



Rijksinstituut voor Volksgezondheid
en Milieu
*Ministerie van Volksgezondheid,
Welzijn en Sport*

Alles verandert, inclusief het klimaat

Trends in vector-overdraagbare infectieziekten van belang voor Nederland

Marieta Braks

Medisch Entomoloog, Dr.

Afdeling Wild- en Vectoroverdraagbare infecties

Centrum voor Zoönosen en Omgevingsmicrobiologie

Cib/RIVM



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Inhoud

1. Alles verandert, inclusief het klimaat
2. Vectoren & infectieziekten: Trends in Nederland en Europa
 - a muggen &
 - b teken &
3. Bloedveiligheid
4. Conclusies





1. Alles verandert, inclusief het klimaat

Trends in klimaat, leefomgeving en mens



Klimaatverandering



opwarming



droogte



extreme regenval

Klimaatadaptatie



vergroening



verblauwing



duurzaamheid

Demografie



vergrijzing



multicultureel



ongezond

Globalisatie



verkeer



tourisme



handel

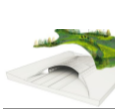
Ecologie



rewildering



natuurrestauratie



connectiviteit

Gedrag



individualism



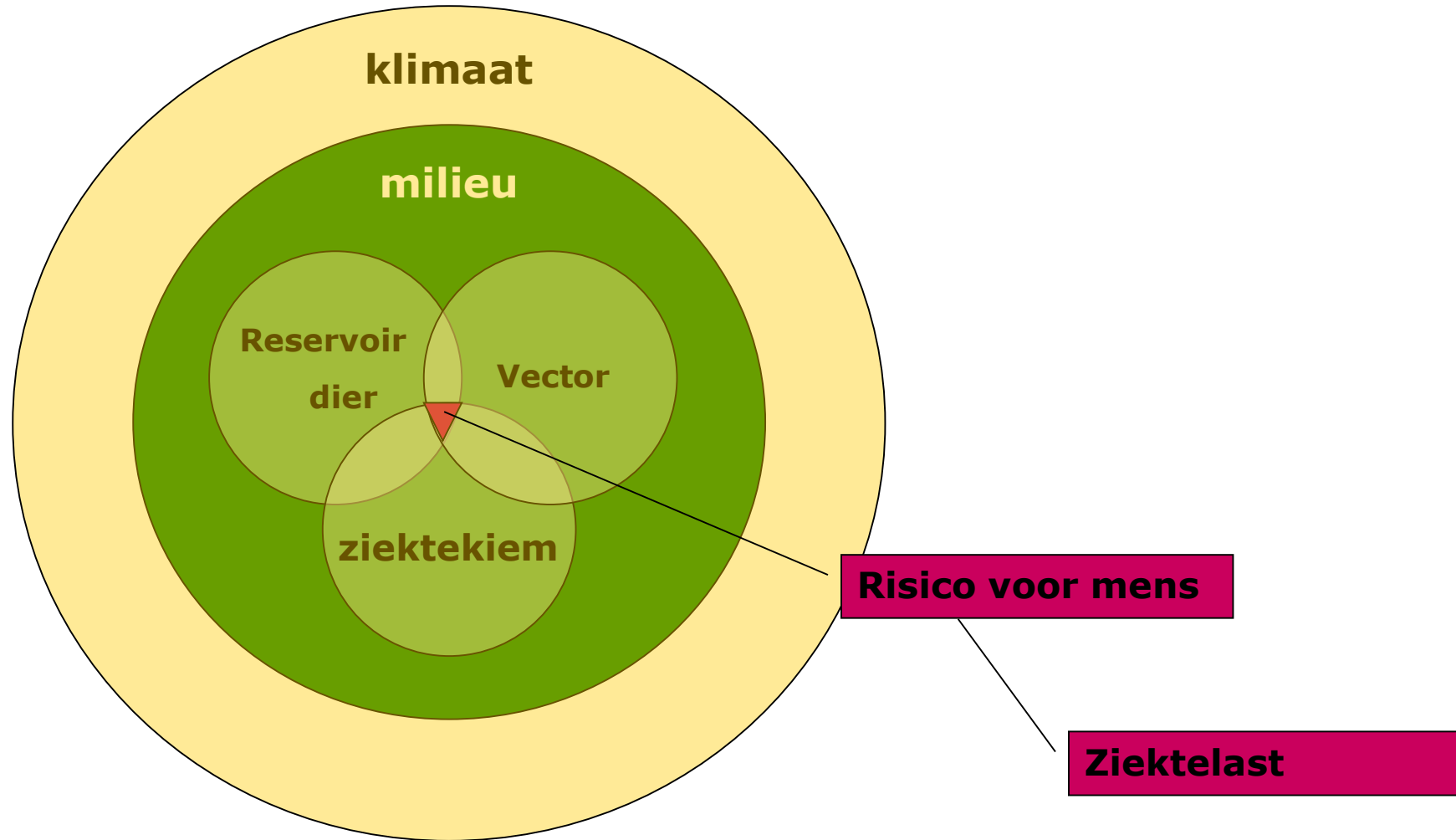
veganistisch



polarisatie



2. Vectoren en infectieziekten



Vectoren	Bacteria	Virus	Protozoa	Filaria
Teken	✓	✓	✓	
Zandvliegen		✓	✓	
Muggen		✓	✓	✓
Knutten				
Kleerluizen				
Vlooien				
Mjten				
<i>Kissing bugs</i>				
Tseetseevliegen				
<i>Black flies</i>				
Luisvliegen				
Dazen (mech)				

