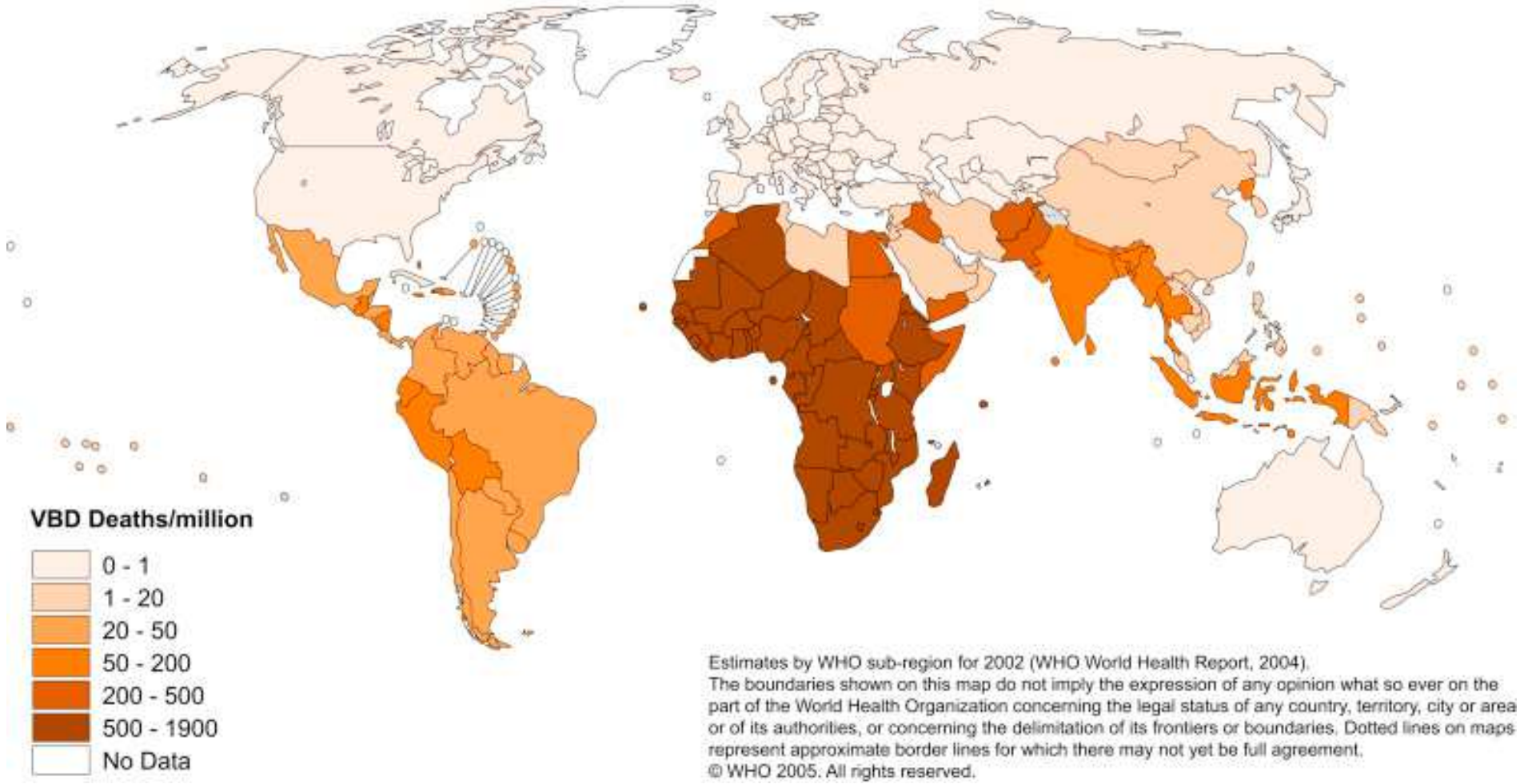
Deaths from vector-borne disease



Estimates by WHO sub-region for 2002 (WHO World Health Report, 2004).

Molte famiglie di interesse sanitario

- *Culicidae* (mosquitoes)
- *Muscidae* (flies)
- *Sarcophagidae e Calliphoridae* (blowflies)
- *Tabanidae* (horseflies)
- *Simuliidae* (black flies)

Inoltre i generi

- *Culicoides* (biting midges)
- *Phlebotomus* (sandflies)

Flebotomi Italiani

- *P. perniciosus* (Centro Sud, Nord Ovest)
- *P. ariasi* (Nord Ovest)
- *P. neglectus* (Sicilia, Calabria, Puglia e Veneto),
- *P. perfiliewi* (Sud e Centro Italia),
- *P. papatasi* (Centro Sud, Veneto),
- *P. mascitti* (Centro Sud),
- *P. sergenti* (Sicilia)

Arbovirus

Phlebovirus		human disease
Febre da pappatacio (Sicilian virus)	*Phlebotomus* spp.	yes
Febre da pappatacio (Napoli virus)	*P. papatasi , P. perfiliewi*	yes
Tosacana virus	*P. perniciosus, P.perfiliewi*	yes
Arbia virus	*P. perniciosus, P.perfiliewi*	no
Corfù virus	*P. neglectus*	no
Rabdoviridae		
Radi virus	*P.perfiliewi*	no
Yug Bogdanovac virus	*P.perfiliewi*	no

Zanzare

Larve acquatiche

Sviluppo larvale più breve (circa una settimana alle temperature ottimali)

Più abbondanti in pianura

Buone volatrici (*Cx pipiens* circa 4 km, *Ae./Oc. caspius* anche >20 km)

Adulti più longevi (si **stima** circa un mese)

VS.

Flebotomi

Larve terricole focolai larvali in substrati ricchi di sostanza organica

Sviluppo larvale più lungo (circa quaranta giorni alle temperature ottimali)

Più abbondanti in ambienti collinari nelle nostre regioni

Scarsi volatori (non volano con il vento), 200-300 m (anche se cono state registrate distanze superiori a 2 km)

Adulti meno longevi (si **stimano** 2-3 settimana)

Principali specie di zanzare vettrici in Europa

Species	Distribution	Pathogens transmitted in Europe
Aedes caspius	All of Europe	Tahyna virus and *Dirofilaria repens*
Aedes vexans	All of Europe	Tahyna virus
Aedes albopictus	Signaled in 1991 in Italy and now established in Southern Europe	Dengue virus and Chikungunya virus
Aedes communis	Eastern Europe (rare in Western Europe)	Inkoo virus and Sindbis virus
Culiseta morsitans	All of Europe	Sindbis virus
Culex pipiens complex		
Cx. pipiens	All of Europe and more spread in Southern Europe	West Nile virus and *Dirofilaria repens*
Cx. torrentium	All of Europe and more spread in Northern-Central Europe	Sindbis virus
Anopheles maculipennis complex[a]		
An. labranchiae	Southeastern Europe	*Plasmodium* spp.
An. atroparvus	Mainly Continental Europe	
An. sacharovi	Southern Europe (Mediterranean)	
An. maculipennis s.l.		Batai virus

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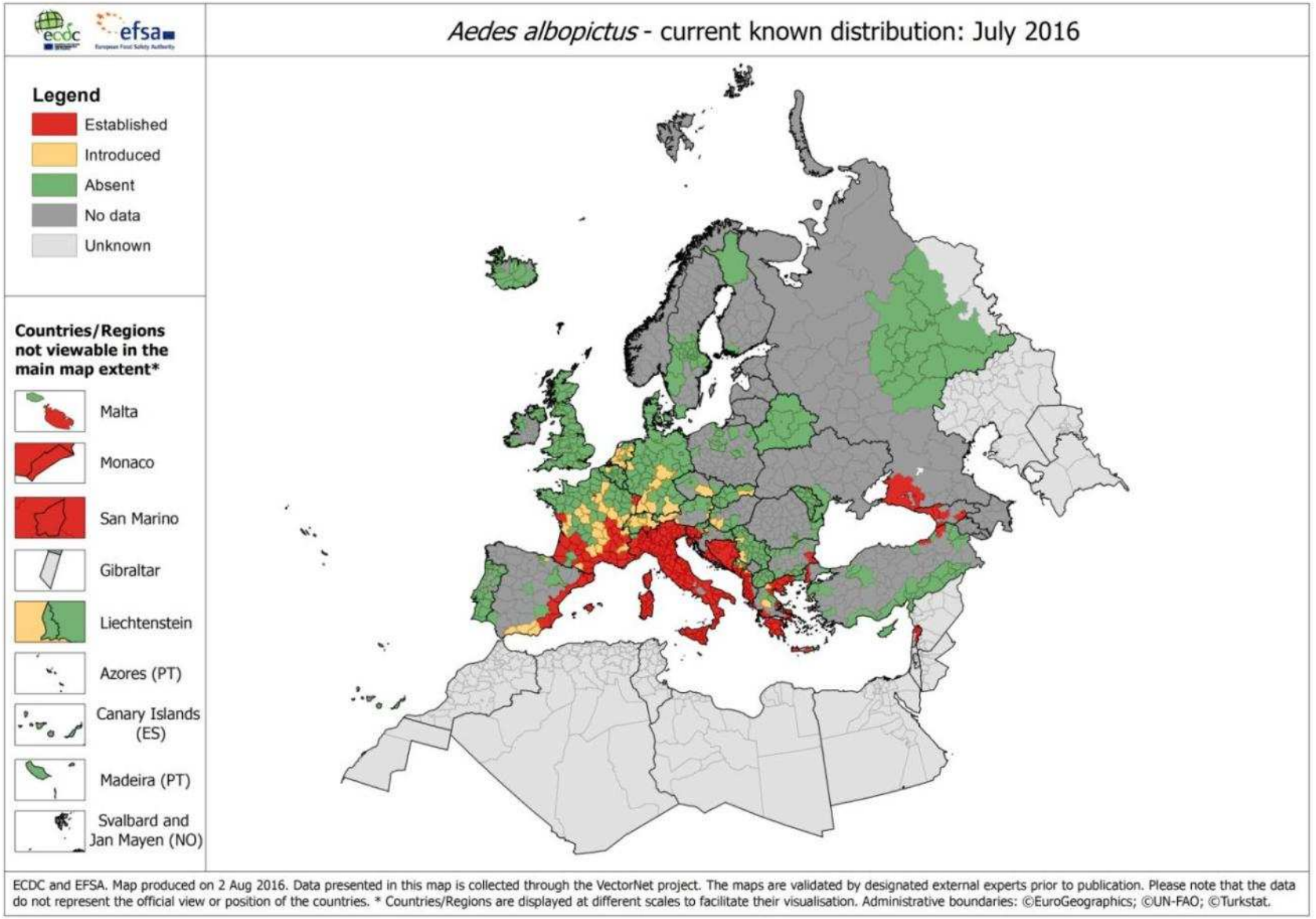
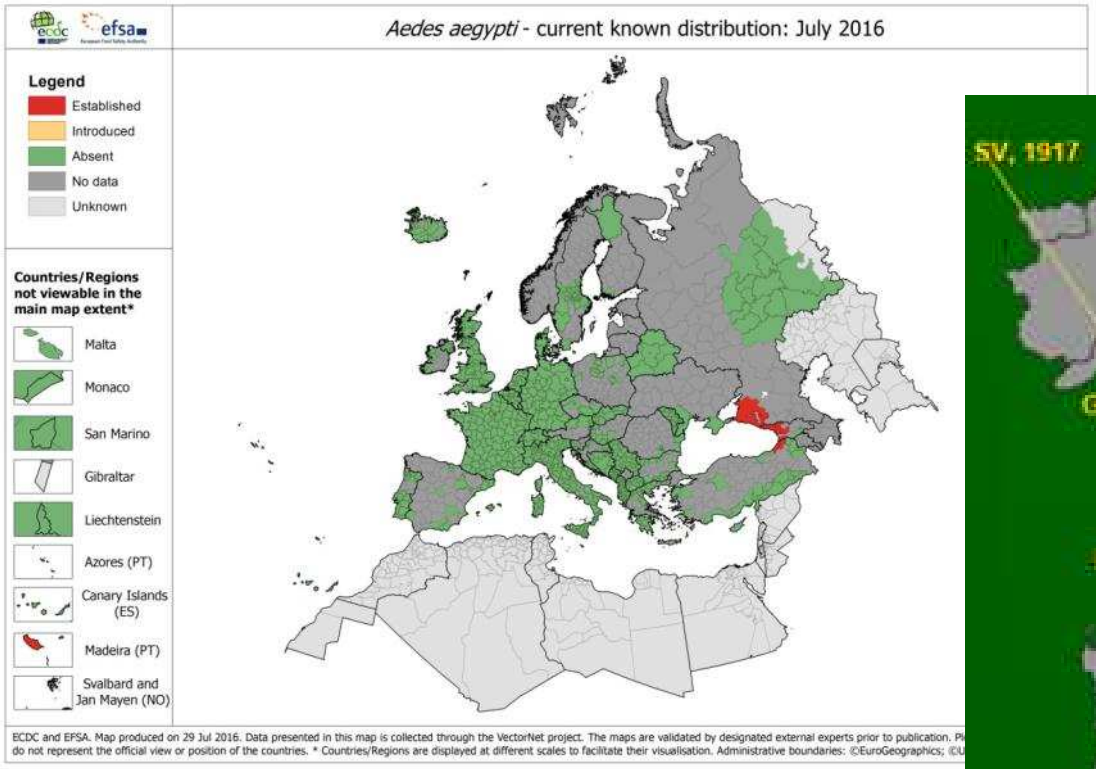
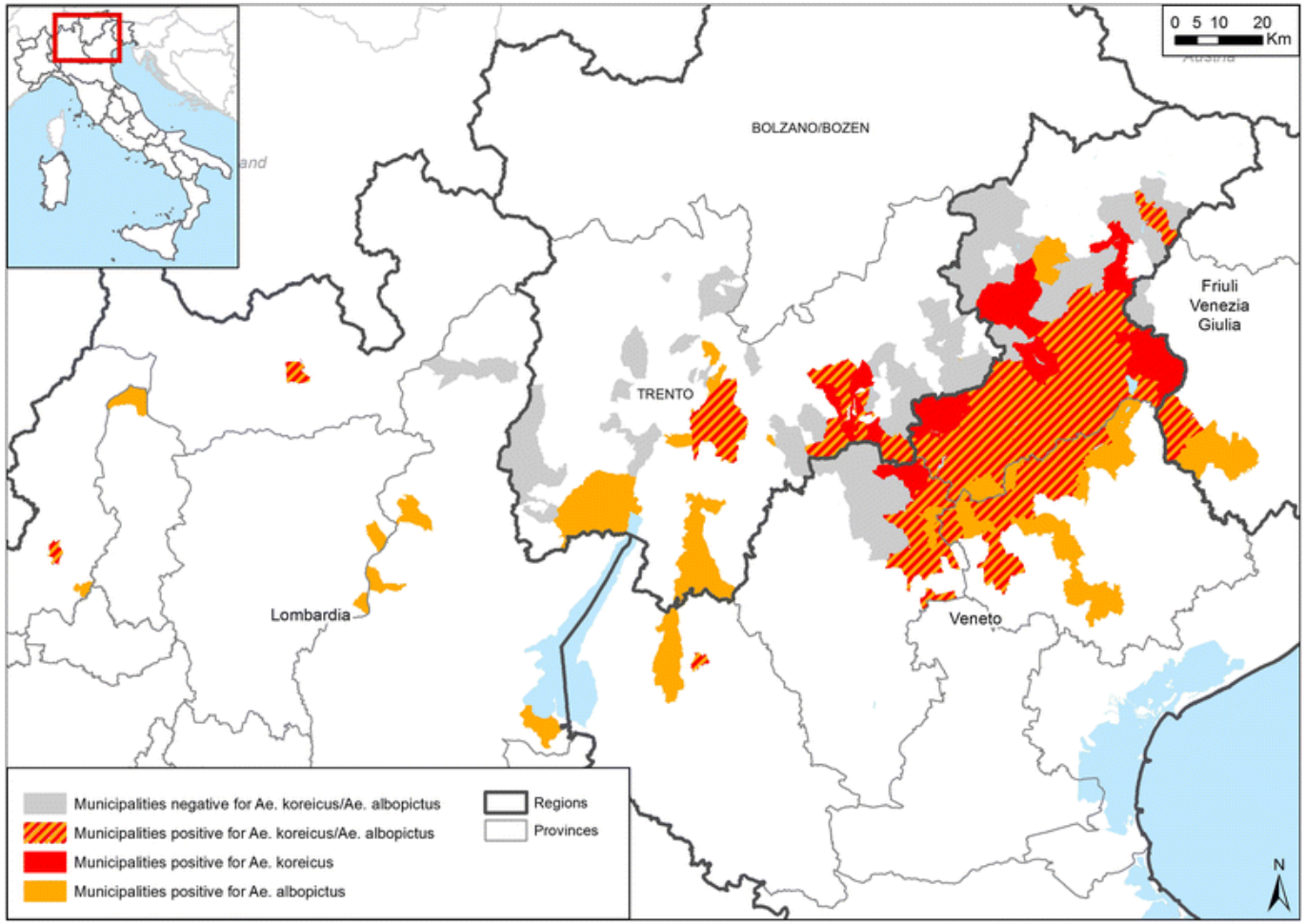

