VectorNet

European Network for sharing data on geographic distribution of arthropod vectors transmitting human and animal disease agents
What is VectorNet?

• Network project

• More than just the extension of VBORNET
  – Inter-institutional project (EFSA-ECDC)
  – Human & animal health
  – Field work driven by:
    • Current vector maps/knowledge
    • Gaps (knowledge & distribution)
    • ECDC-EFSA requests

• 21 partners from 14 countries

• Time-frame: 2014 – 2018
The VectorNet trail

- Chikungunya assessment 2006
- Chikungunya Italy 2007
- VborNet project 2008
- Tigermaps 2008–2009
- VBORNET 2009–2013
General objectives

A collaborative approach to data collection activities on vectors (and pathogens?)

• To collect information on the geographical distribution of priority vectors;
• To further develop the network of medical entomologists and public health professionals, including veterinary entomologists and veterinarians working in the field of vectors or vector-borne diseases;
• To deliver ad-hoc scientific advice to support ECDC and EFSA;
• To carry out targeted entomological surveillance.
Mosquito group activities: major achievements in 2015

Schaffner F, Robert V, Kampen H, Petric D

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Priorities for field studies, overall

- **Year 1**
  - Validation of protocols and traps
  - Filling important gaps on invasive species
  - Filling gaps on native species in areas with no or very little recent data
  - Collecting data on distribution limits of *Cx. pипiens* and *Cx. torrentium*

- **Year 2**
  - Continuing and...
  - Collecting data on distribution of *Cx. perexiguus* and *Cx. tritaeniorhynchus*; testing abundance protocols
  - Filling gaps according to gap analysis (validating model outputs)

- **Year 3**
  - Continuing and...
  - Collecting data on abundance of *Ae. albopictus* and *Culex* species (*pipiens, torrentium, perexiguus, tritaeniorhynchus*)
Mosquito Field Studies 2015

- Objectives:
  - Filling gaps of vector distribution maps
    1. Invasive species (IMS)
    2. Native species (NMS) where no or little information is available
  - Building local capacities for mosquito surveillance

- 4 studies proposed (priorities)
  1. Caucasus: IMS
  2. Balkans: IMS & NMS
  3. Italian southern isles: IMS
  4. EU Northern territories: NMS
Priority 1: Caucasus countries, Balkans, Italian isles, EU Northern territories
## Local participants 2015 – 18/12

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<tr>
<th>No.</th>
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<td>Turkey, Bosnia and Herzegovina, Serbia, Hungary, Montenegro, Italy, Faroe, Iceland, Greenland, Denmark, Lichtenstein, USA</td>
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<tr>
<td>1</td>
<td>Kafkas University, Merkez</td>
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<td>2</td>
<td>Recep Tayip Erdogan University, Rize</td>
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<td>3</td>
<td>National Centre for Disease Control and Public Health of Georgia, Tbilisi</td>
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<td>4</td>
<td>Veterinary Institute of the Republic of Srpska, Banja Luka</td>
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<td>5</td>
<td>Faculty of Veterinary Medicine Sarajevo, Federation Bosnia and Herzegovina</td>
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<td>University of Novi Sad, Serbia</td>
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<td>7</td>
<td>National Centre for Epidemiology, Budapest</td>
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<td>Hungarian Natural History Museum, Budapest</td>
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<td>Biotechnical Faculty, Podgorica</td>
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<td>10</td>
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<td>Istituto Superiore di Sanità, Roma</td>
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<td>12</td>
<td>Istituto Zooprofilattico Sperimentale della Sicilia, Palermo</td>
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<td>Museum of Natural History, Torshavn, Faroe</td>
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<td>Icelandic Institute of Natural History, Iceland</td>
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<td>Institute of Biology, University of Iceland</td>
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<td>University of Aarhus, DK</td>
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<td>17</td>
<td>Dartmouth College, USA</td>
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<td>Greenland Institute of Natural Resources, Greenland</td>
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## Local participants 2015 – >33/12

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<td>1</td>
<td>Zati Vatansever</td>
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<td>Francesco Severini</td>
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<td>Berna Demirci</td>
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<td>Mustafa Akiner and team</td>
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<td>Alessandra Torina</td>
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<td>Aleksandra Ignjatović Ćupina</td>
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<td>Marco Di Luca</td>
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Priority 1: Caucasus countries

