

VectorNet-Update on arthropod vectors of medical and veterinary importance in Luxembourg

VectorNet European Network
for Medical and
Veterinary Entomology



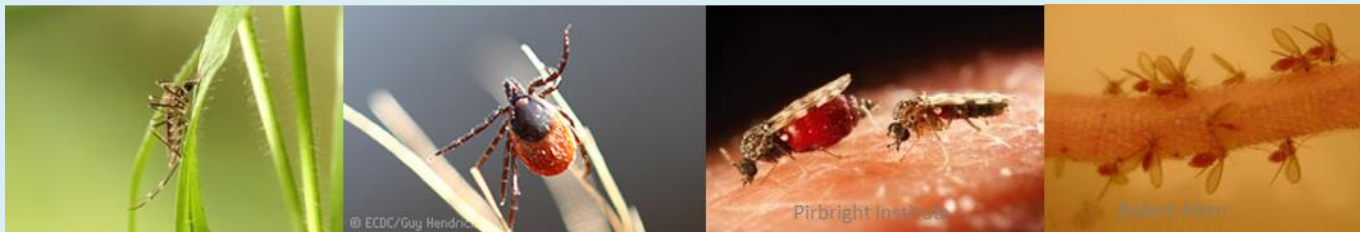
Alexander Weigand & Francis Schaffner

Musée national d'histoire naturelle de Luxembourg
Francis Schaffner Consultancy

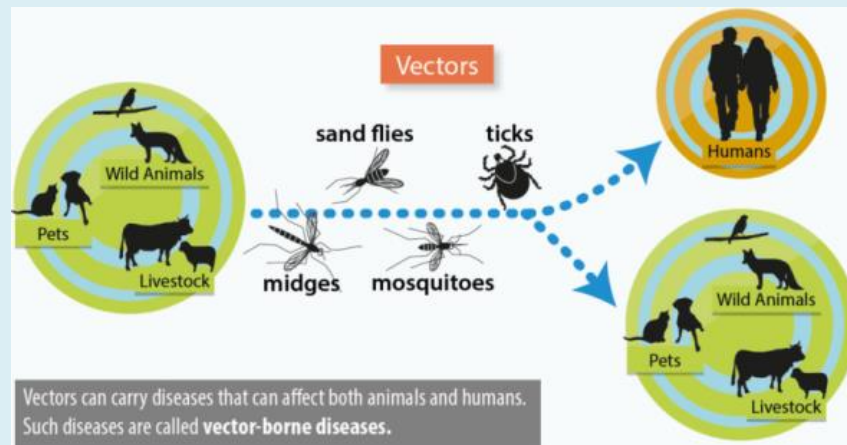


VectorNet

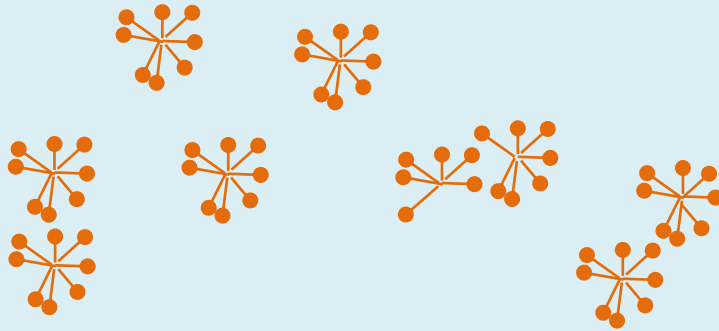
- European entomological network with national representatives
- since 2014
- Goal: to improve preparedness and response for vector-borne diseases



- sharing data for vectors
 - geographic distribution
 - abundance
 - seasonality



VectorNet



individual national
experts & expert networks



mosquitoes



ticks



biting midges



sand flies

VectorNet



Vector Group Leaders
ECDC/EFSA



mosquitoes



ticks



biting midges



sand flies

VectorNet



Vector Group Leaders ECDC/EFSA

One representative entomologist appointed as member of
Vectornet Entomological Network (VEN) per country

50 country level network members from the

- EU (26)
- European Economic Union (EEU) (3)
- EU enlargement policy (7)
- European Neighborhood Policy (ENP) (14)

VectorNet AENM 2023



Mosquitoes

Diptera, Culicidae



Mosquito identification | reverse key



& MosKeyTool

- 4 invasive, 21 native priority species
- maps updated each 6 months
- comprehensive data for Luxembourg



LE GOUVERNEMENT
DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de la Santé

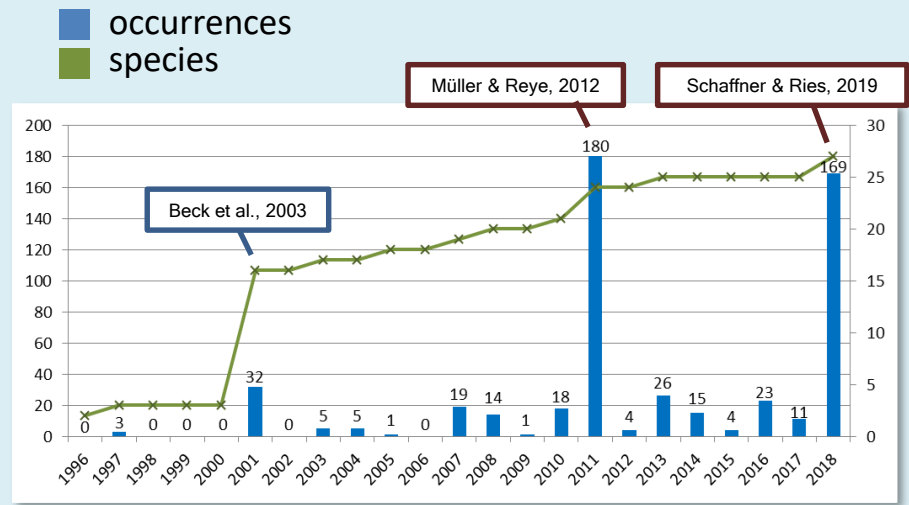
Direction de la santé



LE GOUVERNEMENT
DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de l'Environnement, du Climat
et du Développement durable

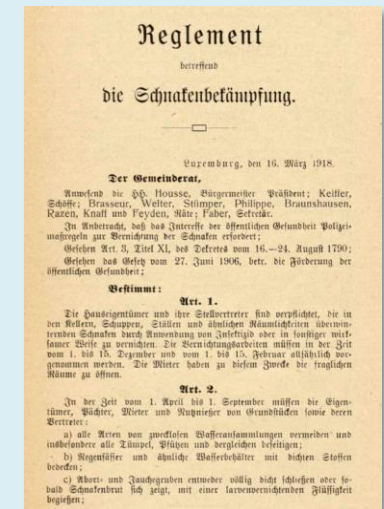
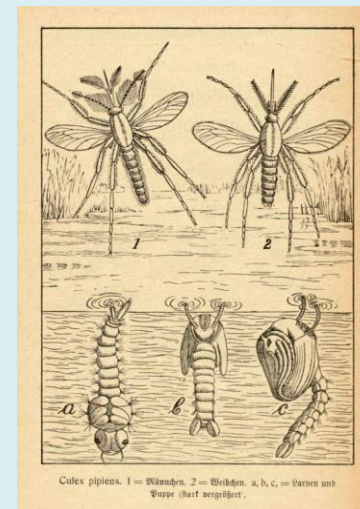
Mosquito-atlas