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Knutten		✓		✓
Kleerluizen	✓			
Vlooien	✓			
Mjten	✓			
<i>Kissing bugs</i>			✓	
Tseetseevliegen			✓	
<i>Black flies</i>		(?)	✓	✓
Luisvliegen	✓		✓	
Dazen (mech)	(✓)	(✓)		✓

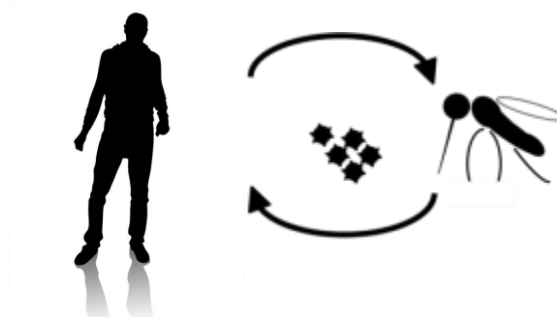
2a. Muggen &.....



2a. Muggen &.....



- ✓ Dengue
- ✓ Zika
- ✓ Chikungunya



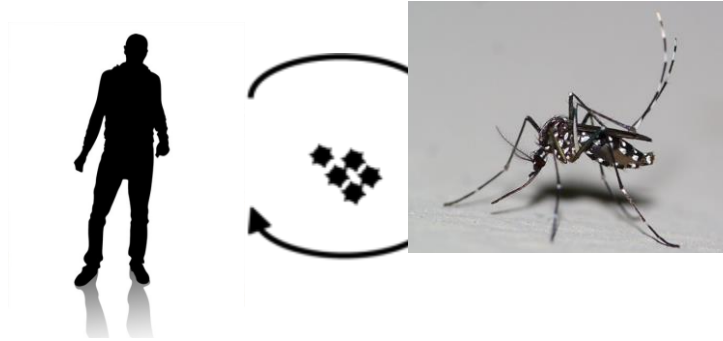
-
- ✓ Westnijkkoorts



2a. Muggen &.....



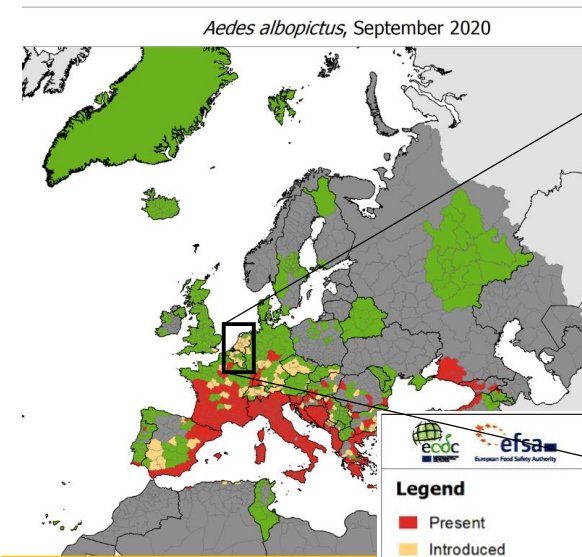
- ✓ Dengue
- ✓ Zika
- ✓ Chikungunya



-
- ✓ Westnijkkoorts

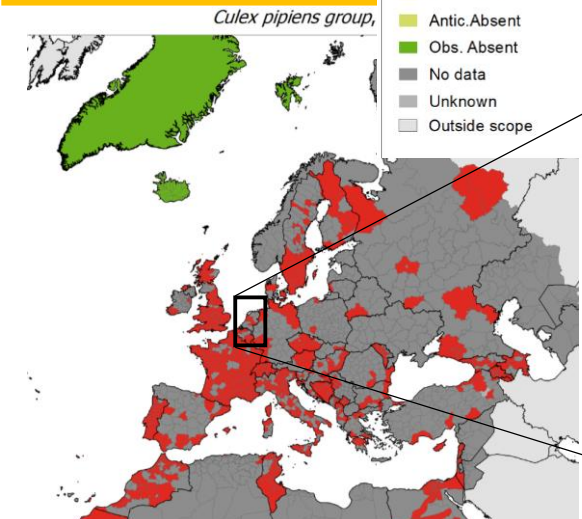


2a. Muggen &.....