- Presence of *Ae. aegypti* reported from Georgia (Abkhazia and Tbilisi; 2007) but lack of updated data
- Report of presence of both *Ae. albopictus* and *Ae. koreicus* in bordering Russia (Krasnodarskij kraj) in 2012-13; thus possibility of spread of these species into Georgia
- Possible spread of these 3 IMS into Azerbaijan, Armenia, and NE Turkey (*Ae. aegypti* was present in both Azerbaijan and NE Turkey in the past)
- Risk of spread/transport of IMS to other localities along the Black Sea coast
- Existing old records of *Ae. cretinus* in that region, but never confirmed
- Also lack of data on distribution of other native species in that region

✓ For practical and financial reasons, survey in Azerbaijan is postponed
✓ A MediLabSecure training was organised in Ankara
✓ Survey in Armenia was planned but finally also postponed as Armenian people did not attend the training
MosquitoFieldStudy #01: Caucasus – 1

- MediLabSecure training in Ankara, 7-11 Sept 2015
- Field missions in NE Turkey (14-22 Sept) and Georgia (23-30 Sept)
- 3 province in NE Turkey, 6 in Georgia

Yellow: *Aedes aegypti* only
Blue: *Aedes albopictus* only
Red: both *Ae. aegypti* and *Ae. albopictus*
MosquitoFieldStudy #01: Caucasus – 2

Coordinated by Vincent Robert (IRD, France)

Main results

– Presence of both *Ae. albopictus* and *Ae. aegypti* in large parts of Georgia and in Turkey
– No finding of *Ae. koreicus* and *Ae. cretinus*
– Presence of *Cx. tritaeniorhynchus*
Priority 2: Balkan countries

• Report of *Ae. albopictus* from Bosnia & Herzegovina (single specimen in 2005), but no updated data, and spread throughout the country is probable
• No data at all from Bosnia & Herzegovina for both native and invasive mosquito species

✓ MediLabSecure training has benefit to colleagues from the whole region
✓ Field training and equipment was provided to Hungary - occasional surveys along the main ground travel routes
✓ LOVCEN project agreed to share data and host sand fly group
MosquitoFieldStudy #02: Balkan - 1

- Coordinated by Dušan Petrić (Univ Novi Sad, Serbia)
  - MediLabSecure training in Novi-Sad, 8-12 June 2015
  - VectorNet field training in BH, 17-19 June
  - Field missions with training in BH (19-26 June)
  - Additional team missions
  - Almost all BH provinces visited
MosquitoFieldStudy #02: Balkan - 2

• 58 locations
• 166 sites
• 283 ovitraps data
• 37 larval samplings
• 11 human landing catches
• 133 trap samples

✓ 5,254 mosquitoes
✓ 18 species, 8 mapped by VectorNet

surveyed location
positive for *Aedes albopictus*
MosquitoFieldStudy #02: Balkan - 3

Results

- *Ae. albopictus* found established all along the BH coast, and at some places inland
- Lots of distribution data collected for mapped species
- Veterinarians trained in entomology, Ministry considering surveillance
Results

- Additional data from Montenegro (Ae. albopictus and others) shared by LOVCEN project (Biotechnical Faculty, Podgorica)

  - ‘Side’ survey 1 – Hungary: both Ae. albopictus and Ae. japonicus were found

  - ‘Side’ survey 2 – Liechtenstein: presence of Ae. japonicus
Ae. albopictus, 2014
Findings - Ovitraps

*Ae. japonicus*
- 5 positive sites with ovitraps

*Ae. albopictus*
- 4 positive sites with ovitraps
Priority 3: Italian isles

- *Ae. albopictus*: lack of data from parts of Sicily
- No data from Lampedusa
- Risk of introduction of pathogens via immigrants
MosquitoFieldStudy #03: Italian isles – 1

Coordinator: Francis Schaffner

– Training of field team by ISS
– Analysis of samples from 2014 (Agrigento)
MosquitoFieldStudy #03: Italian isles – 2

- 10 locations in Sicily,
- Plus 3 isles:
  - Lampedusa
  - Pantelleria
  - Linosa
MosquitoFieldStudy #03: Italian isles – 3