- historical data
 - „really old“ & 1996-2018



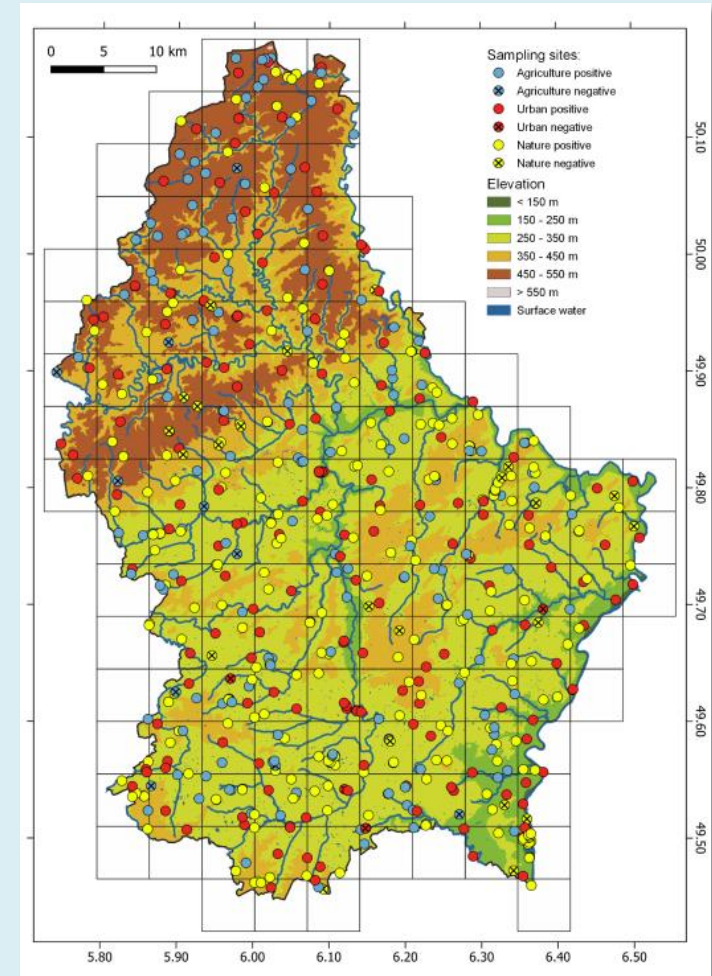
- Malaria reported during 19th Century (e.g. Eisborn, Imbringen, 1857-59)
- First reports of mosquitoes in Luxembourg date back to 1910, 1916 and 1917
- Control actions planned in Luxembourg-City: *Culex pipiens* and *Culiseta annulata*
- Airport malaria cases in 1997 and 1999

to the atlas



Mosquito-atlas

- historical data
 - (Citizen science data)
 - own fieldwork data 2019-2021
- expert-based targeted surveillance
 - mainly larval sampling
 - in 3 land cover: natural, agricultural, urban
 - in each of the 137 5*5 km grid cells



to the atlas



Mosquito-atlas

Artificial habitats:

- *Culex pipiens*
- *Culiseta longiareolata*
- *Aedes japonicus*
- ...



Snow-melt pools:

- *Aedes communis*
- *Aedes rusticus*
- *Culiseta morsitans*
- ...



Permanent ponds:

- *Anopheles maculipennis*
- *Culex pipiens*
- *Culex territans*
- ...



Tree holes:

- *Anopheles plumbeus*
- *Aedes geniculatus*
- *Aedes japonicus*
- ...



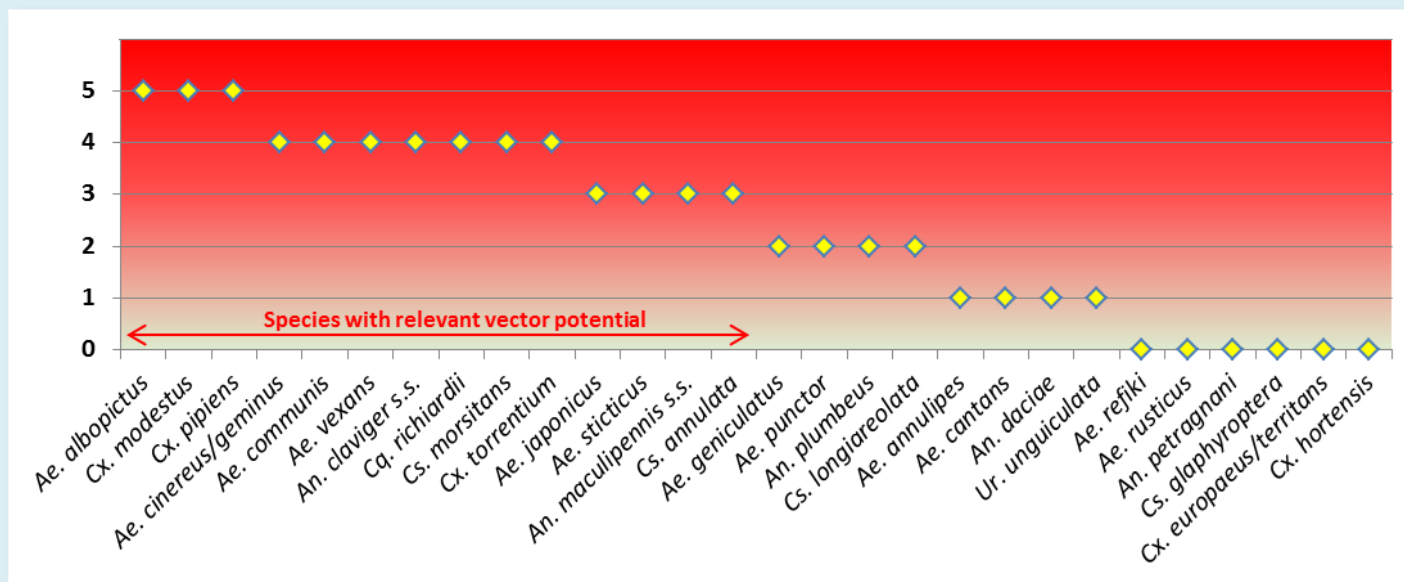
to the atlas



In total, 28 mosquito species detected (6 first records)

Mosquito-atlas

- A primary risk assessment: **15 species** could be involved in a **pathogen or parasite transmission**
- **Nuisance: 18 species** have the potential to disturb humans, with five taxa that can be considered as primary nuisance species



0 = Species not implicated
 1 = Species infected in nature only
 2 = Species competent in the laboratory only
 3 = Species infected in nature and competent, for the same pathogen
 4 = Species known as past/present vector in regions and countries outside Western Europe or, for malaria, secondary vector only
 5 = Species known as vector in Western Europe

