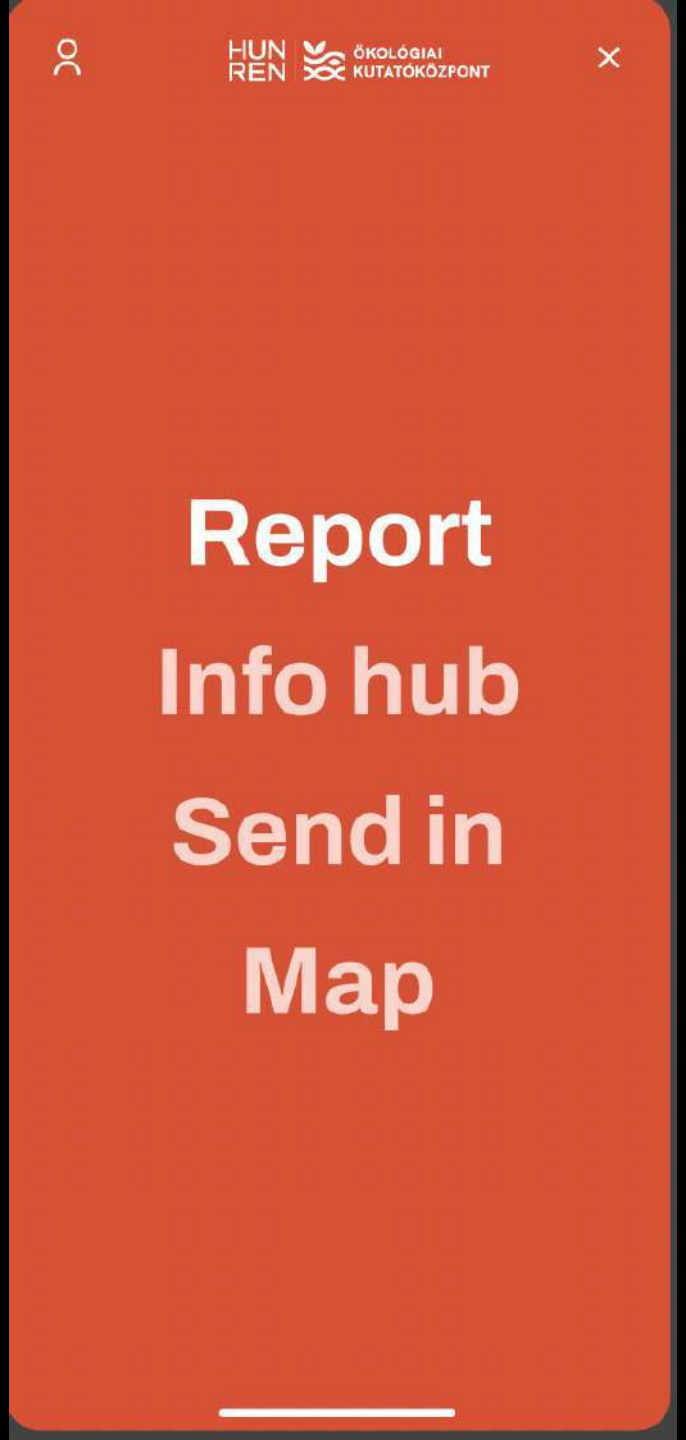
Koncepció

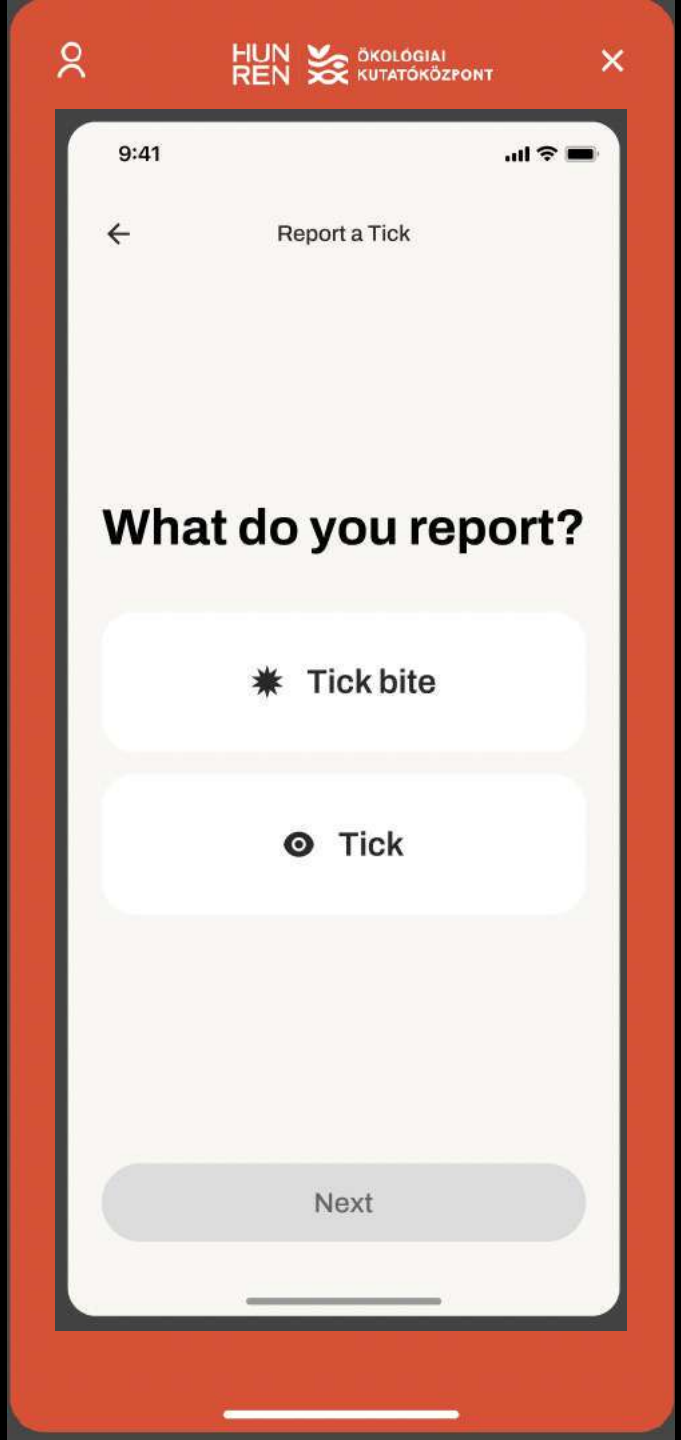
Egyszerű, könnyen használható, kortárs külsővel. Célunk volt megőrizni a