• Results
  – *Ae. albopictus* present in all Sicilian provinces and on all 3 isles
  – Other IMS not found
Priority 4: EU Northern territories

• Absence of data on mosquitoes from Iceland and Faroe (no studies have been performed there)
• Very little data available from Svalbard and Greenland
• Old report of introduction of *Ae. triseriatus* into Greenland exists (1971), but no updated information on its presence or spread exist, nor on possible introduction of other species
MosquitoFieldStudy #04a: Faroe & Iceland –

Coordinated by Francis Schaffner

– Expert’s field mission, 11 working days distributed over July 9 till August 11, 2015

– Trainings on place and prolonged surveys by local teams
MosquitoFieldStudy #04a: Faroe – 2

• Results
  – No single mosquito species found
  – *Culicoides* present in a small area of Iceland (new), common on Faroe
  – *Dixa* sp. observed for the first time in Faroe

• Conclusions
  – Environment suitable for mosquitoes, also around airports and harbour
  – Repeat the survey in a few years?
MosquitoFieldStudy #04a: Iceland – 3

- Larval sampling
- CO$_2$-baited traps
- GAT
- OVI traps (Culicoides)
- Tick dragging
- Checking hosts
- 58 sites in 6 isles
MosquitoFieldStudy #04b: Greenland – 1

Coordinated by Francis Schaffner

- Expert’s field mission June 25th to July 3rd, 2015
- Trainings on place and prolonged surveys by local teams
- Larval sampling, CO₂-baited traps, ovitraps, OVI traps, tick dragging
- Sharing of samples from previous years
MosquitoFieldStudy #04b: Greenland – 2
MosquitoFieldStudy #04b: Greenland – 2

89 sites during the mission
OVI traps at sites 1 & 3 (sheep farms)
Ovitrapts for several weeks at all 3 locations
Additional CO$_2$-baited trappings at locations A & C
MosquitoFieldStudy #04b: Greenland – 3

• Results
  – Many native *Aedes impiger* and *Ae. nigripes* everywhere
  – No *Ae. triseriatus*
  – No *Ae. dorsalis*, no *Culex* sp.
  – Lots of simulids
  – No ticks
  – *Culicoides* in progress

• Conclusions
  – Environment not suitable (anymore) for *Ae. triseriatus*
Achievements

- Delivery of equipment to many countries
- Findings of IMS in many NUTS
- Collection of many data, including negative data
- Contacts with local PH and AH key persons achieved in some countries
- Good achievements in training of local teams and capacity building
- Excellent collaboration with MediLabSecure
- Excellent collaboration with WHO Europe
Mosquito Road Map
2016
VectorNet

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Mosquito Field Studies 2016

2. Balkans

- Continuing filling gaps, at selected place, according to GA

  - Northern Montenegro: IMS, An. spp, Cx. perexiguus/tritaeniorhynchus

  - Bulgaria: IMS, An. spp, Cx. perexiguus/tritaeniorhynchus
Figure 5. Distribution risk map for *Aedes albopictus*, MCDA model.
Subject - Modeling the climatic suitability of *Aedes albopictus* in Montenegro.

Data:

- Climatology: 1981-2010
- *Aedes albopictus* field data: 2012; 2013; 2015
- Climate model data: 2001-2030; 2071-2010

(Bar; Herceg Novi; Kolašin; Pljevlja; Podgorica; Ulcinj; Žabljak)
MODIS

Comparison of the correlation between the two MODIS interpolated raster sets for daily LST for 2000 (1. linear interpolation 2. spline) and the climatic data (obs) for 2000

1. Linear interpol. MODIS and OBS; \( r = 0.83 \)
2. Spline interpol. MODIS and OBS; \( r = 0.80 \)
Suitability prediction (based on regional climate model for Balkan) vs establishment of *Aedes albopictus* in Montenegro period 1981-2010

Petric M. et al. unpublished results
Distribution of *St. albopicta* (*Ae. albopictus*) in Montenegro 2001-2015
1. Overwintering

- 2001-2030
- 2071-2100

[Color-coded maps showing suitability for overwintering in different regions for two time periods.]
2. MCDA

2001-2030

2071-2100
3. Kobayashi