Vectorial risk for human malaria parasites and eight arboviruses of public health relevance (Batai, chikungunya, dengue, Inkoo, Sindbis, Tahyna, West Nile, Zika)



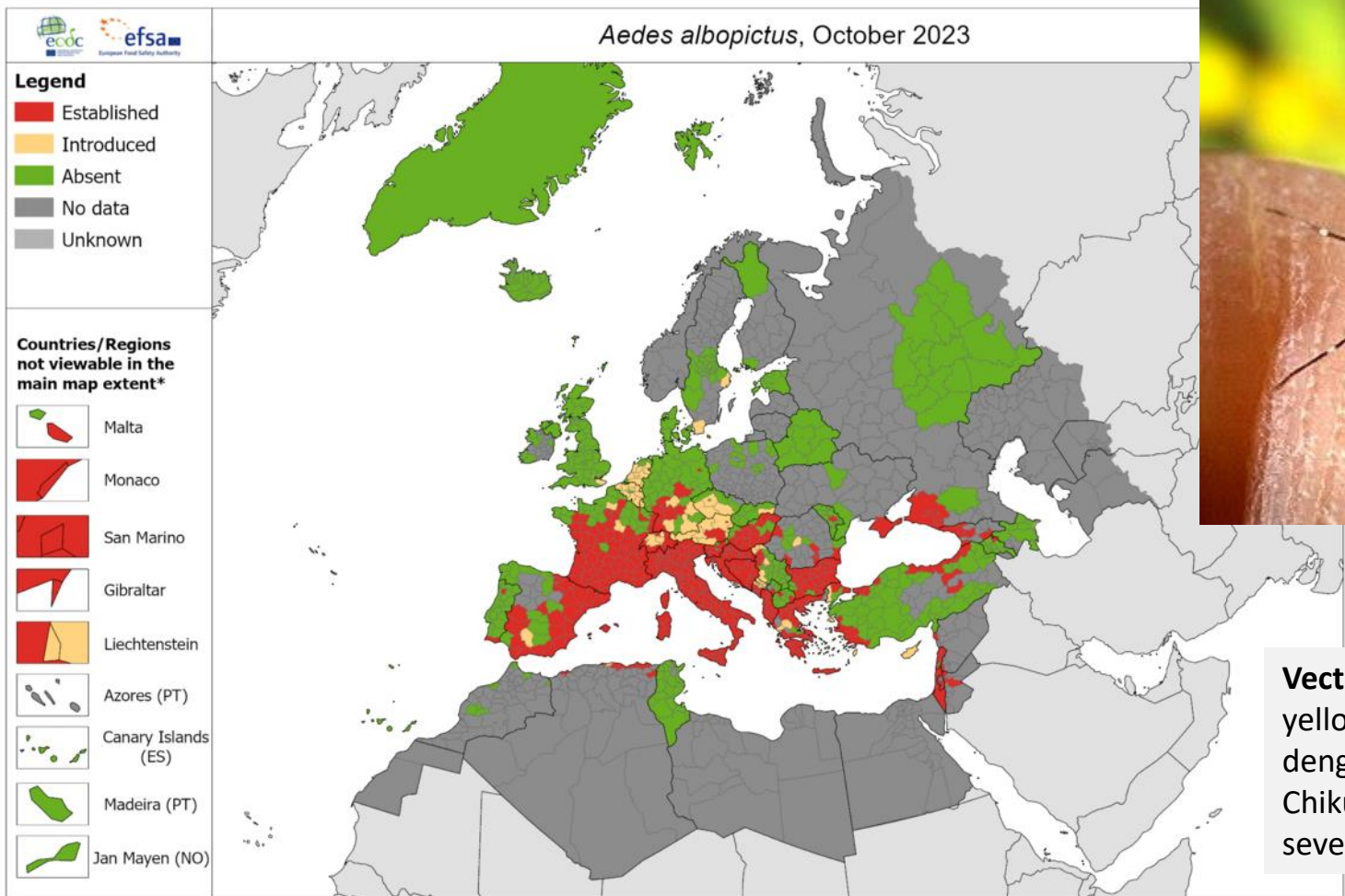
Mosquitoes

invasive



LU data

- First record **2022-09-03**, Roeser
- Eggs found **2023-07**, near Capellen



Vector potential
 yellow fever virus
 dengue fever
 Chikungunya fever
 several filarial nematodes

ECDC and EFSA, map produced on 6 Oct 2023. Data presented in this map are collected by the VectorNet project. Maps are validated by external experts prior to publication. Please note that the depicted data do not reflect the official views of the countries.
 * Countries/Regions are displayed at different scales to facilitate their visualisation. The boundaries and names shown on this map do not imply official endorsement or acceptance by the European Union. Administrative boundaries © EuroGeographics, UNFAO.