Kullancsfigyelő meglévő megjelenését, szélesebb demográfia számára intuitív, használatra ösztönző megjelenést adni.

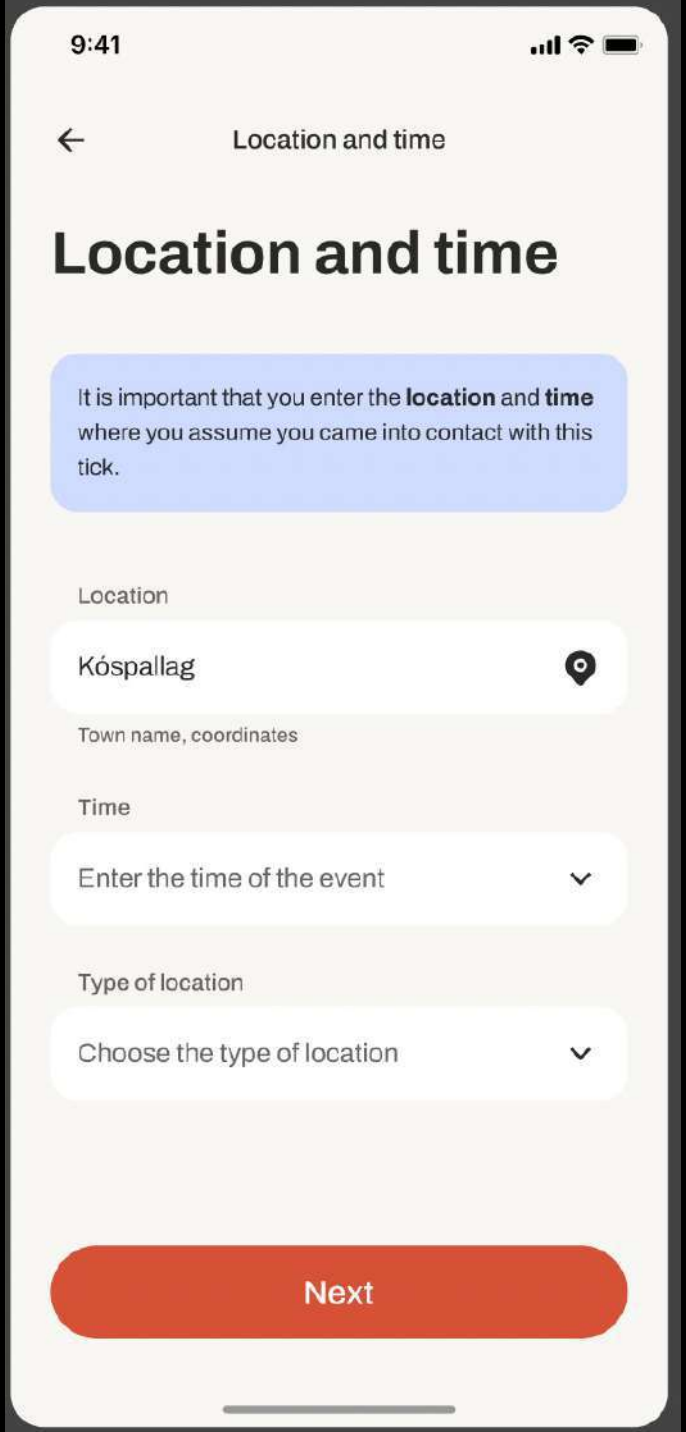
Have you found a Tick?