Aziatische tijgermug
Aedes albopictus

Invasieve exoot

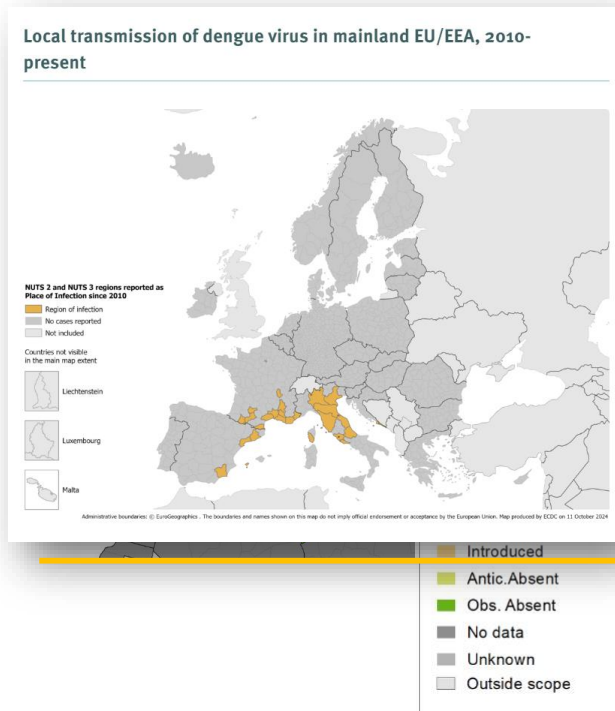


Gewone huisteekmug
Culex pipiens



Inheemse soort

2a. Tijgermug &.....



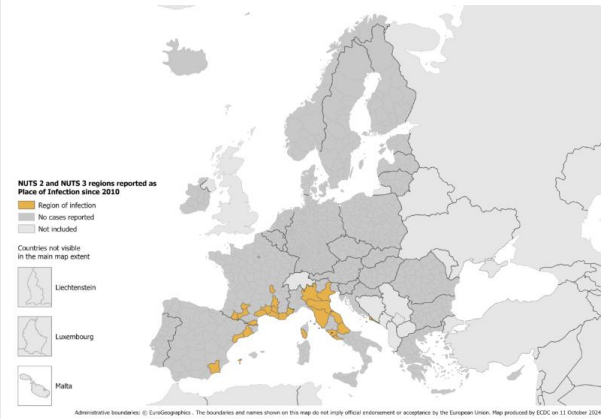
Aziatische tijgermug
Aedes albopictus

Invasieve exoot

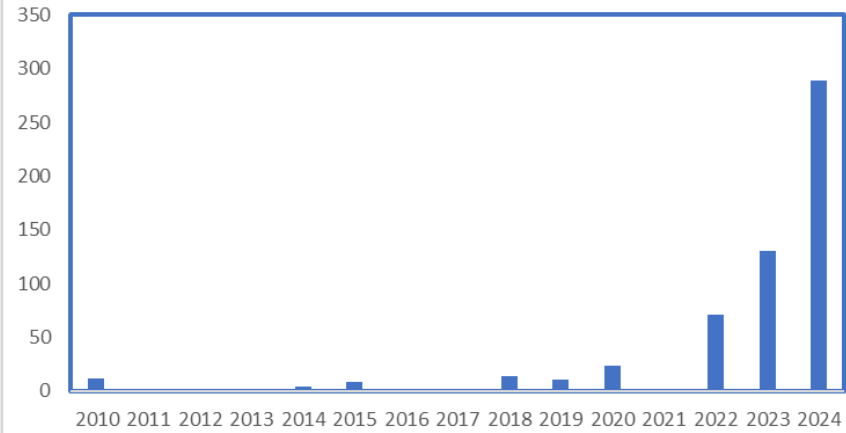
2a. Tijgermug & dengue



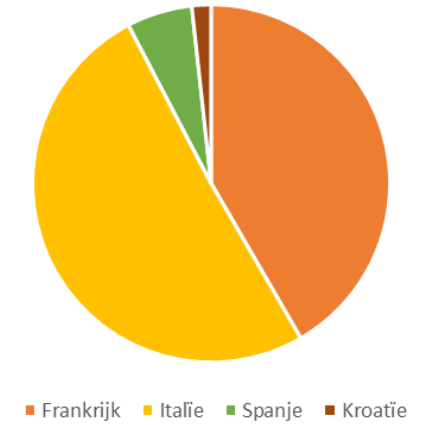
Local transmission of dengue virus in mainland EU/EEA, 2010-present