Mosquitoes

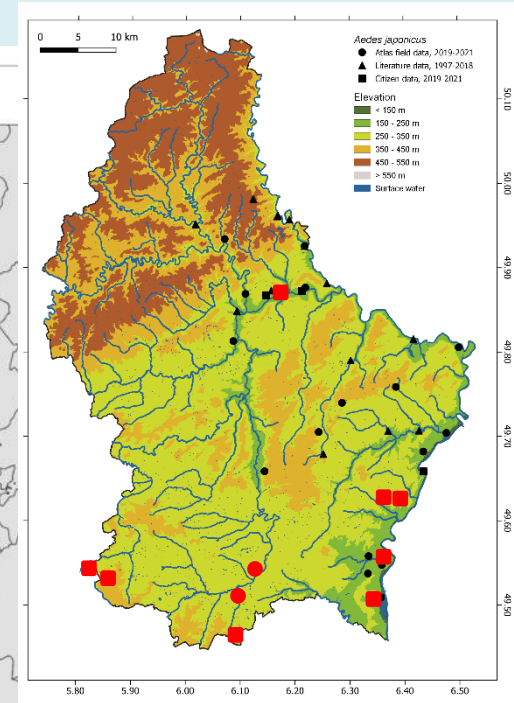
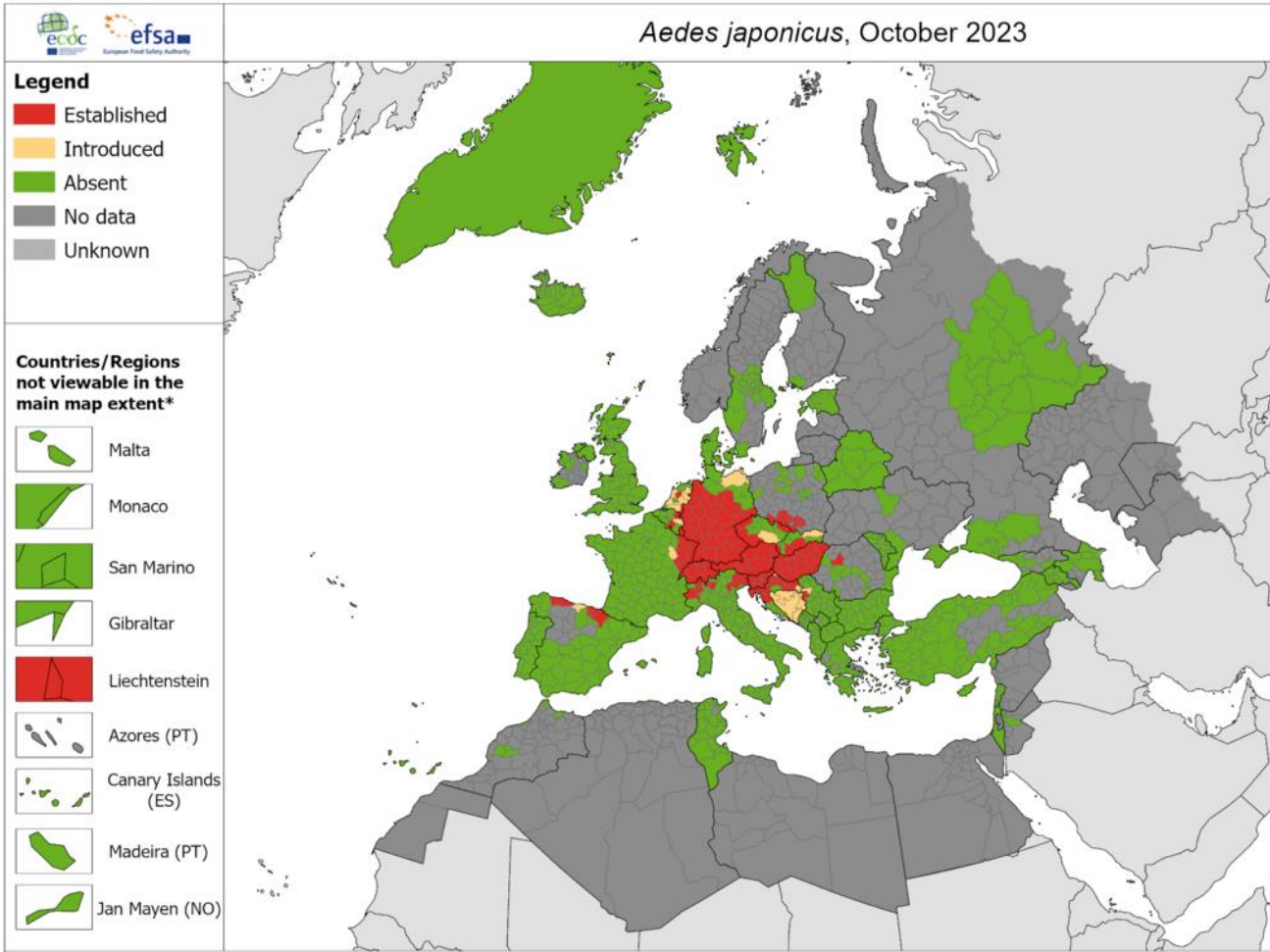
invasive



LU data

- First record **2018-07-04**, Stolzembourg
- First report in Europe 2000 (FR) – tyre depot
- Spreading from CH since 2008

Aedes japonicus, October 2023



ECDC and EFSA, map produced on 6 Oct 2023. Data presented in this map are collected by the VectorNet project. Maps are validated by external experts prior to publication. Please note that the depicted data do not reflect the official view of the European Union. * Countries/Regions are displayed at different scales to facilitate their visualisation. The boundaries and names shown on this map do not imply official endorsement or acceptance by the European Union. Administrative boundaries © Euro

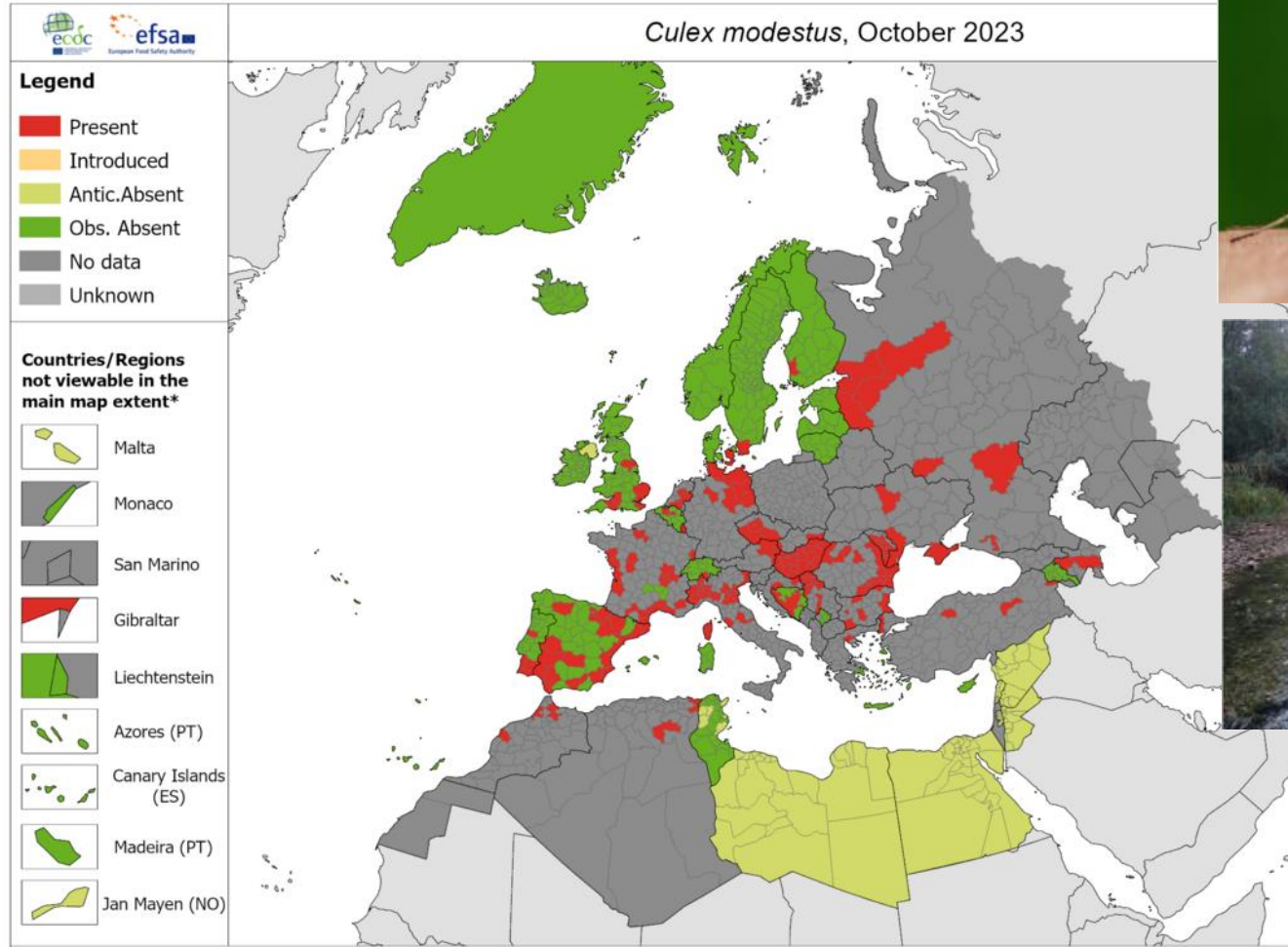
Mosquitoes

native



LU data

- First record **2019-06-24**,
Haff Réimech nature reserve
- Rare, but stable population (2019-23)