ecdc
efsa
European Food Safety Authority
Aedes albopictus - current known distribution: July 2016
Legend
Established
Introduced
Absent
No data
Unknown
Countries/Regions not viewable in the main map extent*
Malta
Monaco
San Marino
Gibraltar
Liechtenstein
Azores (PT)
Canary Islands (ES)
Madeira (PT)
Svalbard and Jan Mayen (NO)
ECDC and EFSA. Map produced on 2 Aug 2016. Data presented in this map is collected through the VectorNet project. The maps are validated by designated external experts prior to publication. Please note that the data do not represent the official view or position of the countries. * Countries/Regions are displayed at different scales to facilitate their visualisation. Administrative boundaries: ©EuroGeographics; ©UN-FAO; ©Turkstat.

Aedes aegypti

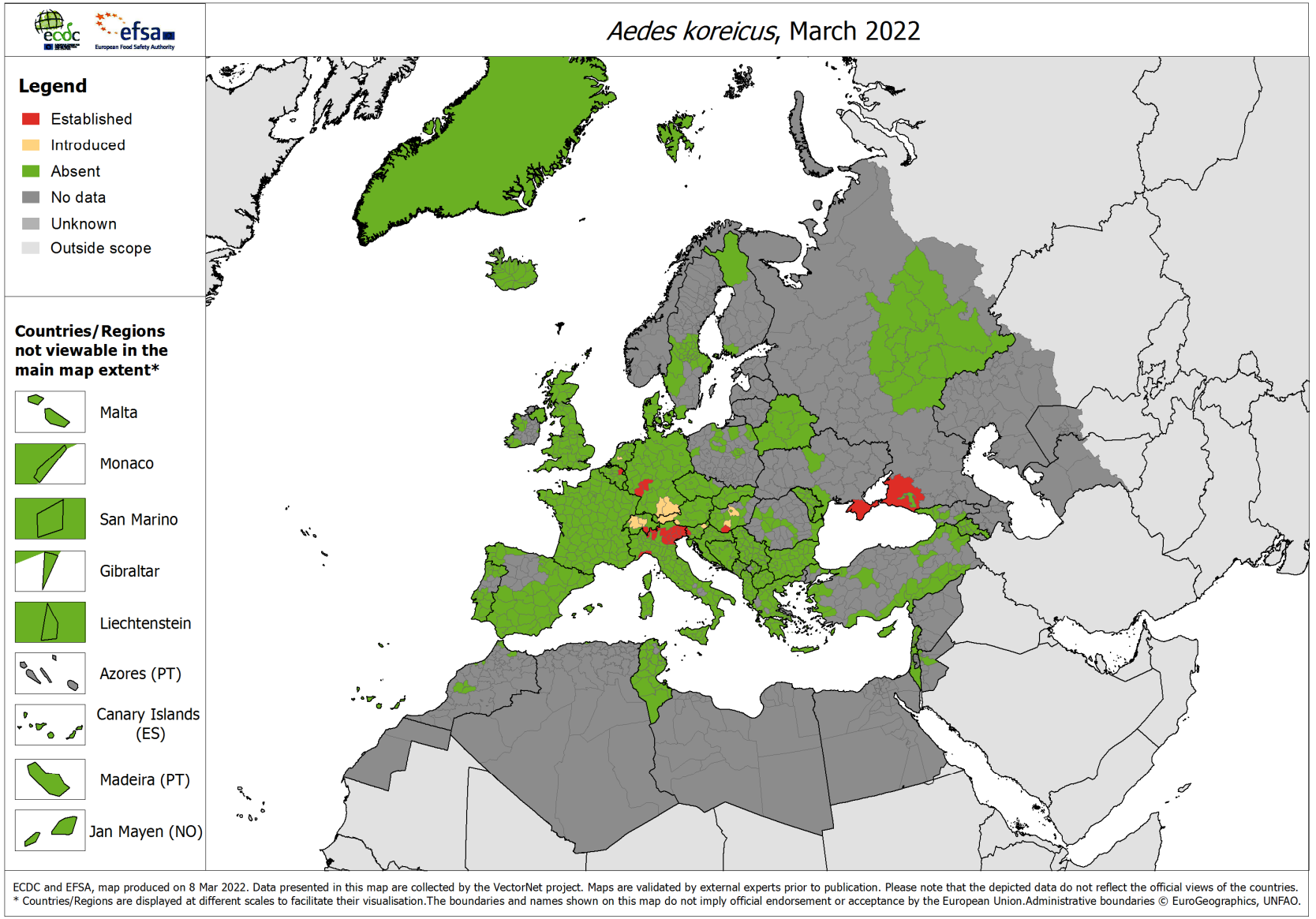


Aedes koreicus in Nord Italia

(Montarsi et al. 2015)