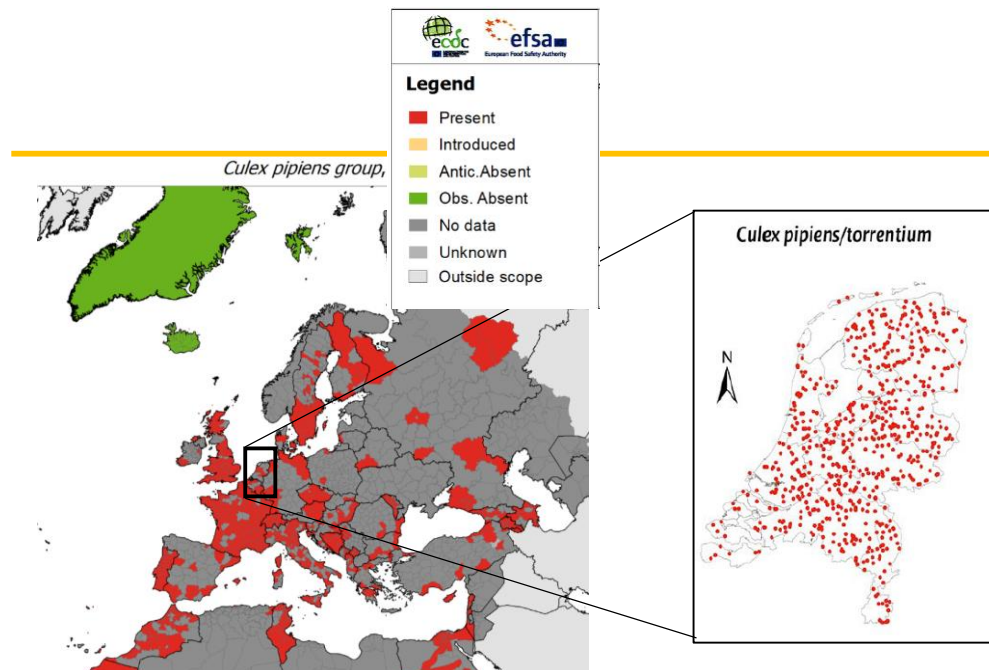
Autochtone DENV casussen



Autochtone DENV casussen



2a. Muggen &

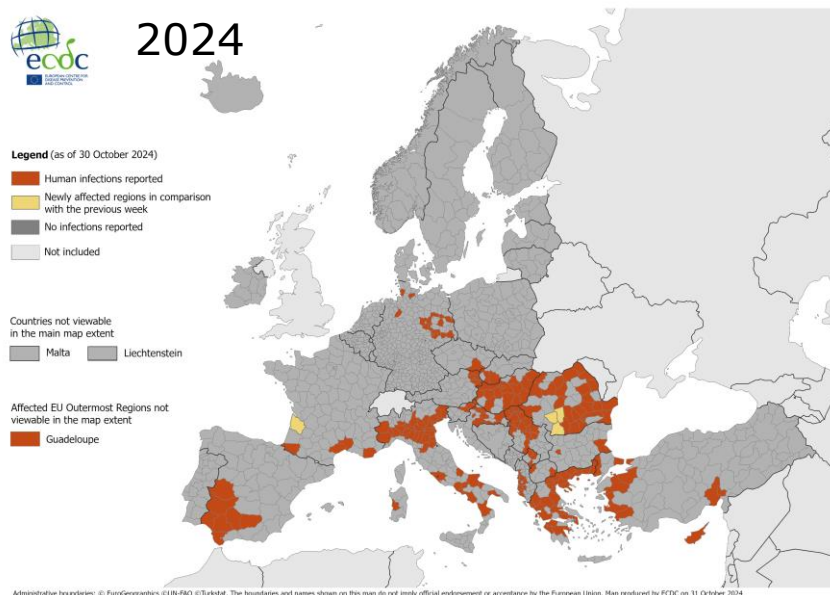


Gewone huisteekmug
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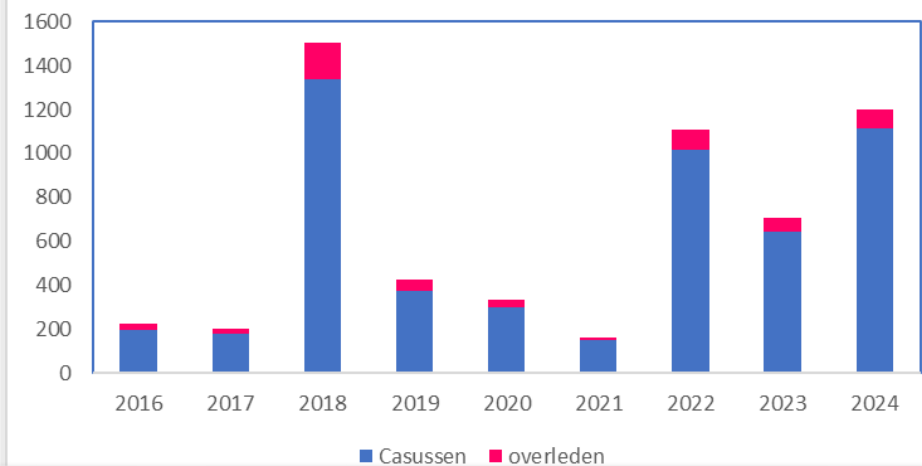


Inheemse soort

2a. *Culex*-mug & Westnijlvirus



WNV casussen in Europa, 2016-2024



Historical data by year - West Nile virus seasonal surveillance (europa.eu)
<https://www.ecdc.europa.eu/en/west-nile-fever/surveillance-and-disease-data/historical>



Teken Overdraagbare Aandoeningen: Meer dan Lyme ?