Vector potential
West Nile virus

ECDC and EFSA, map produced on 6 Oct 2023. Data presented in this map are collected by the VectorNet project. Maps are validated by external experts prior to publication. Please note that the depicted data do not reflect the official views of the countries.
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Mosquitoes

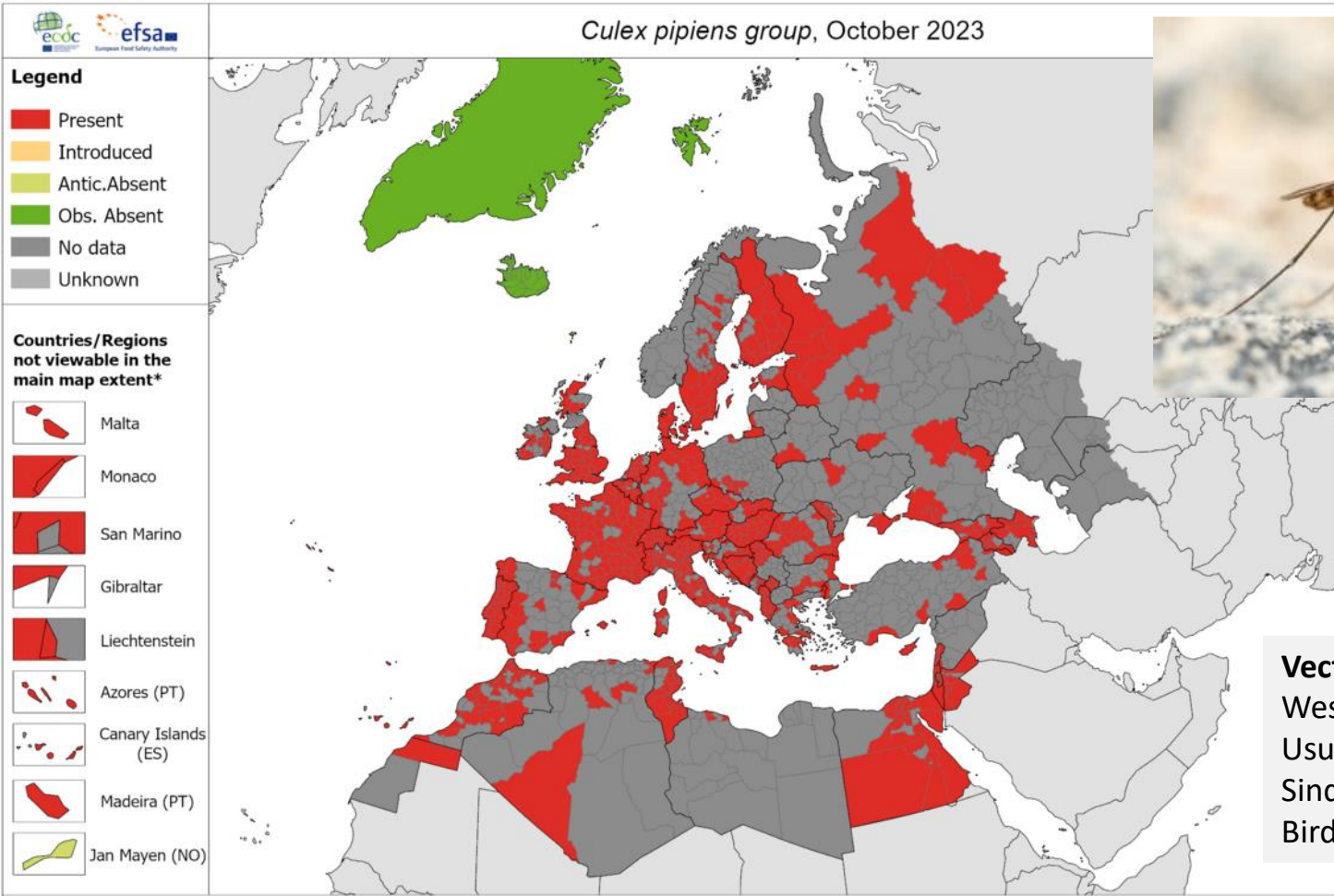
native



LU data

- First record **1997**
- Two species: *Cx. torrentium*, *Cx. pipiens*
- Both *Cx. pipiens* ecoforms present:
 - Cx. pipiens* f. *pipiens* (birds) and
 - Cx. pipiens* f. *molestus* (mammals)

Culex pipiens group, October 2023



Vector potential
West Nile virus
Usutu virus
Sindbis virus
Bird plasmodiums

ECDC and EFSA, map produced on 6 Oct 2023. Data presented in this map are collected by the VectorNet project. Maps are validated by external experts prior to publication. Please note that the depicted data do not reflect the official views of the countries.
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Ticks

Acari, Ixodida



- 7 species assessed, maps updated each 6 months
 - *Dermacentor reticulatus*
 - *Hyalomma lusitanicum*
 - ***Hyalomma marginatum***
 - *Ixodes persulcatus*
 - *Ixodes ricinus*
 - *Ornithodoros erraticus*
 - *Rhipicephalus sanguineus* (?)



Hyalomma marginatum, first record Luxembourg. MNHNL67133

Ticks



LU data

- First record **2018-08-31**, Dudelange
- 2020-06-14: Beaufort
- 2020-07-06: Aspelt
- 2022-08-22: Goesdorf