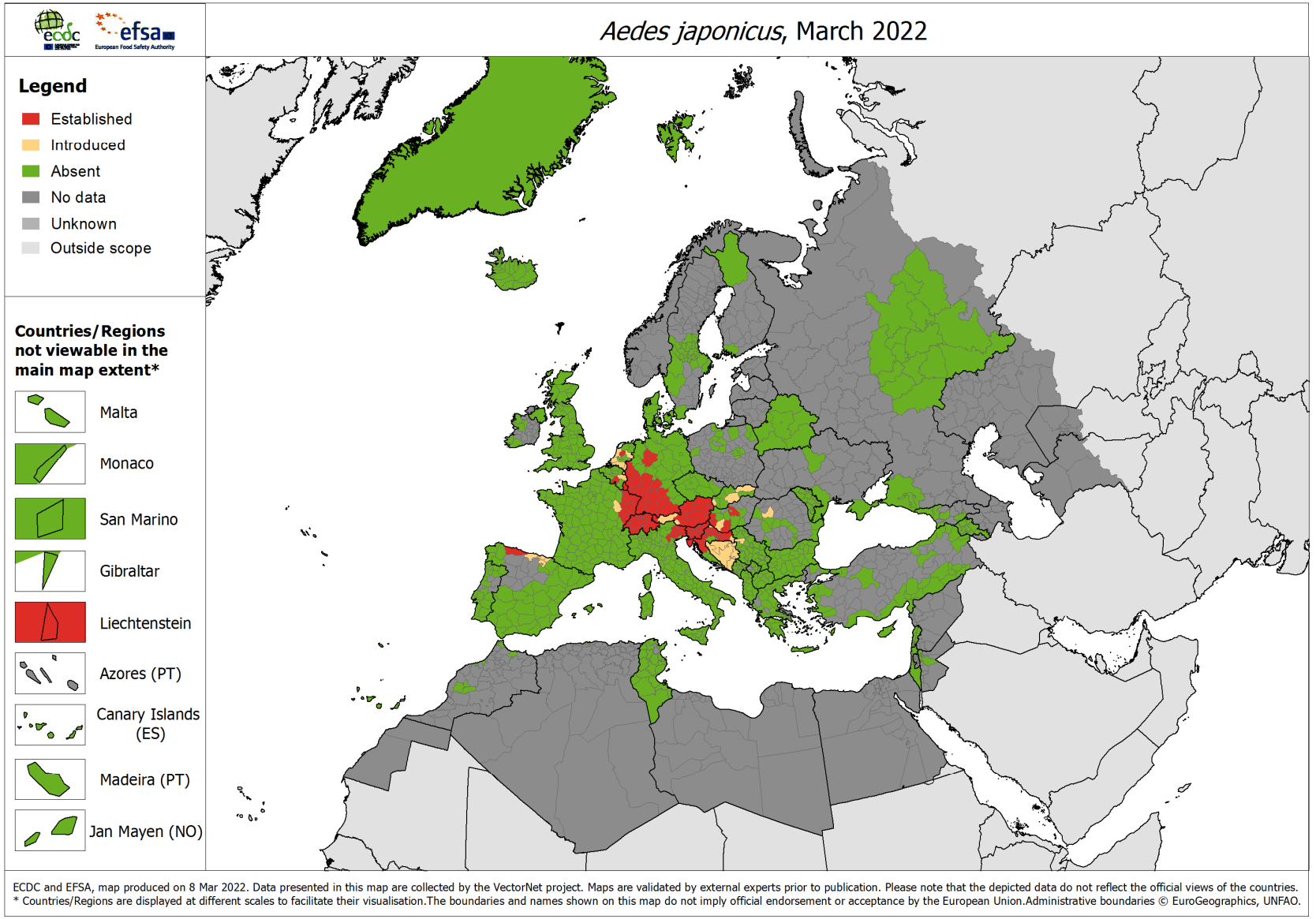


Aedes koreicus



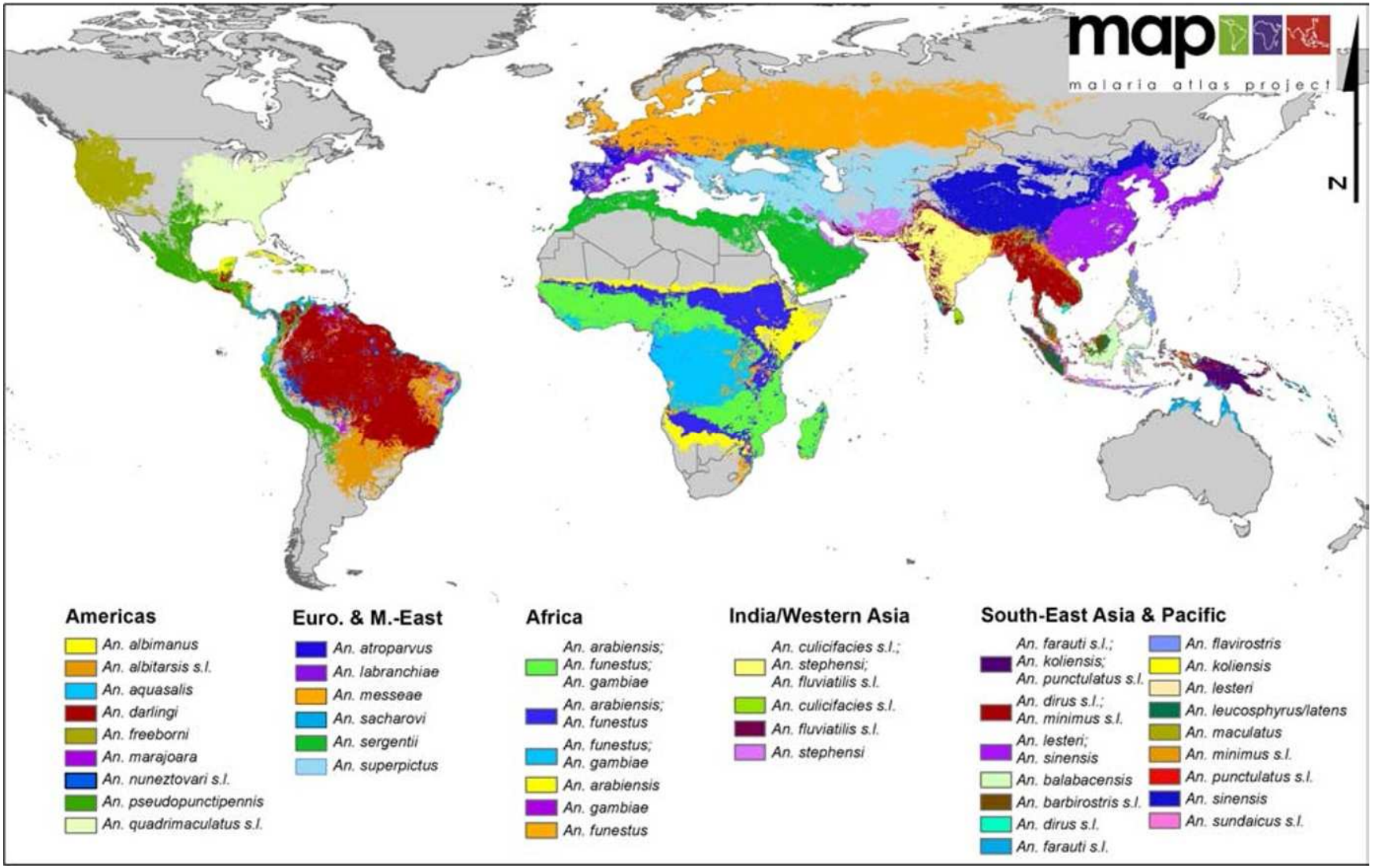
ECDC and EFSA, map produced on 8 Mar 2022. Data presented in this map are collected by the VectorNet project. Maps are validated by external experts prior to publication. Please note that the depicted data do not reflect the official views of the countries.
* Countries/Regions are displayed at different 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.

Aedes japonicus



ECDC and EFSA, map produced on 8 Mar 2022. 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.

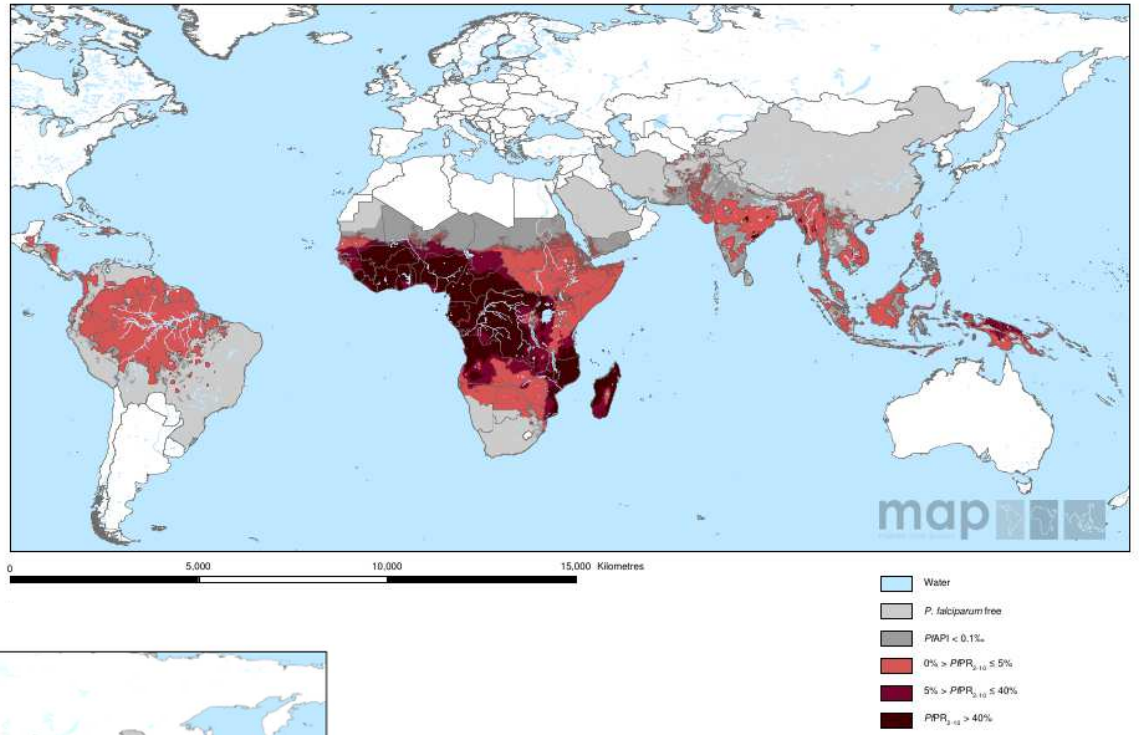
A global map of dominant malaria vector species

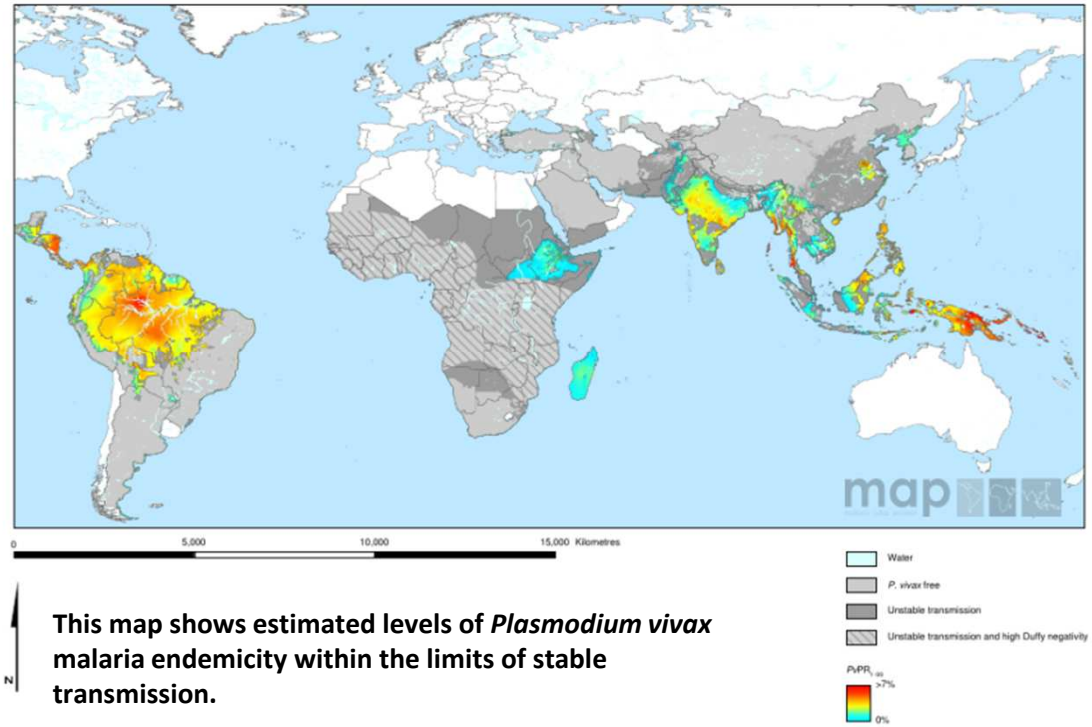


Sinka et al 2012

This map classifies Plasmodium falciparum endemicity into successive levels of risk, within the limits of stable malaria transmission.

map
malaria atlas project





This map shows estimated levels of *Plasmodium vivax* malaria endemicity within the limits of stable transmission.

Maculipennis Complex I

- *Anopheles* Italiane dalla Checklist delle Specie della Fauna d'Italia

Famiglia **Culicidae**

007.0. **Anopheles** Meigen, 1818 subg. **Anopheles** Meigen, 1818					
	001.0 algeriensis Theobald, 1903	N	S	Si	Sa
	002.0 atroparvus Van Thiel, 1927	N	S		
	003.0 claviger (Meigen, 1804)	N	S	Si	Sa
	004.0 hyrcanus (Pallas, 1771)	N	S	Si	Sa
	005.0 labranchiae Falleroni, 1926		S	Si	Sa
	006.0 maculipennis Meigen, 1818	N	S	Si	
	007.0 marteri Senevet & Prunnelle, 1927	N?	S	Si	Sa
	008.0 melanoon Hackett, 1934	N	S		Sa
	009.0 messeae Falleroni, 1926	N	S		
	010.0 petragnani Del Vecchio, 1939	N	S	Si	Sa
	011.0 plumbeus Stephens, 1828	N	S	Si	Sa
M	012.0 sacharovi Favre, 1903	N	S		Sa
	013.0 *subalpinus Hackett & Lewis, 1935	N	S		

Anopheles del Complesso Maculipennis (femmine adulte solo parzialmente distinguibili con caratteri morfologici macroscopici)

Anopheles (An.) labranchiae, *An. sacharovi*, *An. atroparvus*, *An. maculipennis S.S.*, *An. melanoon*, *An. messeae*, *An. subalpinus*, quest'ultima specie ha però una tassonomia ancora dibattuta (Severini *et al.* 2009).

Maculipennis Complex II

- Le tre specie *An. labranchiae*, *An. sacharovi*, *An. atroparvus* erano note come vettori primari della malaria in Italia, in particolare le prime due specie per la loro spiccata attitudine a pungere l'uomo. *An. labranchiae*, *An. sacharovi* prediligono le acque salmastre, mentre *An. atroparvus* può vivere anche in acque dolci, abitudini che ne caratterizzano la distribuzione.
- L'Italia è ufficialmente libera dalla malaria dal 1970 (campagna di eradicazione negli anni 50, cambiamento stile di vita)
- Nel caso siano presenti le zanzare in grado di trasmettere i parassiti, casi di malaria autoctona possono verificarsi dopo l'arrivo di persone infette, come la recente epidemia in Grecia, con 76 casi autoctoni dal 2009 al 2013, ha confermato.

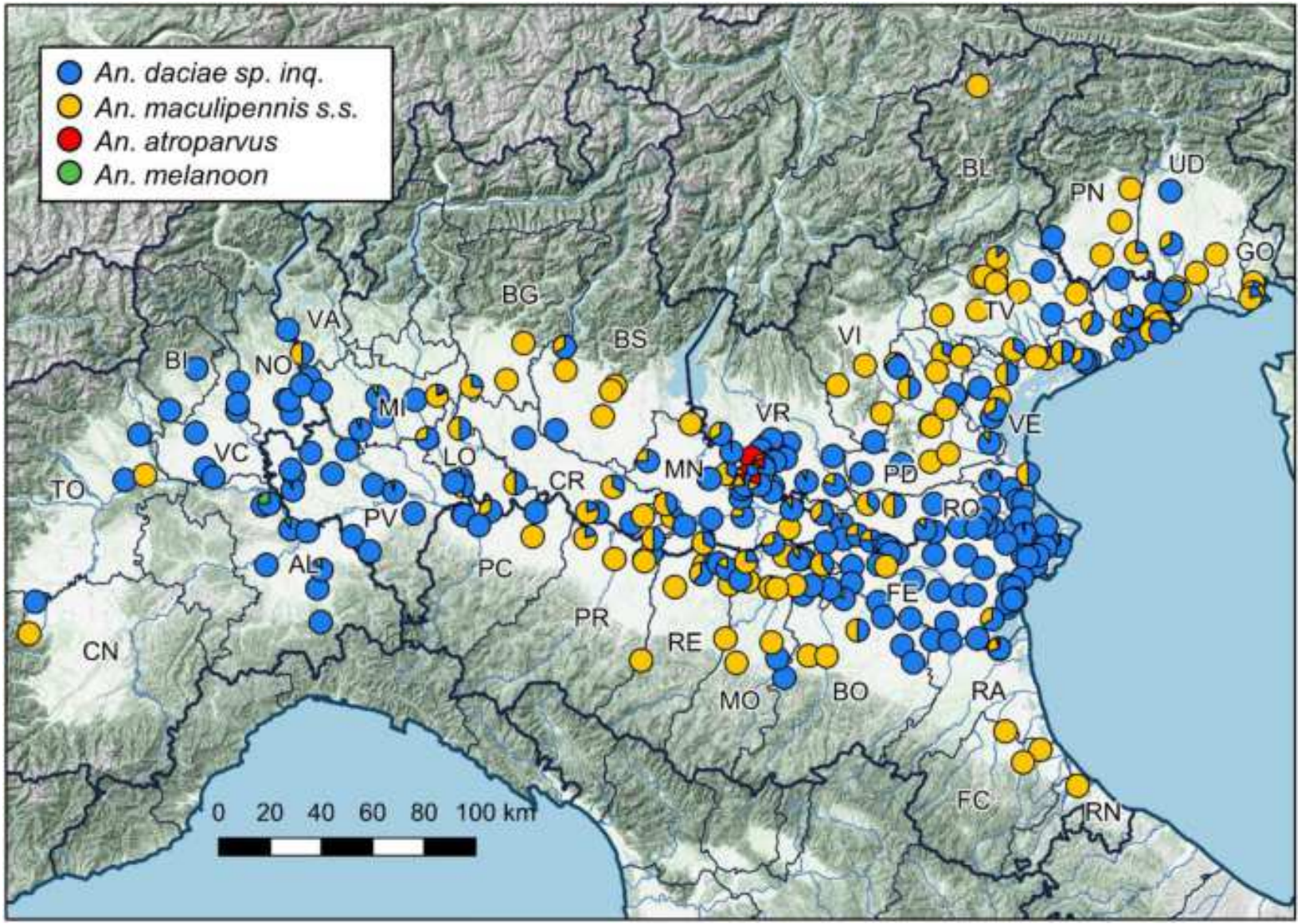
1882

Identificazione delle specie di zanzare del Complesso Maculipennis attraverso approcci biomolecolari e morfometrici