- Symbionts gedetecteerd in schapenteek

***Borrelia burgdorferi* sensu lato**

- *B. afzelii*
- *B. garinii*
- *B. bavariensis*
- *B. spielmanii*
- *B. valaisiana*
- *B. sensu stricto*
- *B. lusitaniae*
- *B. turdii*

Andere Ixodes pathogenen

Tick-borne encephalitis virus
Anaplasma phagocytophilum
Borrelia miyamotoi
Babesia divergens
Babesia microti
Neoehrlichia mikurensis
Rickettsia helvetica/*R. monacensis*
Spiroplasma ixodetes

Overgedragen door *I. ricinus*?

- *Francisella tularensis*
- *Bartonella* spp.
- *Coxiella burnetti*

Getriggered door *I. ricinus* antigens

Meat allergy

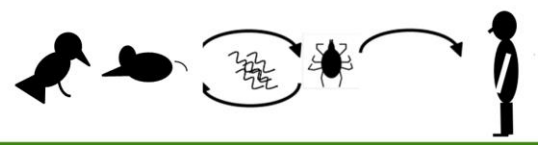
En nog meer

Midichloria midichondrii
Rickettsiella spp.
Grotenhoutvirus
Eyach virus
Hepatozoon spp.
Ixodiphagus hookeri
.....

2b. Teken &.....

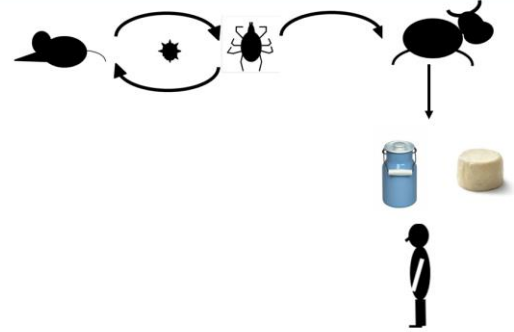


✓ Ziekte van Lyme





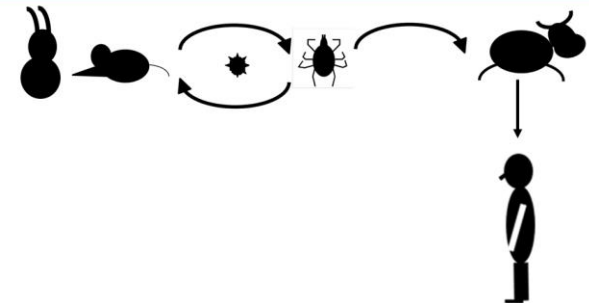
✓ Teken-encefalitis





TBE is
easily prevented
by vaccination.

✓ Crimean Congo Hemorrhagische koorts

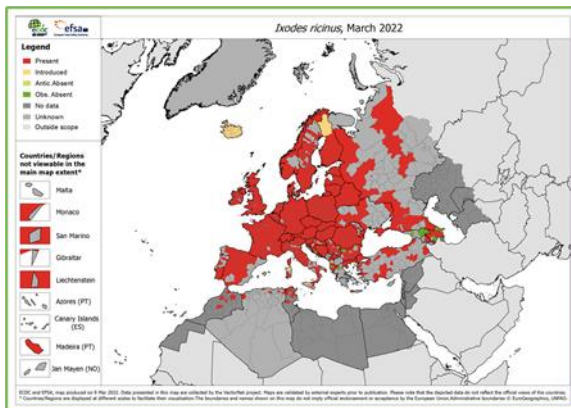




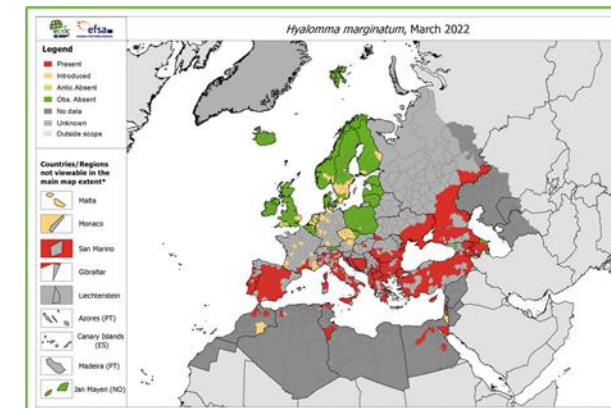
2b. Teken &.....