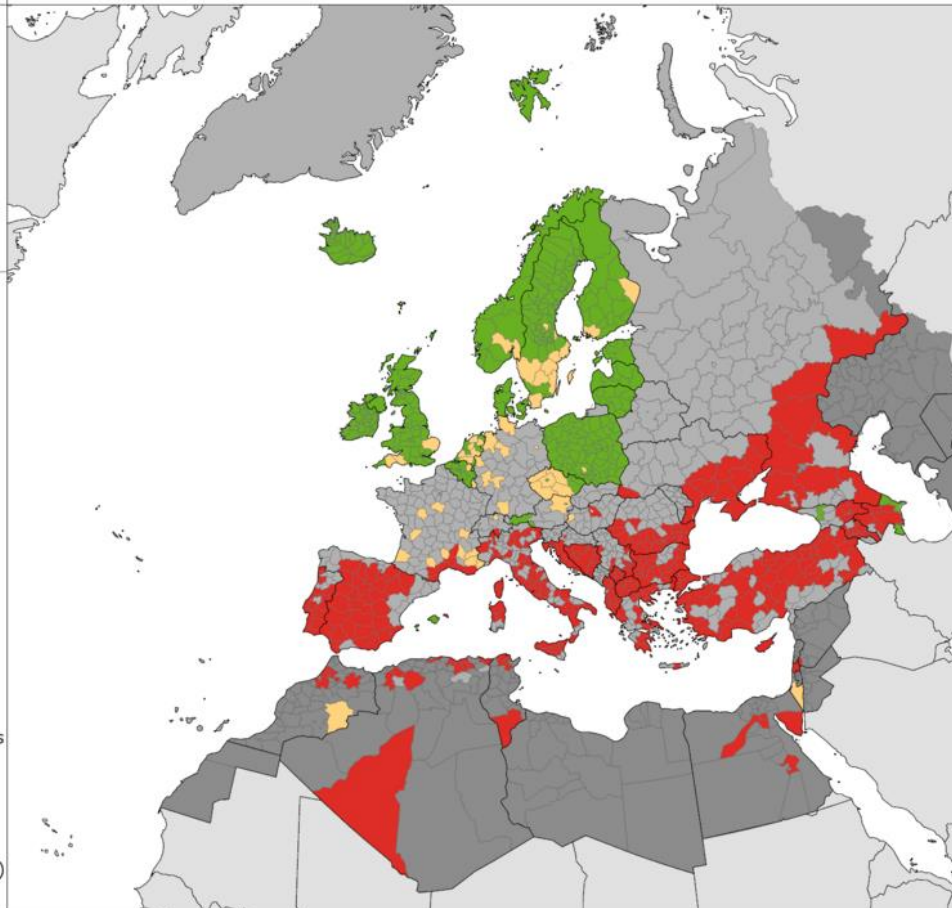
Hyalomma marginatum, October 2023

Legend

- Present
- Introduced
- Antic. Absent
- Obs. Absent
- No data
- Unknown

Countries/Regions not viewable in the main map extent*

- Malta
- Monaco
- San Marino
- Gibraltar
- Liechtenstein
- Azores (PT)
- Canary Islands (ES)
- Madeira (PT)
- Jan Mayen (NO)



1x on human
3x on horses!

? Migratory birds
from Asia / Caucasus ?



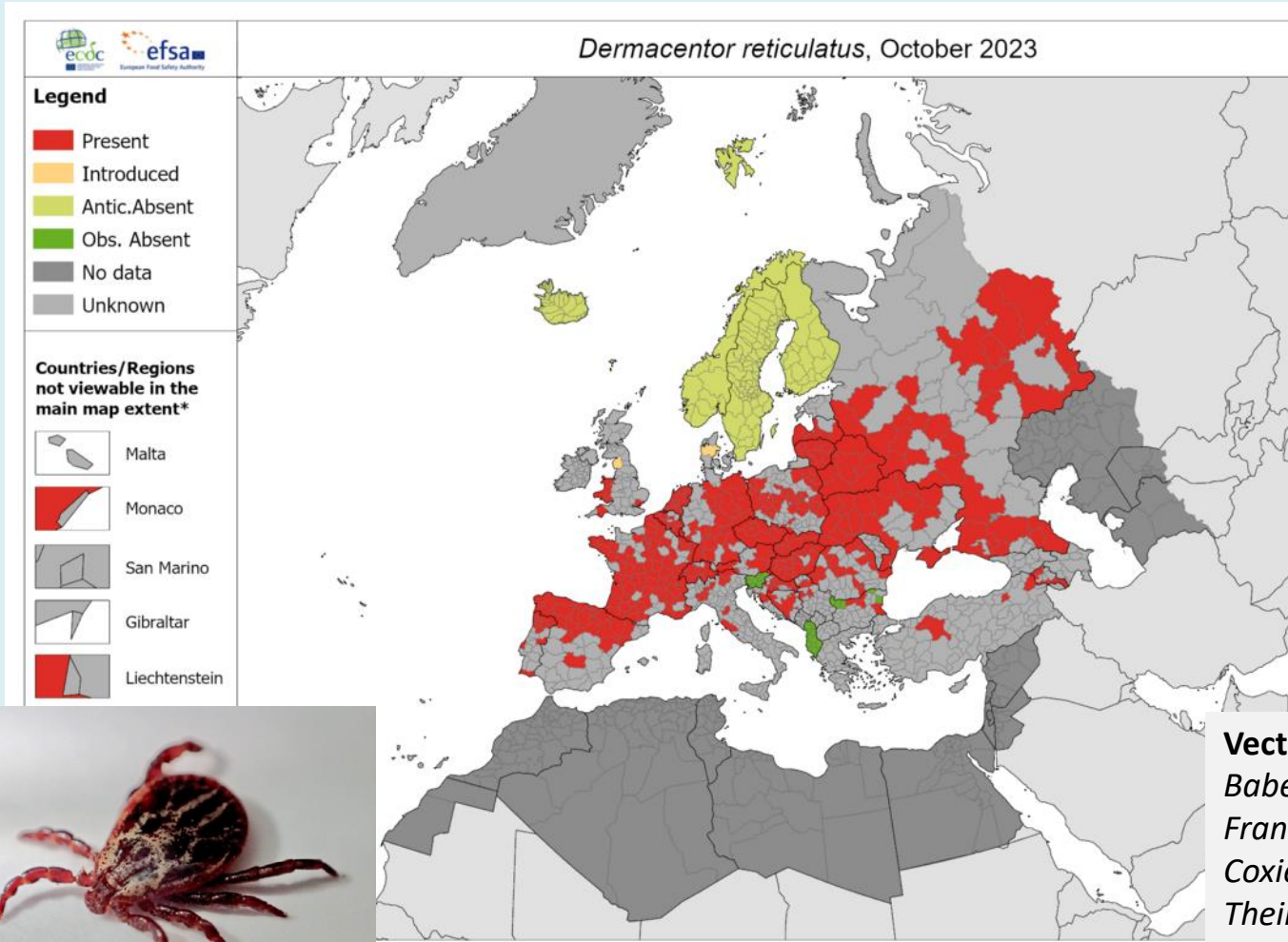
Vector potential
Crimean-Congo Hemorrhagic fever
Rickettsia aeschlimannii

Ticks



LU data

- First record **2009** (Reye et al. 2010, Reye 2011)
- currently spreading from the South
- many records from dogs, occas. humans



Records of *Dermacentor reticulatus* (FABRICIUS, 1794) in Luxembourg. Data source: [Recorder-Lux](#), [iNaturalist](#) & [GBIF](#), 2023-11-28.