- Analisi esemplari conservati
- Nuovi campionamenti
- Identificazione (morfometria, metodi biomolecolari in doppio), catalogazione dei diversi esemplari.
- Produzione di una check-list regionale

Risultati preliminari (2017) campionate 2113 *Anophleles* 363 saranno identificate a livello di specie

specie	BO	FC	FE	MN	MO	PC	PR	RE	
An. atroparvus			1	3					4
An. maculipennis ss		3	4	9	4		2	2	24
An. messeae	7		71	31	15	1	1	5	131



Calzolari *et al.* 2021

Trappole

Sticky traps, fogli 20x20 cm imbibiti di olio di ricino
(non attrattive, per flebotomi)

CDC a luce

Trappole a CO2 (modello CAA)

Black Light mod. Onderstepoort
Culicoidi (anche per flebotomi)

BG-sentinel zanzare

Efficacia dei diversi modelli di trappola per diverse zanzare

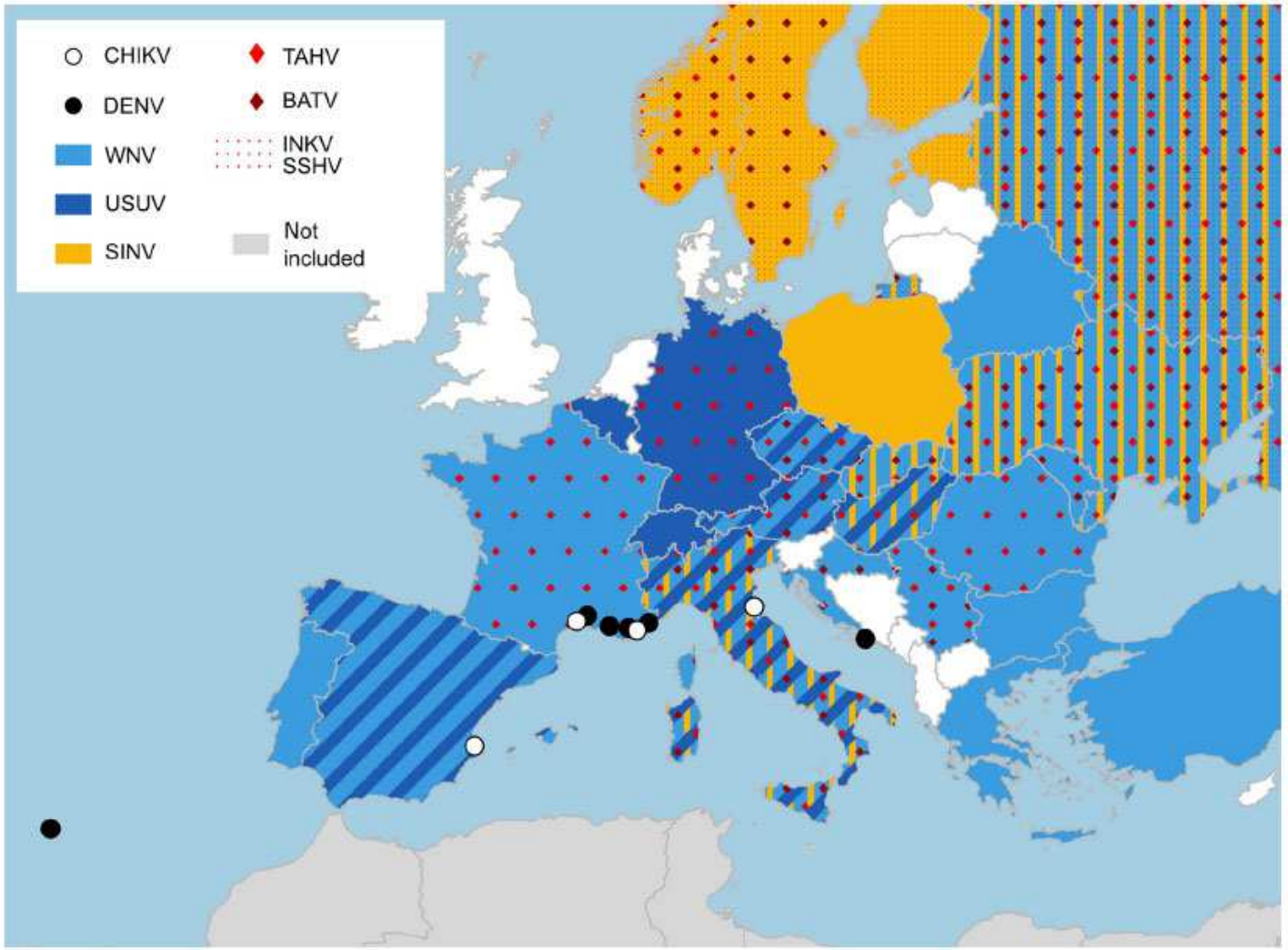
Table 9. Efficacy of collection methods for native adult mosquitoes, by mosquito species

Targeted species	Host-seeking females				Ovipositing females	Resting females
Trap type	**CO_2 traps**	**HLC**	**Light traps**	**MM (CO_2)**	**Gravid traps**	**Aspirating**
Ae. cinereus/geminus *Ae. communis* *Ae. caspius* *Ae. detritus/coluzzii* *Ae. dorsalis* *Ae. excrucians s.l.* *Ae. vexans* *Ae. sticticus*	+++	+++	-	+++	-	+ (vegetation)
An. claviger *An. plumbeus*	++	+++	+	++	-	-
An. hyrcanus	++	+++	+	++	-	++
An. atroparvus *An. labranchiae* *An. sacharovi*	+	++[1]	++	+	+?	++
An. maculipennis s.s. *An. melanoon* *An. messeae*	+	-	++	+	+	++
An. cinereus *An. sergentii sergentii* *An. multicolor* *An. superpictus*	?	++[1]	?	?	?	?
Cq. richiardii	+++	+++	-	+++	-	++
Cx. modestus	++	+++	?	+++	-	-
Cx. perexiguus	?	+[1]	?	?	+++	++
Cx. pipiens s.l.	+++	+[1]	?	++	+++	++
Cx. theileri	++	+[1]	?	++	++?	?
Cx. torrentium	-	-	?	-	?	++
Cx. tritaeniorhynchus	++	+[1]	?	++	+++	++
Cs. morsitans	-	-	-	-	-	-

CO_2 traps = CO_2-baited suction traps (e.g. CDC light trap [with light on or off], EVS trap, BG Sentinel); HLC = human landing collection; light traps = light-baited suction traps; MM = MosquitoMagnet CO_2-baited suction traps with chemical attractant; gravid traps = infusion-baited suction traps; – = low efficacy; + = fair efficacy in some situations; ++ = good efficacy; +++ = excellent performance; ? = unknown

Catture di flebotomi con
trappola attrattiva a co2

Principali arbovirus trasmessi dalle zanzare in Europa



CHIKV, Chikungunya virus; DENV, Dengue virus; WNV, West Nile virus; USUV, Usutu virus; SINV, Sindbis virus; TAHV, Tahyna virus; BATV, Batai virus; INKV, Inkoo virus; SSHV, Snowshoe Hare virus.

Da Calzolari 2016 Reports in Parasitology

Casi autoctoni di malattie trasmesse da zanzare segnalati in Europa

Disease	Location	Year	Human cases	Involved mosquito
Chikungunya	Castiglione, Emilia-Romagna, Italy	2007	205	*Aedes albopictus*[66]
	Frejus, Department of Var, France	2010	2	*Aedes albopictus*[67]
	Montpellier, France	2014	12	*Aedes albopictus*[68]
	Gandía, Spain	2015	1	*Aedes albopictus*[72]
Dengue	Nice, France	2010	2	*Aedes albopictus*[69,70]
	Peljesac Peninsula, Croatia	2010	2	*Aedes albopictus*[61]
	Funchal, Madeira, Portugal	2012–2013	1,080	*Aedes aegypti*[64]
	Departement of Bouches du Rhône, France	2013	1	*Aedes albopictus*[68]
	Departement of Var, France	2014	2	*Aedes albopictus*[68]
	Departement of Bouches du Rhône, France	2014	2	*Aedes albopictus*[68]
	Nîmes, Departement du Gard, France	2015	6	*Aedes albopictus*[68]

Da Calzolari 2016 Reports in Parasitology

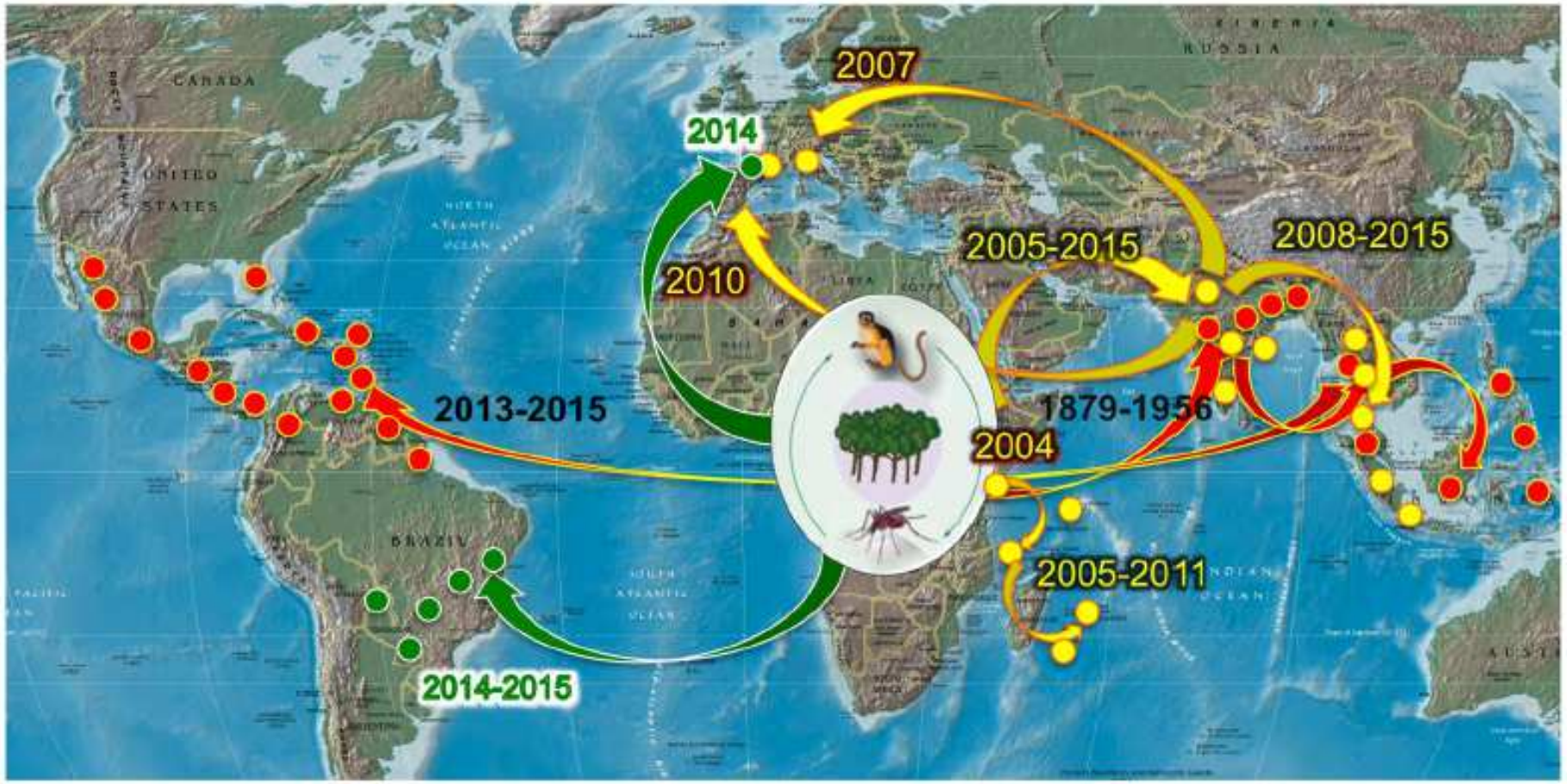
Competenza vettoriale *Aedes albopictus*

	Infezione	Trasmissione
FLAVIVIRIDAE		
Dengue 1,2,3,4	+++	+++
Febbre gialla	++	++
St. Louis E.	+	+
West Nile	++	++
Zika	++	++
Chikungunya	+++	+++
TOGAVIRIDAE		
Eastern Equine E.	+++	++
Western Equine E.	+++	+++
Venez. Equine E.	+++	++
Ross River	++	++
Mayaro	++	++
Chikungunya	+++	+++
Sindbis	++	++

	Infezione	Trasmissione
BUNYAVIRIDAE		
LaCrosse	+++	++
Jamest. Canyon	+++	+
Keystone	+++	-
Oropouche	+	-
Potosi	+	+
Rift Valley Fever	++	+
Trivittatus	+	-
REOVIRIDAE		
Orungo	+(?)	+(?)