Schapenteek versus reuzenteek



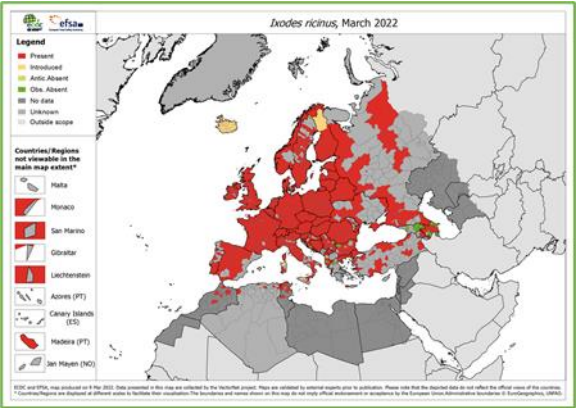
“Ambush strategy”



“Active seeking”



Schapenteek



“Ambush strategy”

2b. Teken & TBEv



In Nederland

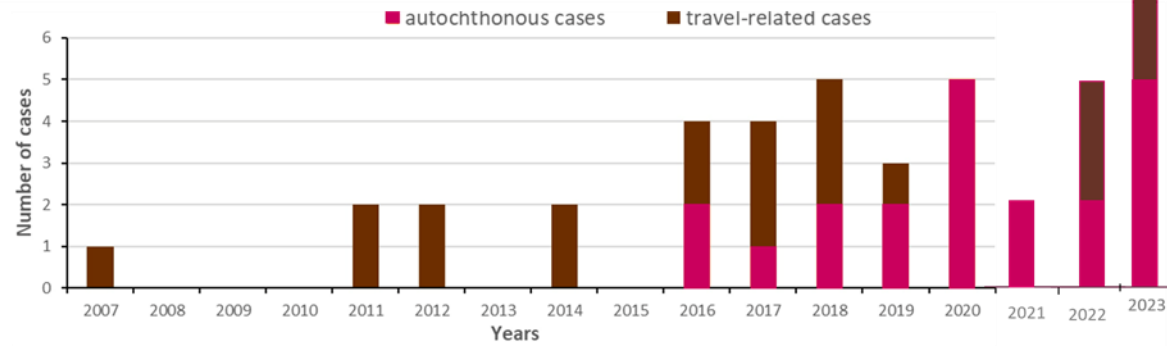
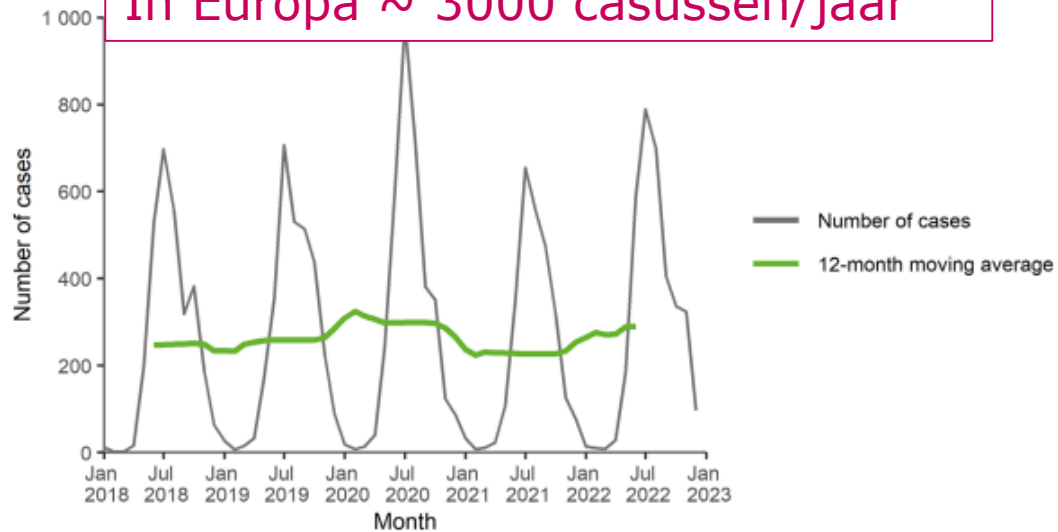


Figure 2.

In Europa ~ 3000 casussen/jaar



Source: Country reports from Austria, Czechia, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Romania, Slovakia, Slovenia, Spain, and Sweden.