Vector potential

- Babesia canis*
- Francisella tularensis*
- Coxiella burnetti*
- Theileria equi*
- several *Rickettsia* species

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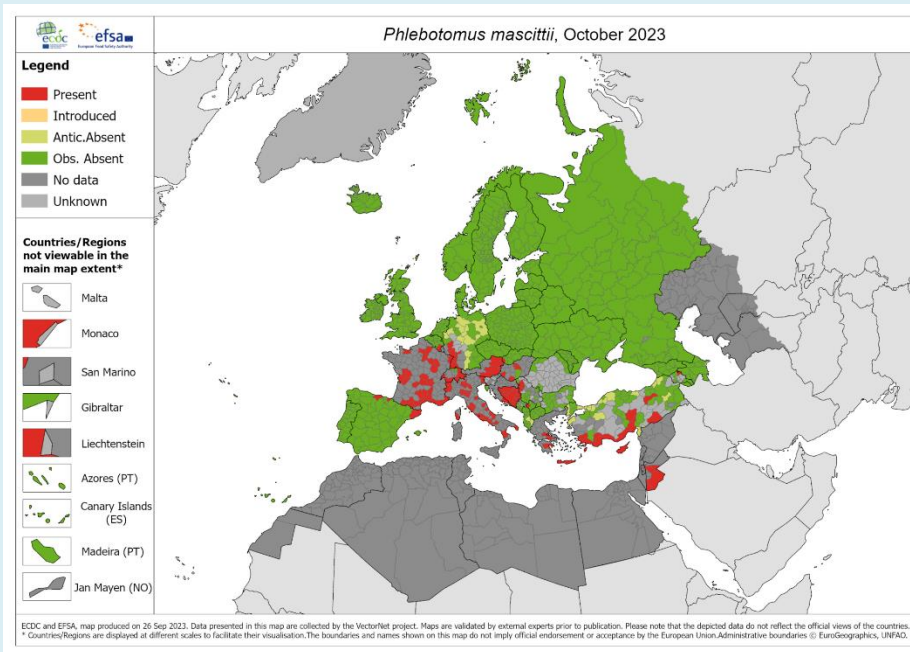


Sand flies

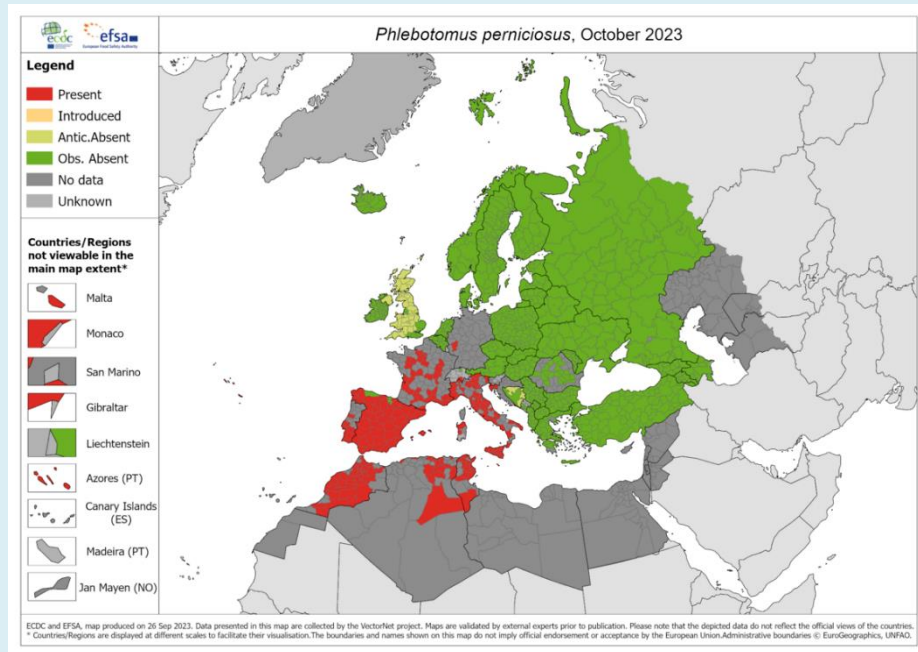


Diptera, Psychodidae, Phlebotominae

- 12 sand fly species assessed, maps updated each 6 months
- no published records for Luxembourg, but 2 species likely
- warm and humid, shaded, open soil, hosts near-by (cattle, chicken, ...)



present in Greater Region

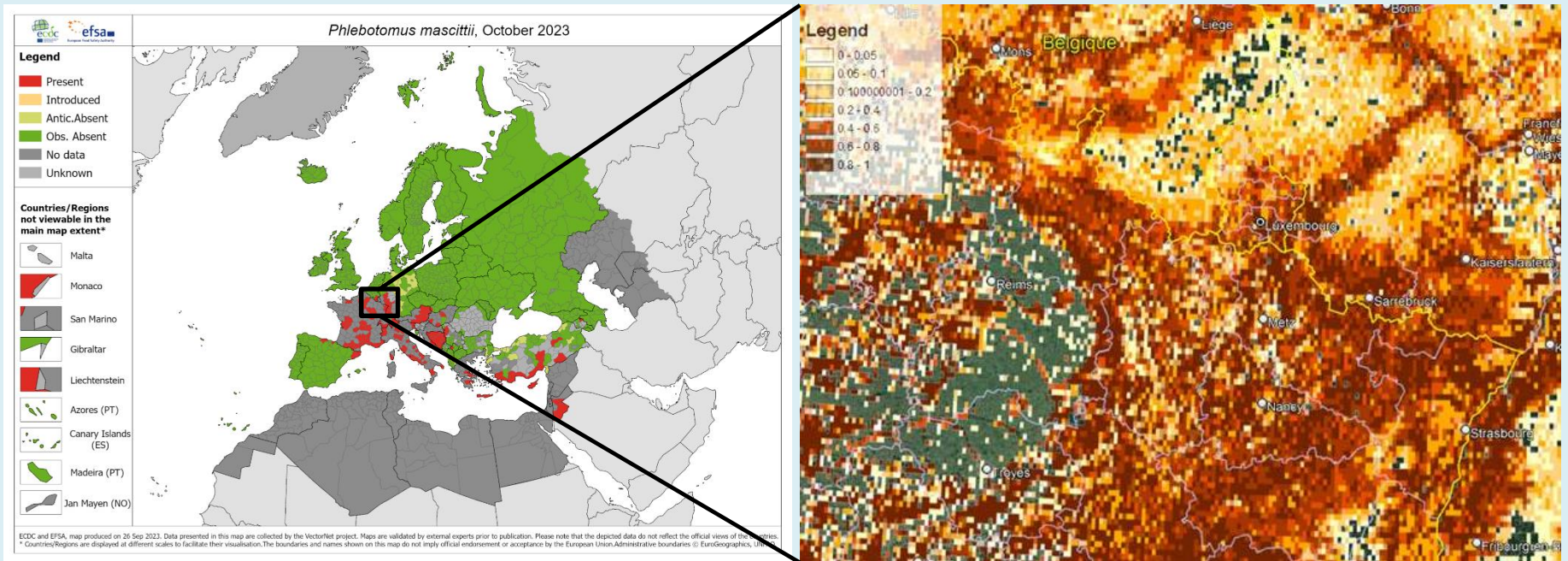


present in F and D

Sand flies



- Habitat suitability model of *Ph. mascittii*
- Luxembourg-City, Mosel Valley and Minette highly suitable