+++ alta; ++ moderata; + bassa; - negativa; (?) livello non determinato

Chikv



ECSA lineage, Asian lineage, Indian Ocean Lineage

Fig. 3. Map showing the known historic spread of Chikungunya virus based on phylogenetic reconstructions (Lanciotti and Valadere, 2014; Volk et al., 2010; Tsetsarkin et al., 2014, 2011b), as well as recent introductions (http://www.ecdc.europa.eu/en/press/news/_layouts/forms/News_DispForm.aspx?List=8db7286c-fe2d-476c-9133-18f-f4cb1b568&ID=1096) Nunes et al. (2015). Green dots, arrows and years indicate the East/Central/South African (ECSA) lineage, Red dots, arrows and years indicate the Asian lineage, and yellow dots, arrows and years indicate the Indian Ocean lineage (IOL).

from Weaver and Forrester

Ministero della Salute

ISTITUTO SUPERIORE DI SANITÀ

ITALIA: FOCOLAI AUTOCTONI DI INFEZIONE DA VIRUS CHIKUNGUNYA

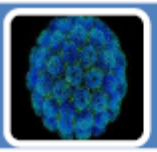
(aggiornato al 13 ottobre 2017)

Mappa dal report ECDC

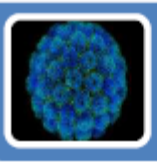
358 Casi notificati totali:
297 Regione Lazio
54 Regione Calabria
4 Regione Emilia-Romagna
1 Regione Marche
2 Paesi Europei (Francia/Germania)

183 casi confermati totali:
170 Regione Lazio (Anzio, Roma e Latina)
9 Regione Calabria (Guardavalle marina)
1 Regione Emilia-Romagna con legame epidemiologico Anzio
1 Regione Marche con legame epidemiologico Anzio
1 Francia con legame epidemiologico Anzio
1 Germania con legame epidemiologico Roma

175 casi probabili totali:
127 Regione Lazio (Anzio, Roma e Latina)
45 Regione Calabria (Guardavalle marina)
3 Regione Emilia-Romagna con legame epidemiologico Guardavalle marina



168 (47 %) MASCHI
190 (53 %) FEMMINE
Età mediana: **54 anni** (range: 0-93 anni)



Gravità dell'infezione
Ospedalizzati **24 (6 %)**
Deceduti **1 (0.28 %)**

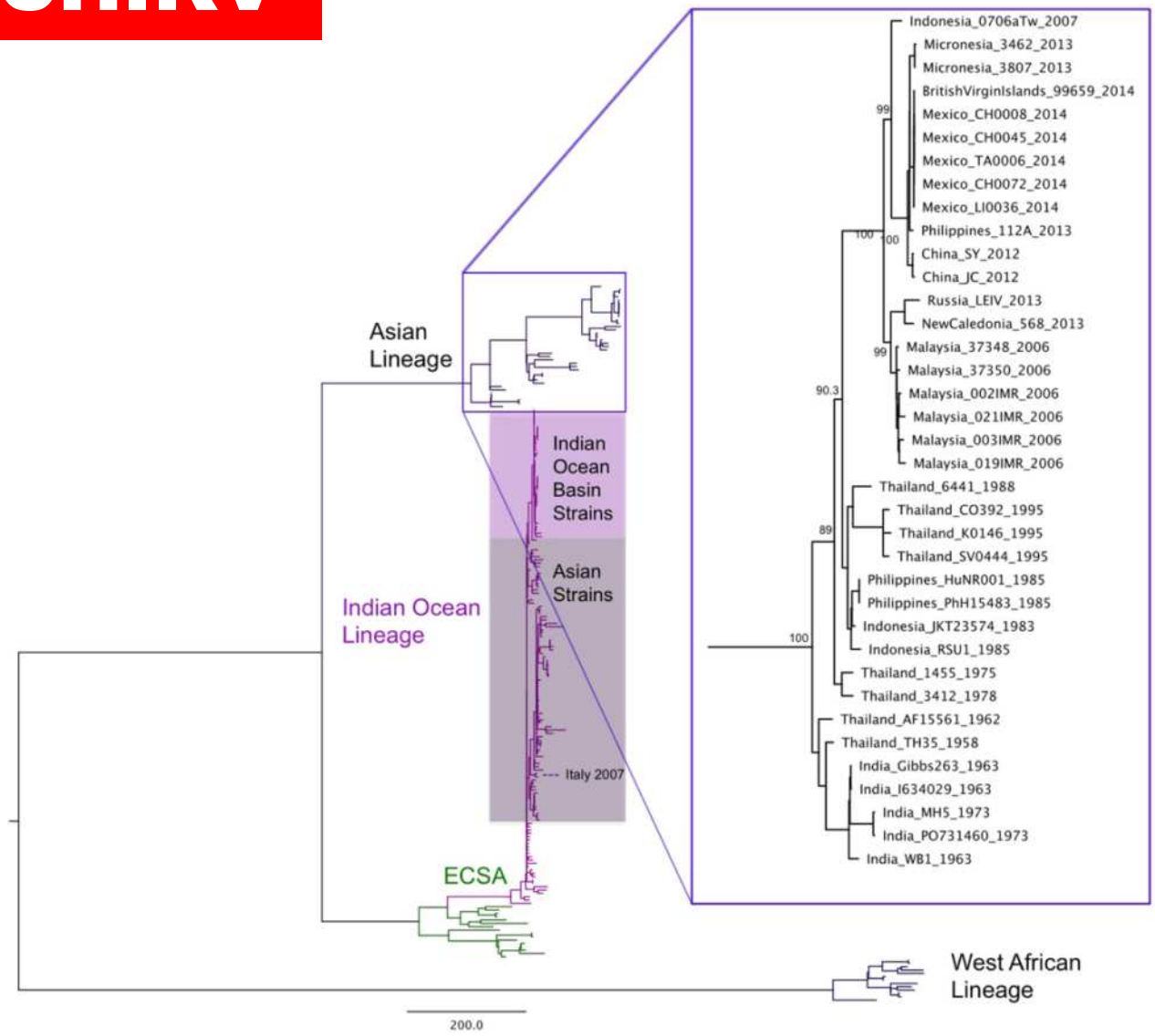
Chikv in Italia

Figure 1. Distribution of chikungunya autochthonous cases in Italy, July to 3 October 2017

Dal report ECDC

As of 4 October, Italy has reported 239 chikungunya cases in the Lazio region (146 confirmed and 93 probable) andsix confirmed autochthonous cases among 55 reported cases in the city of Guardavalle Marina, Calabria region. Several probable and confirmed cases were reported in other regions of Italy (i.e. Emilia-Romagna, Marche) [25]and other EU Member States (France and Germany). All were epidemiologically linked to Anzio, Rome or Guardavalle Marina. This brings the number of reported cases in Italy to 298cases.

CHIKV


Asian Lineage
Indian Ocean Basin Strains
Asian Strains
Indian Ocean Lineage
Italy 2007
ECSA
West African Lineage
200.0
Indonesia_0706aTw_2007
Micronesia_3462_2013
Micronesia_3807_2013
BritishVirginIslands_99659_2014
Mexico_CH0008_2014
Mexico_CH0045_2014
Mexico_TA0006_2014
Mexico_CH0072_2014
Mexico_LI0036_2014
Philippines_112A_2013
China_SY_2012
China_JC_2012
Russia_LEIV_2013
NewCaledonia_568_2013
Malaysia_37348_2006
Malaysia_37350_2006
Malaysia_002IMR_2006
Malaysia_021IMR_2006
Malaysia_003IMR_2006
Malaysia_019IMR_2006
Thailand_6441_1988
Thailand_CO392_1995
Thailand_K0146_1995
Thailand_SV0444_1995
Philippines_HuNR001_1985
Philippines_PhH15483_1985
Indonesia_JKT23574_1983
Indonesia_RSU1_1985
Thailand_1455_1975
Thailand_3412_1978
Thailand_AF15561_1962
Thailand_TH35_1958
India_Gibbs263_1963
India_I634029_1963
India_MH5_1973
India_PO731460_1973
India_WB1_1963
99
100
00
99
90.3
89
100

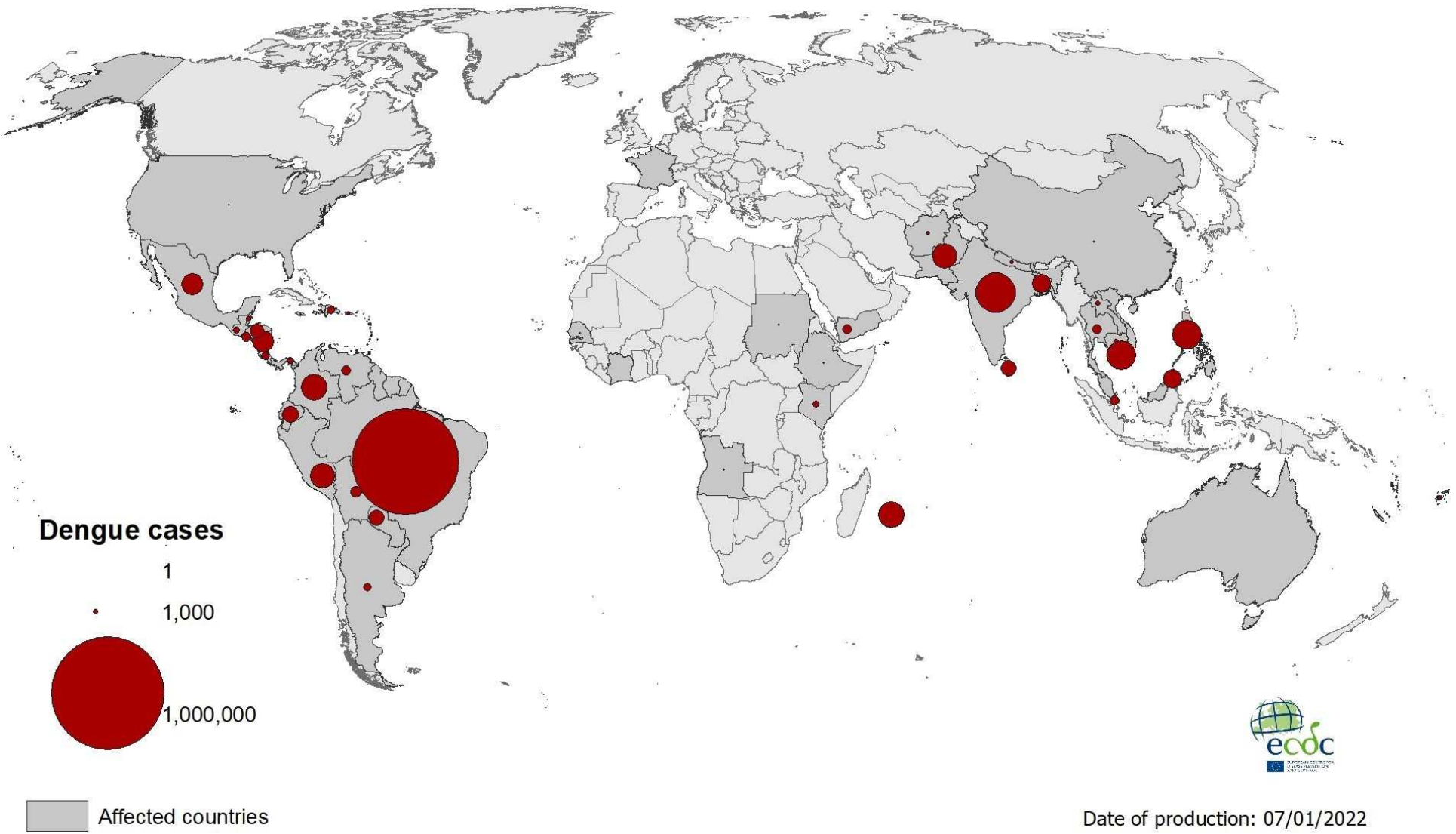
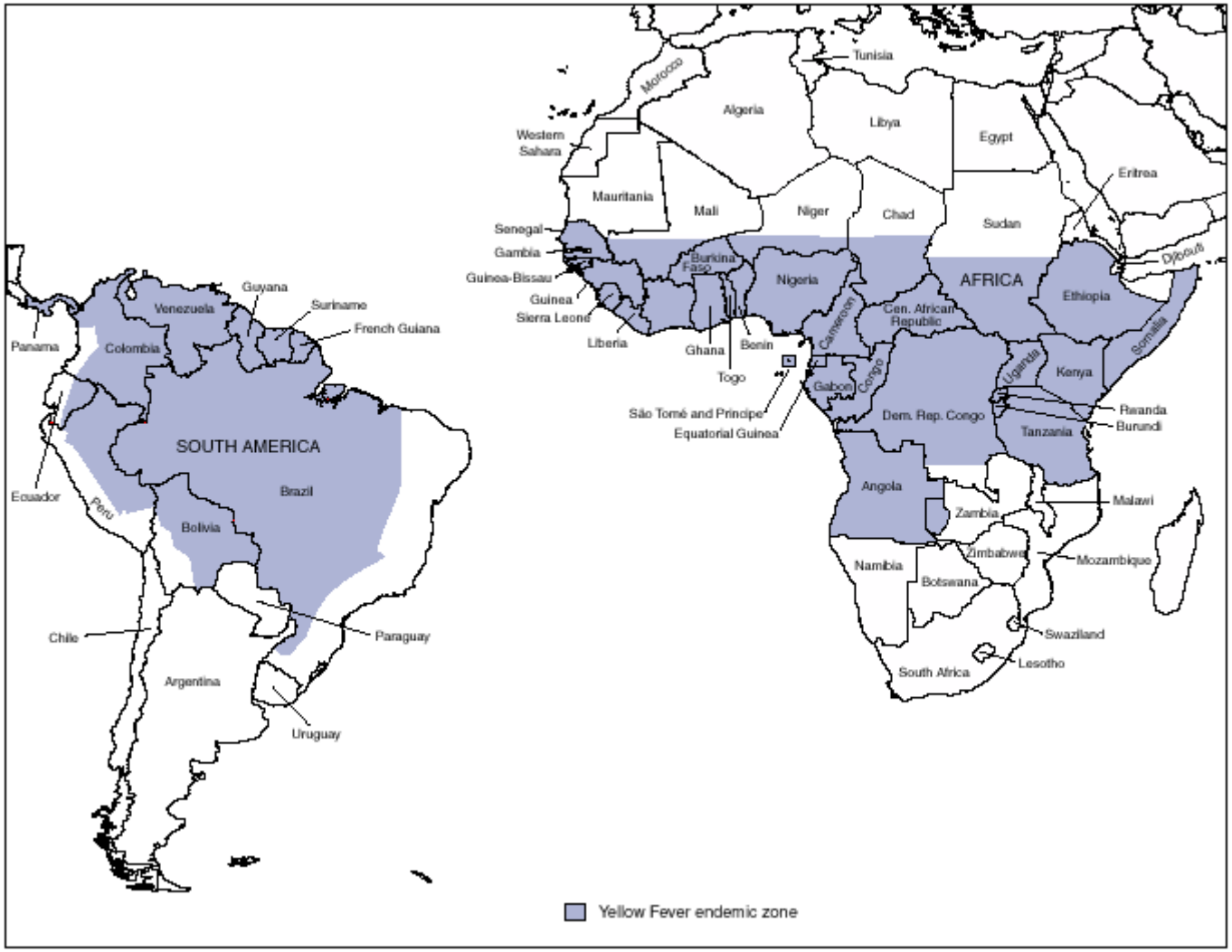