2b. Teken & TBEv



Babesia species

- Geen humane gevallen /sporadische gevallen in runderen

Babesia	Teken (~25,000)	
	nymfen	adulten
Ba. divergens	0.02%	0.1%
Ba. odocolei-like	0.00%	0.0%
Ba. capreoli	0.06%	0.1%
Ba. venatorum	1.21%	1.7%
Ba. microti	0.63%	1.3%

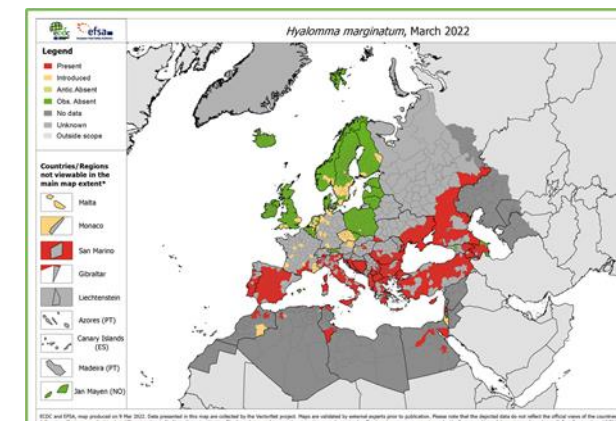


2b. Teken & CCHFv

reuzenteek



©Zati Vatansever

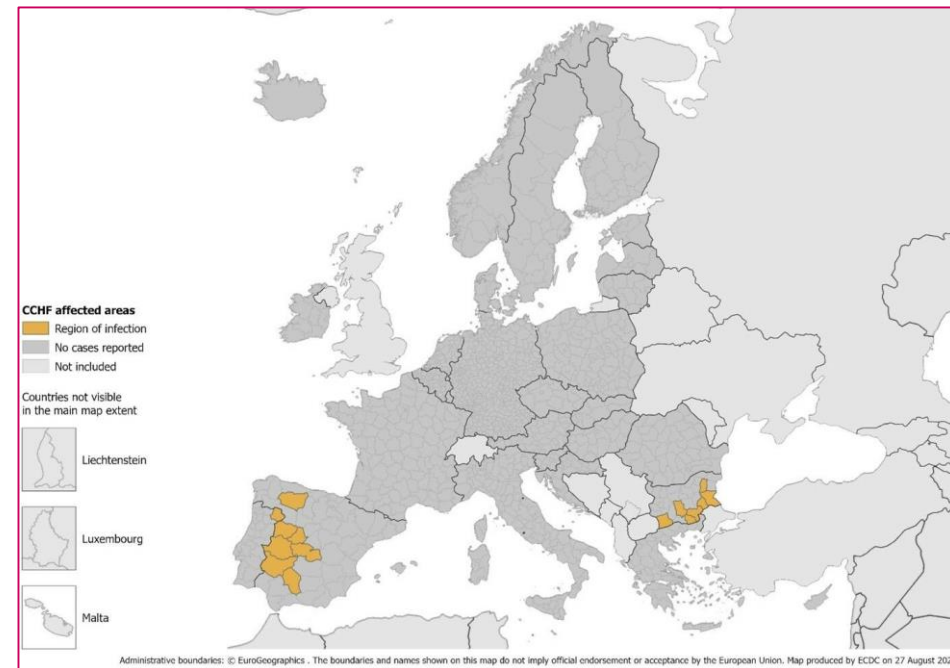


“Active seeking”



2b. Teken & CCHFv

In Europa <8 casussen/jaar



3. Bloedveiligheid



- arbovirussen
- andere vector overgedragen pathogenen

3. Bloedveiligheid



- arbovirussen

-

Table 4. Arboviruses that could pose a threat to transfusion safety due to direct non-vector related transmission mechanisms.

Source of threat to transfusion safety	Arboviruses
Transmission through organ—and/or hematopoietic stem cell transplantation	Dengue virus, eastern equine encephalitis virus, heartland virus, Jamestown Canyon virus, tick-borne encephalitis virus, and West Nile virus
Mother-to-child transmission	Colorado tick fever virus, Japanese encephalitis virus, Ross River virus, yellow fever virus, Zika virus, dengue virus, West Nile virus, chikungunya virus, Crimean-Congo hemorrhagic virus, La Crosse virus, O'nyong'nyong virus, Rift Valley fever virus, Sindbis virus, Venezuelan equine encephalitis virus and Western equine encephalitis virus.
Prevalence in blood donors	Japanese encephalitis virus, Ross River virus, St. Louis encephalitis virus, tick-borne encephalitis virus, yellow fever virus, Zika virus, dengue virus, West Nile virus, Barmah Forest Virus, chikungunya virus, Crimean-Congo hemorrhagic virus, eastern equine encephalitis virus, Heartland virus, Jamestown Canyon virus, Mayaro virus, Murray Valley encephalitis virus, O'nyong'nyong virus, Rift Valley fever virus, Huaiyangshan banyangvirus (Severe fever with thrombocytopenia syndrome Virus), Sindbis virus, Tahyna virus, Toscana virus, and Piry vesiculovirus.
Other direct routes of transmission	<i>Blood contact:</i> tick-borne encephalitis virus, dengue virus, chikungunya virus, Crimean-Congo haemorrhagic virus, La Crosse virus, Zika virus