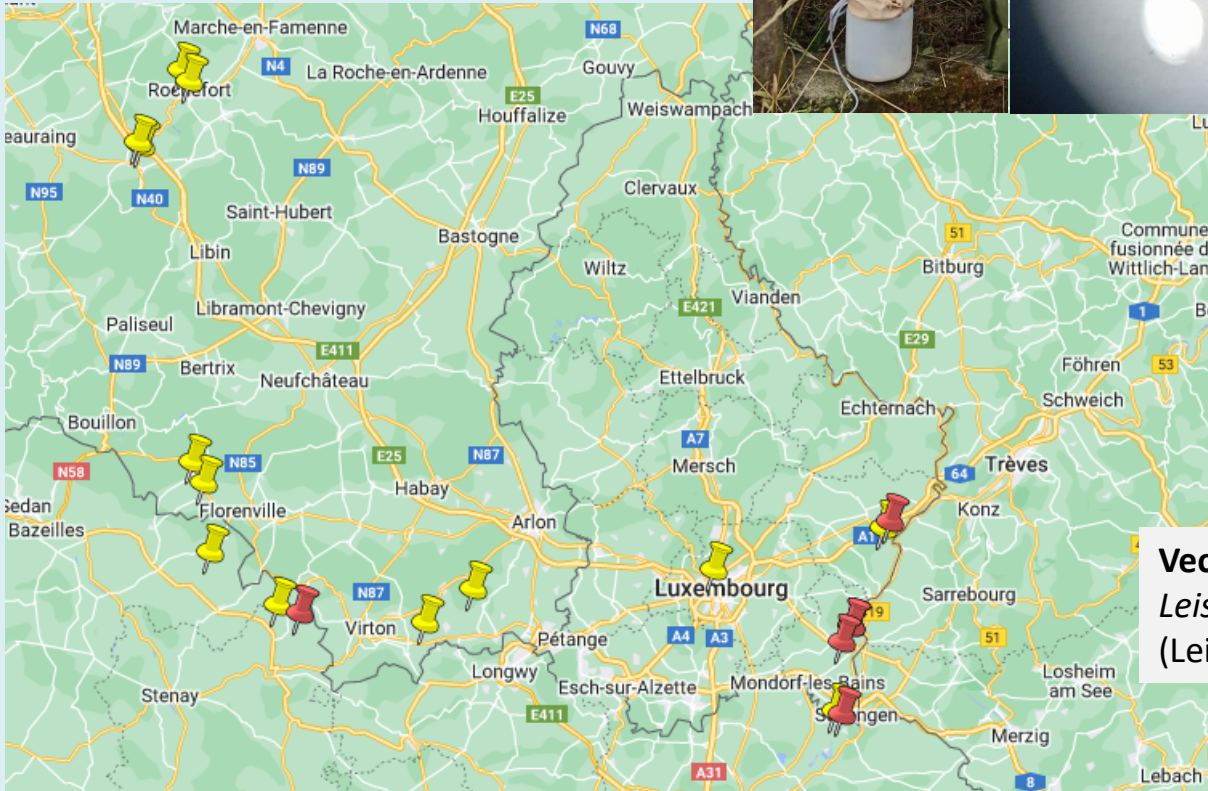
Sand flies



LU data

- First record **2023-07-12** of *Ph. mascittii*
- 2 sites (Remich, Bech-Kleinmacher)

- Workshop July 2023 in LU
- CDC light trapping
- *Phlebotomus mascittii*



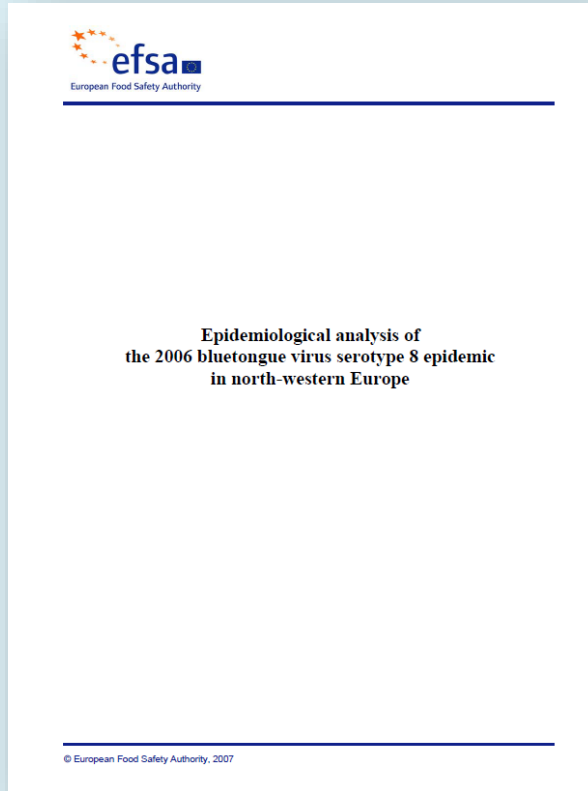
Vector potential
Leishmania infantum (?)
(Leishmaniasis)

Biting midges



Diptera, Ceratopogonidae, *Culicoides*

- 10 species assessed, maps updated each 6 months
- databases have no records, but ...



Annex C to Appendix 9

Entomological monitoring of *Culicoides* species in Belgium and the Grand Duchy of Luxembourg

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*M. Cavelier*², *B. Losson*³, *E. Haubruge*⁴, *J. Bortels*⁴, *F. Francis*⁴, *A. Besch*⁵

¹ITMA, Belgium; ²Wallon Agricultural Research Center, Gembloux, Belgium;
³University of Liège, Liège, ⁴Gembloux Agricultural University, Gembloux,
Belgium; ⁵Ministère de l'agriculture, de la viticulture et du développement
rural, Luxembourg;

Biting midges



- Artisanal trapping 1. – 12. September 2006
- High species diversity
 - 81 specimens of 8 species
- No *C. imicola*, indicating Blue-Tongue-Virus transmission by indigenous species (e.g. *C. dewulfi*, *C. obsoletus* s.l.)

species	specimens
<i>C. obsoletus</i> s.l.	54
<i>C. dewulfi</i> (males)	2
<i>C. pulicaris</i>	17
<i>C. nubeculosis</i>	3
<i>C. punctatus</i>	2
<i>C. festivipennis</i>	1
<i>C. lupicaris</i>	1
<i>C. kibunensis</i>	1

bold = assessed by VectorNet

Summary

- All four vector groups present in LU



assessed by VectorNet:

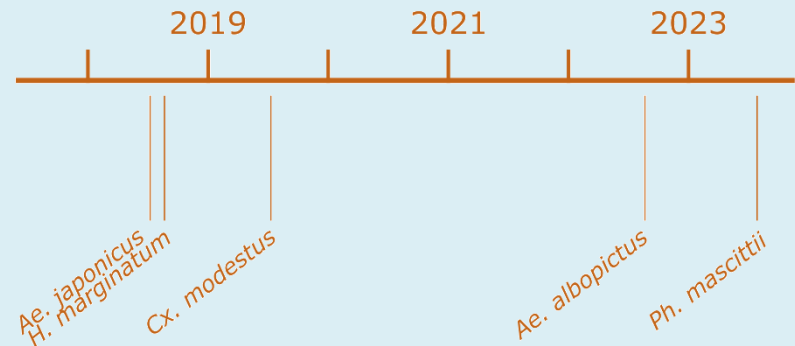
10

3

1

5

- Several first records during last ~5 years + ongoing spread of *D. reticulatus*



- Occurrence data to MNHNL for map updates
- Basic info good for mosquitoes and ok for ticks; missing for sand flies and biting midges
- Regular (environmental) surveillance for all groups / selected species?
(faunal changes, introductions, spreads, changes in abundance)

Thank you for your attention!

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