Dengue cases
1
1,000
1,000,000
Affected countries
ecdc
Date of production: 07/01/2022

FIGURE 1. Yellow Fever endemic zones



Tahyna

Aedes vexans, Ochlerotatus caspius, Culex spp

Lagomorfi, roditori, insettivori (ricci)

Uomo, pipistrelli

VIREMIA SOPRATTUTTO NEI GIOVANI LAGOMORFI (LEPRI), RICCI, RODITORI, CARNIVORI, SUINI

Sintomi simil influenzali “Valtice fever” (febbre, malessere, congiuntivite, faringite, nausea, anoressia, meningite, non letale)

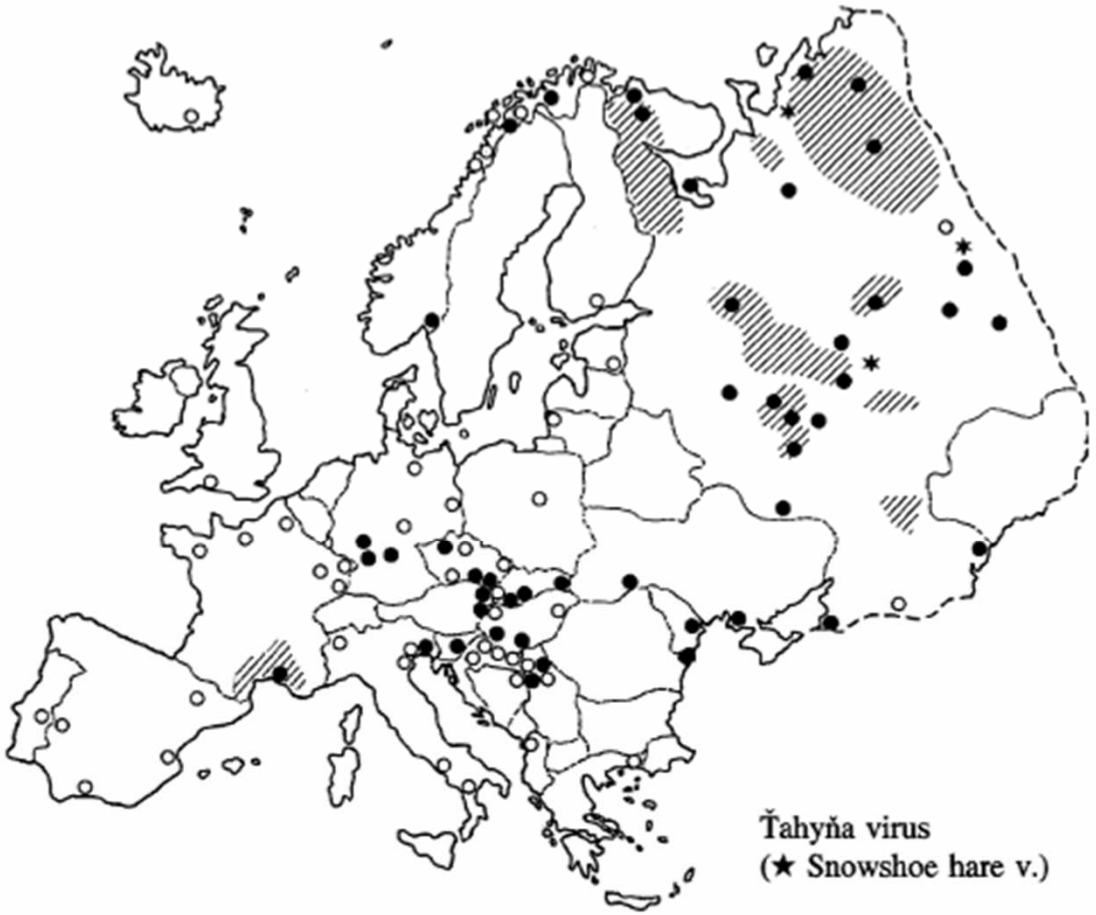


Fig. 3 Geographic distribution of moboviruses in Europe. Explanation: *black points*, the virus isolation; *white circles and hachures*, specific antibodies detected

Hubalek 2006

Tahyna (WNV USUV) in Emilia-Romagna

Arbovirus in Emilia-Romagna

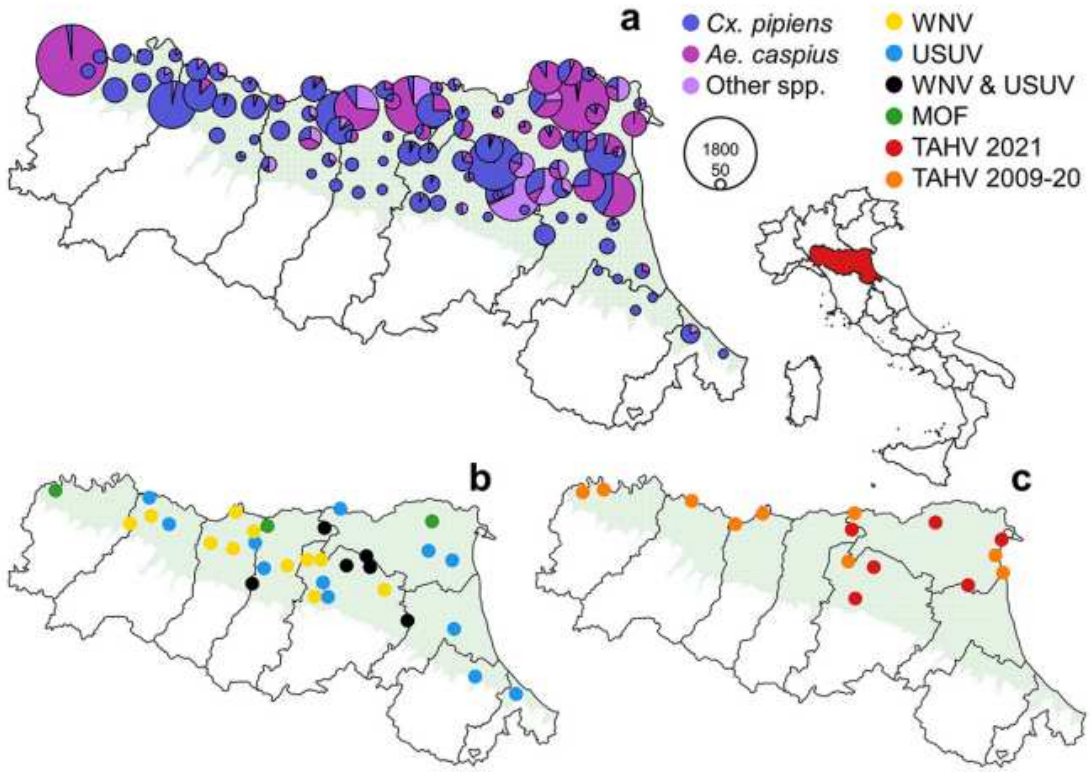


FIG 1 Map of Emilia-Romagna with reference to the location of the region in Italy and surveyed area (green) showing (a) the number of mosquitoes collected at the different sites in 2021 (diameter proportional to the number of mosquitoes collected); (b) the sampling sites of flavivirus positive pools in 2021; (c) the sampling sites of Tahyna virus positive pools in 2021 and in previous years. The maps were produced with the free software QGIS (available at https://www.qgis.org/en/site/index.html, accessed on August 8, 2022).

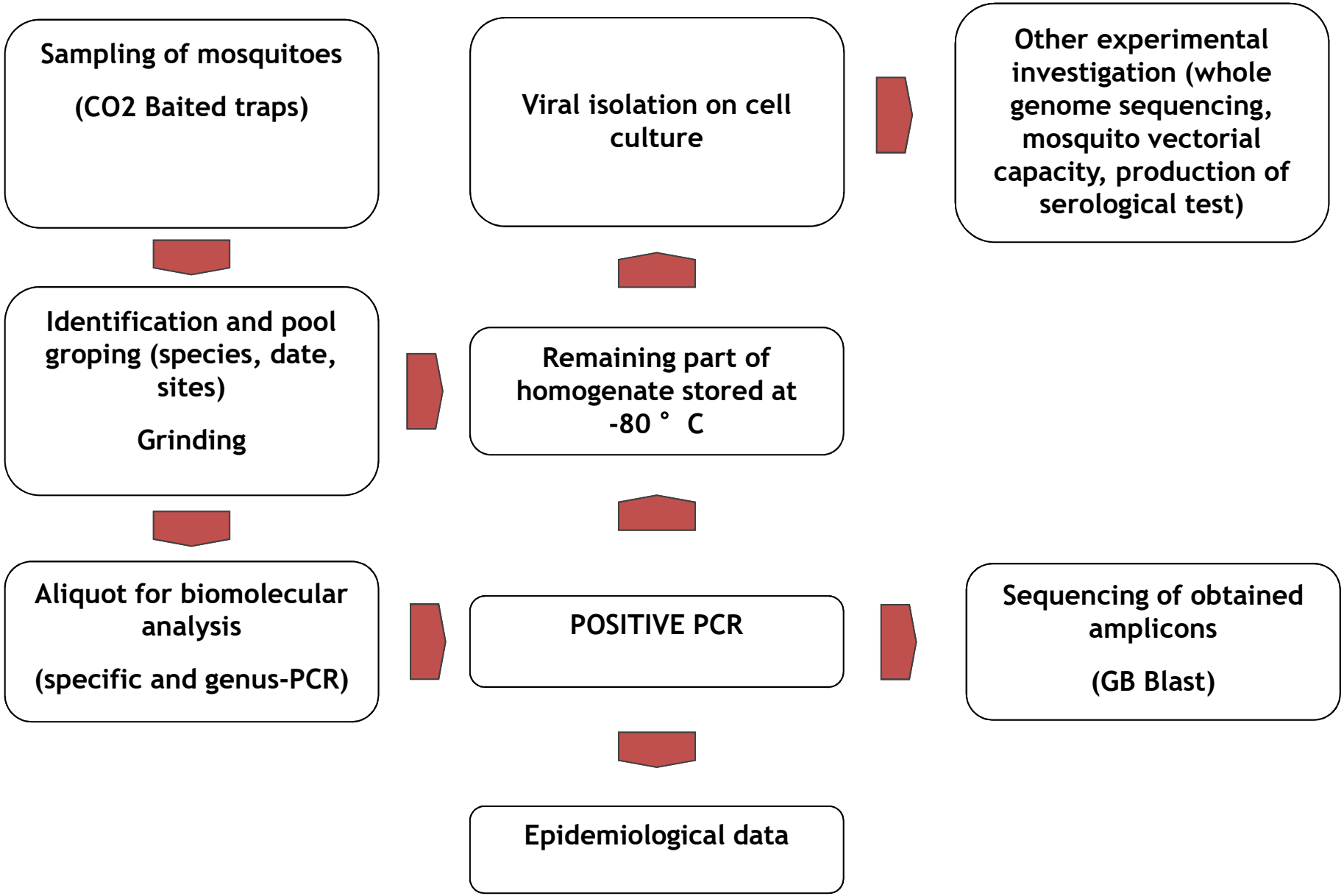
Calzolari *et al.* 2022

Fig. 5 Geographic distribution of moboviruses in Europe. Explanation: *black points*, the virus isolation; *white circles and hachures*, specific antibodies detected

Hubalek 2006

- Trappole attrattive in siti georeferenziati attivate qper una notte (dalle 18:00 alle 9:00 del giorno successivo).
- Suddivisione degli insetti catturati per specie (o genere), sito e data di cattura.
- Pool “spappolati” e sottoposti ad analisi biomolecolari, pannello di PCR.
- Conferma dei pool positivi tramite sequenziamento (per le PCR di genere).