<https://doi.org/10.1371/journal.pntd.0010843.t004>

3. Bloedveiligheid



- arbovirussen

-

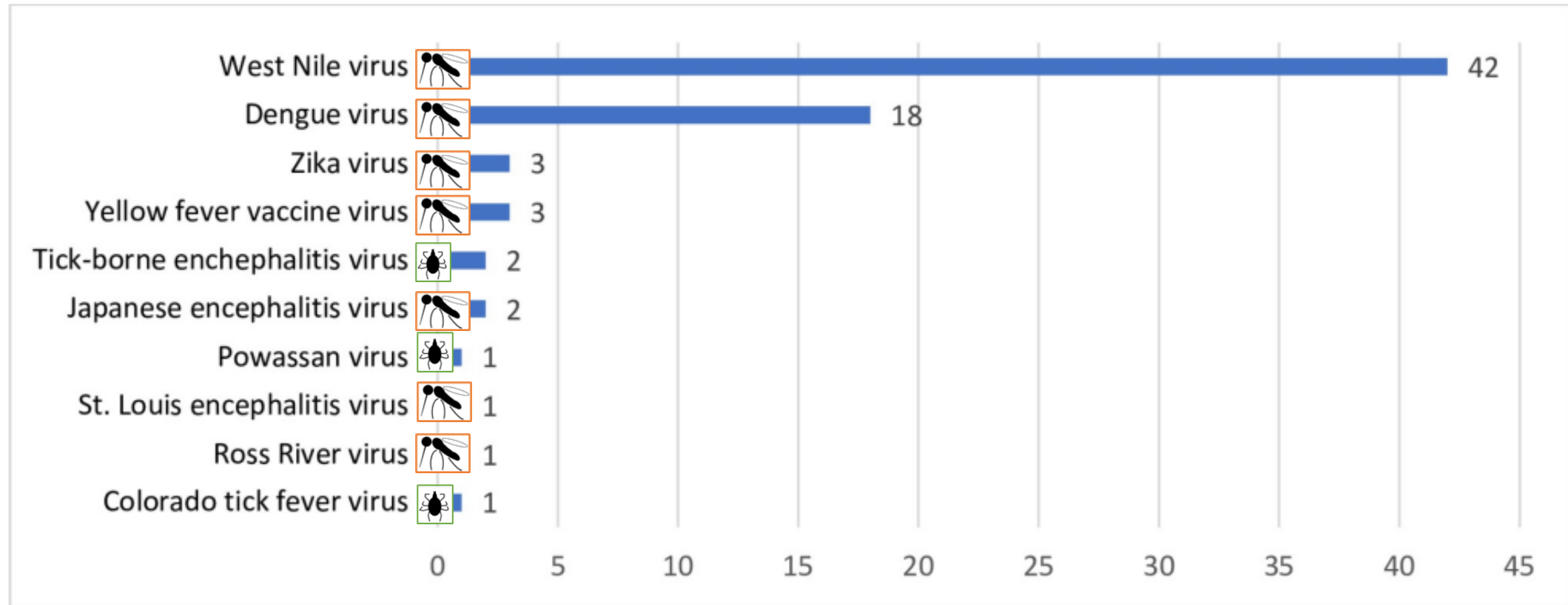


Fig 2. Reported transfusion-transmitted arbovirus cases.

3. Bloedveiligheid



- arbovirussen
- andere vector overgedragen pathogenen

Table 1. Selected Tick-Borne Agents Posing Blood Safety Risks

Agent	Geographical Distribution	Vector(s)
<i>Babesia</i> spp		
<i>Babesia microti</i>	United States (northeast, upper Midwest)	<i>Ixodes scapularis</i>
WA-1	United States (Pacific Coast)	<i>I. pacificus</i>
<i>B. divergens</i>	Europe	<i>I. ricinus</i>
<i>Ehrlichia chaffeensis</i>	United States	<i>Amblyomma americanum</i>
<i>Anaplasma</i>		
<i>phagocytophilum</i>	United States, Europe	<i>I. scapularis, I. pacificus, I. ricinus</i>
<i>Rickettsia rickettsii</i>	North America	<i>Dermacentor variabilis, D. andersoni</i>
Colorado tick fever virus	Western United States, Canada	<i>D. andersoni</i>
Tick-borne encephalitis virus	Eastern and Central Europe, Russia, Asia	<i>I. persulcatus, I. ricinus</i>

Borrelia burgdorferi s.l.: laag bloed tropisme

Babesia species		
• Geen humane gevallen /sporadische gevallen in runderen		
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Waarschijnlijk verschil in pathogeniteit tussen continenten		

4. Conclusie



- Grote verscheidenheid aan pathogenen door teken en muggen overgedragen
- Echter in Nederland effect op bloedveiligheid tov andere infectieziekten:
minimaal
behalve WNV, zeker als indien endemisch in toekomst

TOCH?

Dankwoord



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