PragmaTick is a mobile application created to monitor the domestic tick fauna and to investigate the possible spread of the dangerous *Hyalomma* tick species.

Report a Tick


HUN REN
ÖKOLÓGIAI KUTATÓKÖZPONT
Report
Info hub
Send in
Map


HUN REN
ÖKOLÓGIAI KUTATÓKÖZPONT
9:41
Report a Tick
What do you report?
Tick bite
Tick
Next


9:41
Location and time
Location and time
It is important that you enter the **location** and **time** where you assume you came into contact with this tick.
Location
Kóspallag
Town name, coordinates
Time
Enter the time of the event
Type of location
Choose the type of location
Next

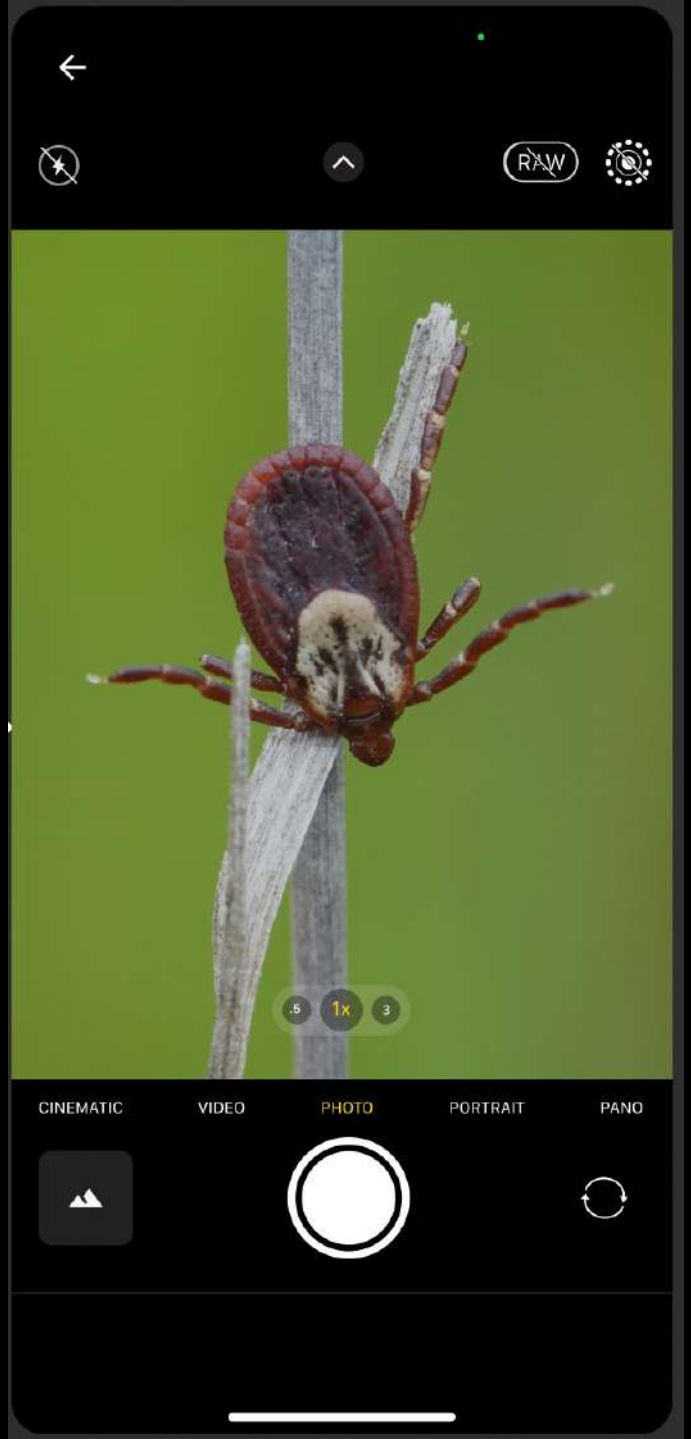
9:41

Location

Kóspallag

Kóspallag

Save


RAW
.5
1x
3
CINEMATIC
VIDEO
PHOTO
PORTRAIT
PANO

9:41

Identification

Identification

Characteristics:
Strongly banded legs, dark shield, large size, fast movement.

Hyalomma 5.5-6.5 mm

Other

Next

PRAGMATICK mobile app

- ✓ Volunteers from different countries wanted
- ✓ National translations and adaptations needed

- ✓ The goal is to have a harmonized data collection


PRO
REACTIVE