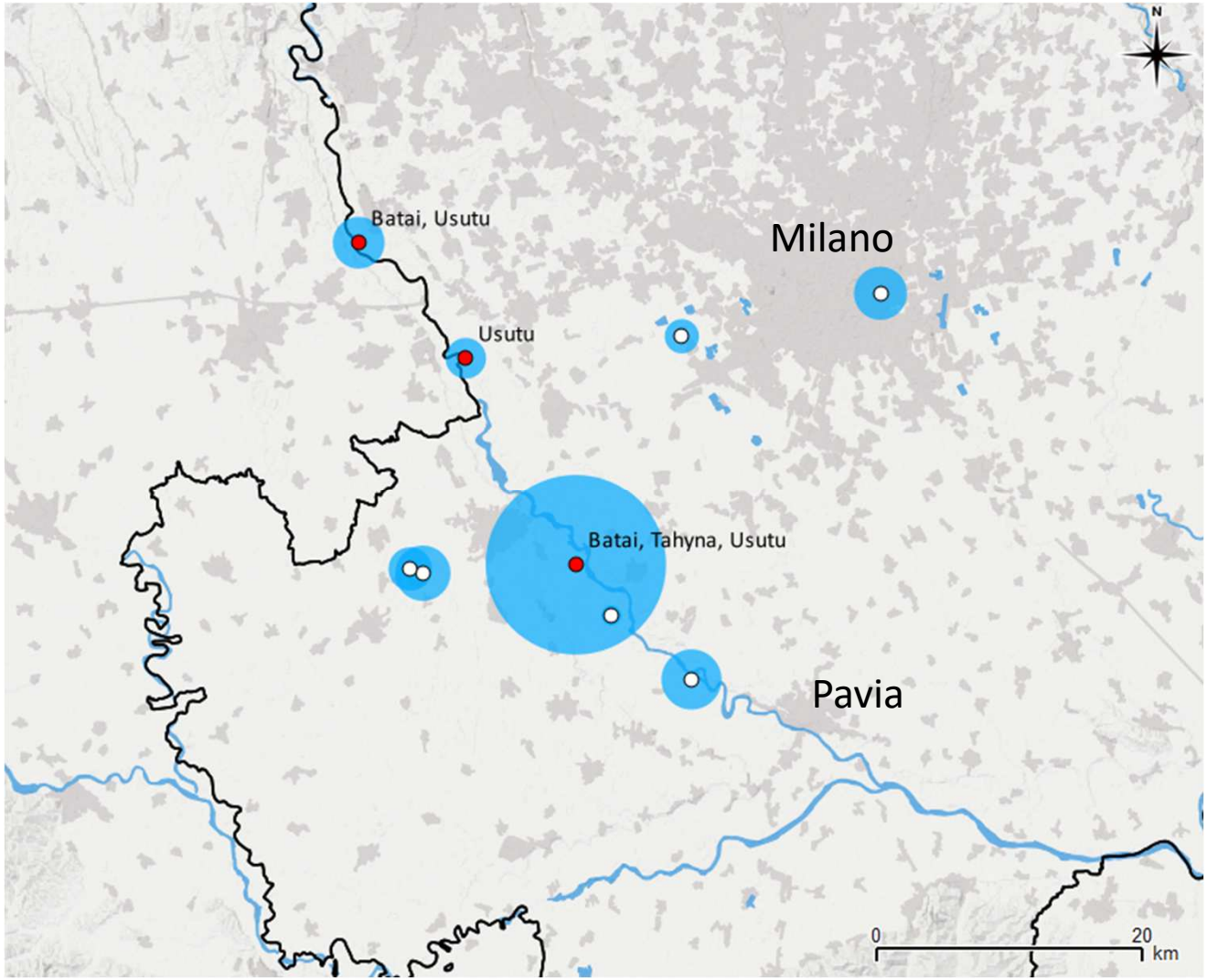
Insetto	PCR
Flebotomi	Tosv, Leish
Zanzare	WNV, USUV, Pan-flavi, Pan-orthobunya


Sampling of mosquitoes
(CO2 Baited traps)
Identification and pool groping (species, date, sites)
Grinding
Aliquot for biomolecular analysis
(specific and genus-PCR)
Remaining part of homogenate stored at -80 ° C
Viral isolation on cell culture
POSITIVE PCR
Epidemiological data
Other experimental investigation (whole genome sequencing, mosquito vectorial capacity, production of serological test)
Sequencing of obtained amplicons
(GB Blast)

Sorveglianza Parco del Ticino

Virus	positive pools	species	years	month
USUTU	3	*Culex pipiens*	2009-2011	August-September
BATAI	3	*Culex pipiens* (2), *Anophleles maculipennis s.l.* (1)	2009-2011	July
TAHYNA	2	*Ochlerotatus caspius, Aedes vexans*	2009-2010	July

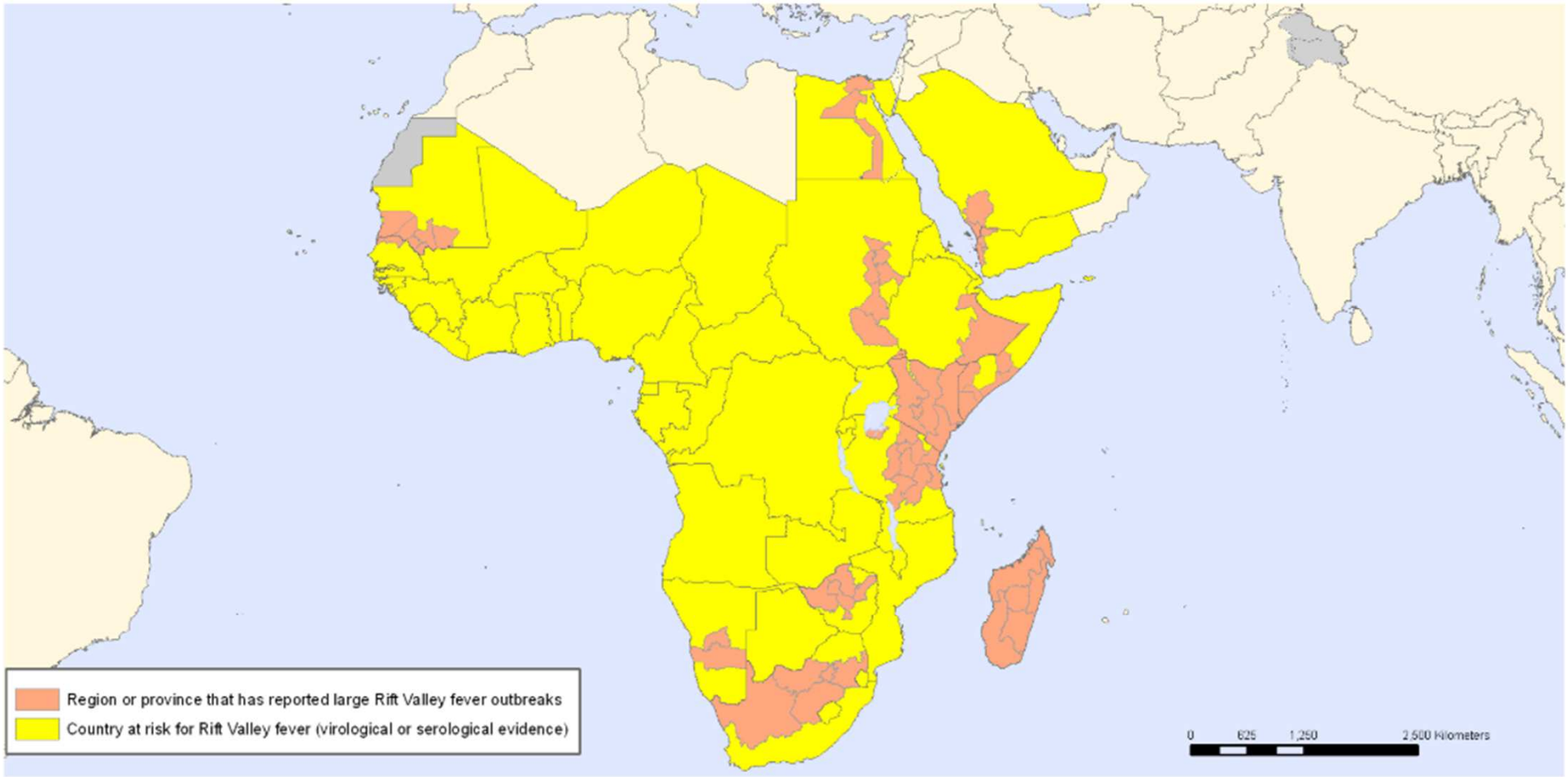
From these preliminary results detected viruses seem to have different seasonality: August September for USUV (Flavivirus). More precocious circulation for BATV and TAHV (Orthobunyavirus)



Circoli azzurri proporzionali al numero di zanzare catturate

JAPANESE ENCEPHALITIS

RVF

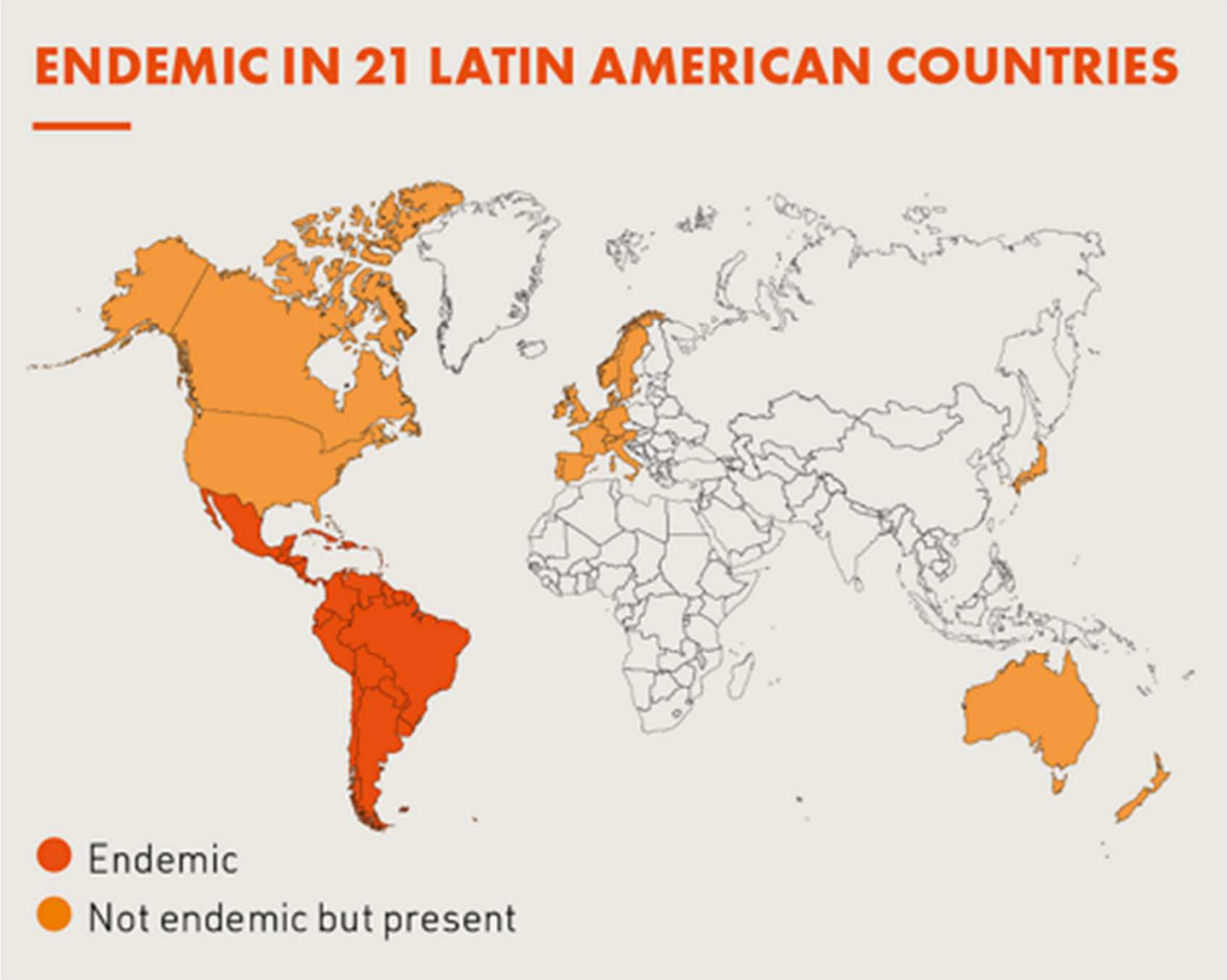


The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: Global Alert and Response Department
World Health Organization
Map Production: Public Health Information
and Geographic Information Systems (GIS)
World Health Organization

World Health Organization

Chagas

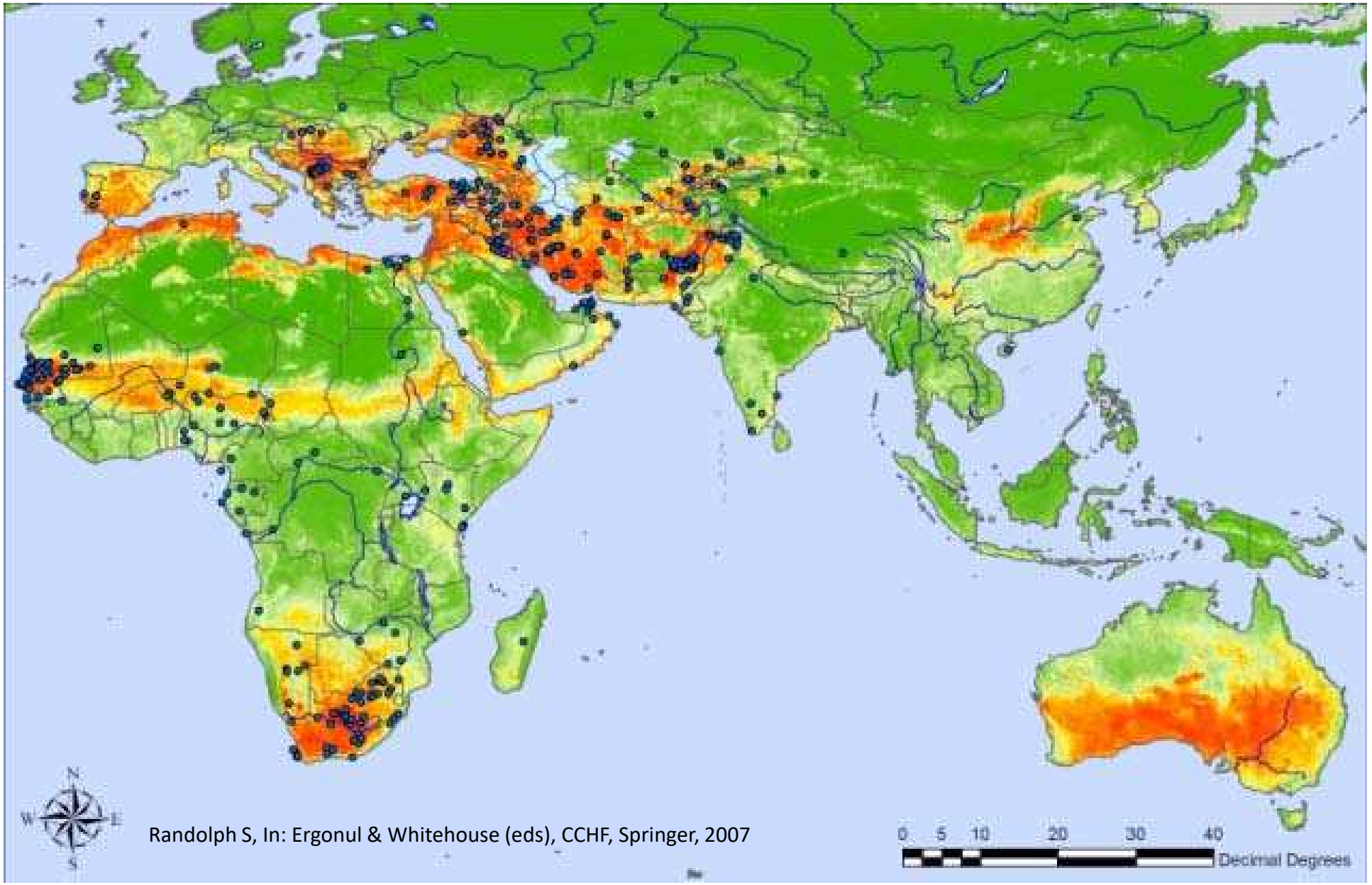

ENDEMIC IN 21 LATIN AMERICAN COUNTRIES
Endemic
Not endemic but present

Crimean-Congo Haemorrhagic Fever

- Crimean-Congo haemorrhagic fever (CCHF) è un infezione virale presente in Africa, Asia, sudest Europa e Medio Oriente.
- L'agente eziologico, CCHF virus, appartiene al genere *Nairovirus,* famiglia *Bunyaviridae*
- Il nome del virus è legato alla prima descrizione clinica della malattia in Crimea nel 1944 e al primo isolamento virale in Congo nel 1956
- Malattia nell'uomo molto grave con alto rischio di infezioni nosocomiali e alta letalità. Periodo d'incubazione: 1–7 giorni (media 3–5).
- Categorie a rischio:

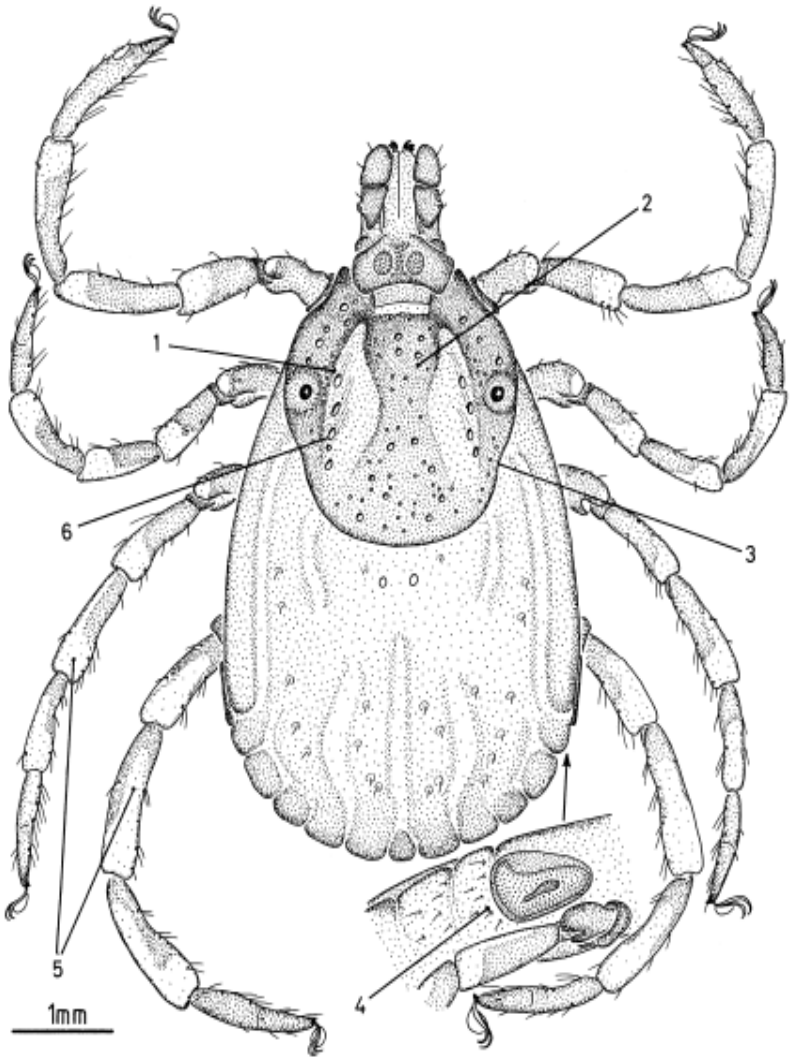
1. Allevatori, veterinari e macellatori in aree endemiche. Le carni infette non possono essere fonte d'infezione (inattivazione del virus dall'acidificazione post-macellazione; non sopravvive alla cottura).
2. Personale sanitario in contatto con pazienti con forma emorragica senza alti livelli di biosicurezza
3. In aree endemiche le attività all'aperto aumentano il rischio di esposizione al morso di zecca

CCHF: the occurrence of the disease is linked to the geographical distribution of its hard tick vectors, mostly from the Hyalomma genus



Randolph S, In: Ergonul & Whitehouse (eds), CCHF, Springer, 2007

Vettore



La zecca (genere *Hyalomma*) è serbatoio del virus

- Zecche esofile a 2 ospiti: stadi immaturi si nutrono su piccoli mammiferi e uccelli che si nutrono a terra, gli adulti si nutrono su grossi mammiferi sia domestici sia selvatici.
- CCHFV si trasmette per via transtadiale, transovarica, venerea e co-feeding
- Una zecca infetta riesce a trasmettere il virus ad un ospite anche dopo essere rimasta 10 mesi a 4° (overwintering)

CCHFV e zecche

CCHF-associated tick species

Hyalomma anatolicum anatolicum
Hyalomma anatolicum excavatum
Hyalomma dromedarii
Hyalomma detritum detritum
Hyalomma marginatum marginatum [a]
Hyalomma marginatum turanicum
Hyalomma marginatum rufipes
Hyalomma impeltatum
Hyalomma nitidum
Hyalomma truncatum
Hyalomma marginatum impressum

Argas persicus
Argas lahorensis

Ixodes (Ixodes) ricinus [b]
Haemaphysalis puctata
Haemaphysalis parva
Dermacentor (Dermacentor) marginatus [b c]
Dermacentor niveus
Dermacentor daghestanicus
Rhipicephalus (Digineus) bursa [a c]
Rhipicephalus (Rhipicephalus) pumilio
Rhipicephalus (Rhipicephalus) rossicus
Rhipicephalus (Rhipicephalus) sanguineus [a]
Rhipicephalus (Rhipicephalus) turanicus
Ripicephalus (Lamellicauda) pulchellus
Rhipicephalus evertsi evertsi
Rhipicephalus guilhoni
Rhipicephalus appendiculatus
Boophilus decoloratus
Boophilus microplus
Boophilus annulatus [a]
Amblyomma variegatum

Africa
Asia
Europe

a. Bulgaria
b. Romania
c. Greece

H.marginatum (femmina)

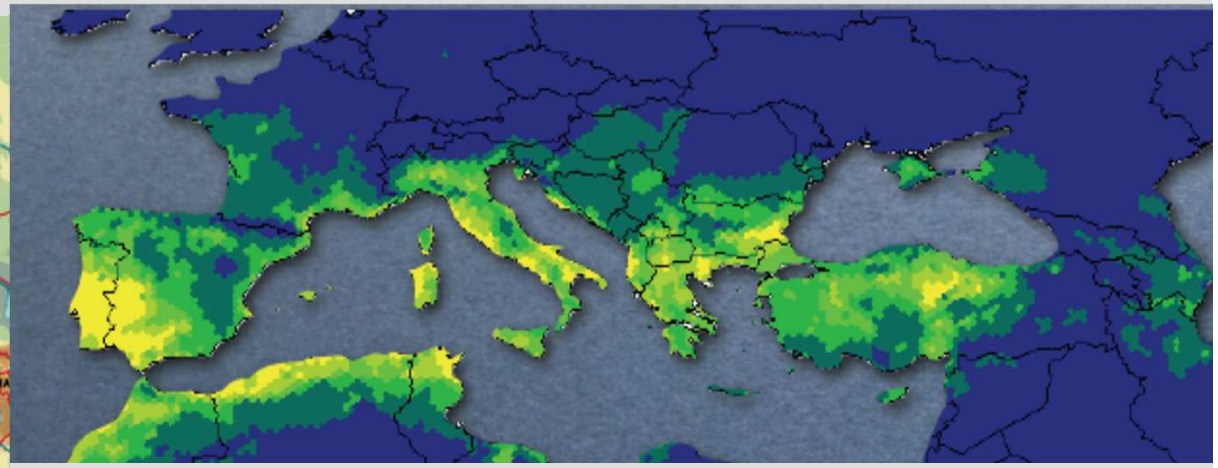
Trasmissione verticale dimostrata

CCHFV-associated tick species (Dr. Valérie Mioulet pers comm)

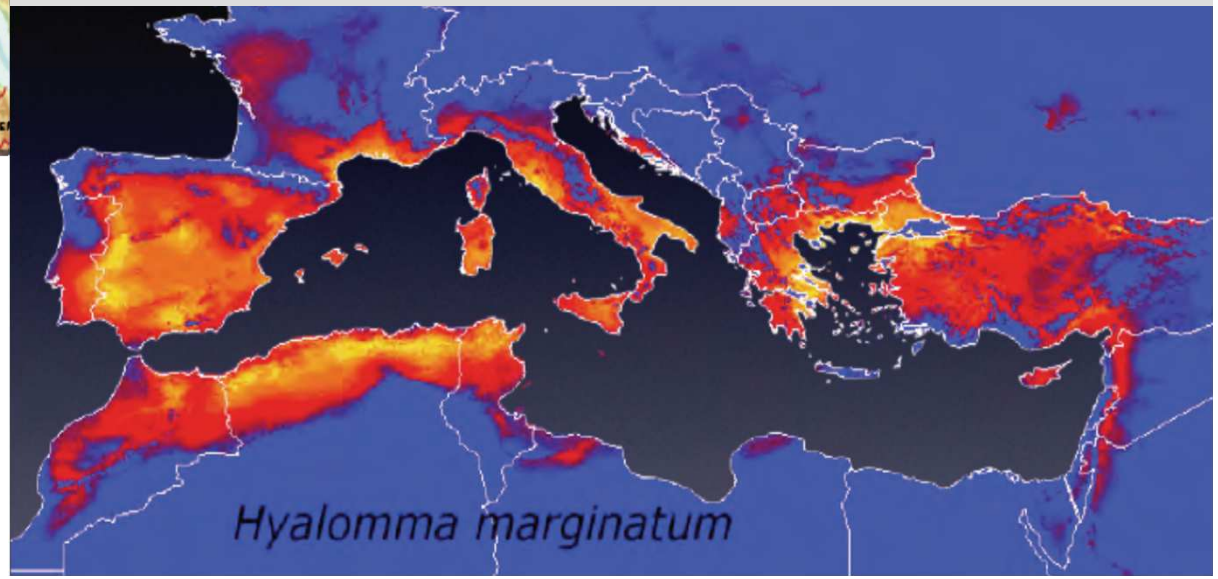
Cambiamenti climatici e rischio d'introduzione in Europa

Figure 9: The main avian migratory routes from Africa to Europe in Spring

Provided by Prof. Agustín Estrada-Peña



Maximum presence and activity recorded at high temperatures and low humidity (around 30ºC and 30-35% humidity), and being almost absent from September to December. Climat change might modify this current pattern of distribution, i.e. if temperatures and humidity change, Hyalommas might move northwards.



Cambiamenti climatici e rischio d'introduzione in Europa

Overwintering

- La zecca (genere *Hyalomma*) è serbatoio del virus
- Una zecca infetta riesce a trasmettere il virus ad un ospite anche dopo essere rimasta 10 mesi a 4°
- Ruolo degli uccelli
- Non sviluppano viremia
- Uccelli inoculati con CCHFV non sviluppano viremia rilevabile, ma le larve che si nutrono su di essi si infettano e sono in grado di infettare un coniglio nelle generazioni successive (zeller et al. 1994)

Hyalomma marginatum in nord Italia

Grazie per l’attenzione