

MEETING ABSTRACTS

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Proceedings of the 1st Conference on Neglected Vectors and Vector-Borne Diseases (EurNegVec): with Management Committee and Working Group Meetings of the Cost Action TD1303

Cluj-Napoca, Romania. 8-11 April 2014

Edited by Supplement Editors: Andrei Daniel Mihalca, Domenico Otranto and Mirabela Oana Dumitrache. Section Editors: WG1 - David Modrý, WG2 - Muriel Vayssier-Taussat, WG3 - Laura Rinaldi, WG4 - Agustin Estrada-Pena, WG5 - Gad Baneth

Published: 1 April 2014

These abstracts are available online at <http://www.parasitesandvectors.com/supplements/7/S1>

ORAL PRESENTATIONS

WG1 - THE "ONE HEALTH" CONCEPT IN THE ECOLOGY OF VECTOR-BORNE DISEASES

01

Ticks feeding on ruminants and humans in Greece

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Parasites & Vectors 2014, **7(Suppl 1)**:01

Ticks are important vectors of disease and transmit an extensive range of viral, bacterial and protozoan pathogens to livestock in a wide variety of habitats. In recent years, diseases such as babesiosis, ehrlichiosis and anaplasmosis have all shown evidence of increased prevalence and distribution in various parts of Europe. However data concerning the prevalence of ticks and tick borne diseases present in livestock and humans in Greece are limited.

In order to fill this gap we performed the current study to define the existence and prevalence of different tick species found in farm animals and humans. As regards livestock, we focused on ruminants (mainly sheep and goats and, in a lesser extent, cattle) since they are the only ones spend time on pastures. A sufficient number of farms all over the country were visited during 2 tick seasons (from March to October), taking different habitats and animal density around Greece into account. Ticks collected from humans originated from infected individuals who visited hospitals.

In total, 2676 ticks were collected from 26 different prefectures (mainland and islands) all over Greece.

From those, 1,883 were coming from sheep (1201) and goats (681) and identified as: *Rhipicephalus sanguineus* 1,216 (64.65%); *R. bursa* 495 (26.3%);

R. camicasi 12 (0.6%); *R. turanicus* 70 (3.7%); *Ixodes ricinus* 1 (0.05%); *Dermacentor marginatus* 47 (2.5%); *Hyalomma marginatum* 5 (0.3%); *H. excavatum* 2 (0.1%), *H. dromedarii* 31 (1.6%) *H. rufipes* 2 (0.1%); *H. impeltatum* 1 (0.05%); and *Rhipicephalus* nymph 1 (0.05%). More than half (54.3%) of the above were found in an altitude of 0-300 meters, 37.1% in an altitude of 301-800m and 3.2% in an altitude of >800m.

142 ticks originated from cattle and were identified as: *R. sanguineus* 15 (10.5%); *R. bursa* 6 (4.2%); *R. camicasi* 5 (3.5%); *R. turanicus* 6 (4.2%); *H. marginatum* 24 (17%); *H. excavatum* 8 (5.6%); *H. dromedarii* 67 (47.2%); *H. rufipes* 4 (2.8%); *H. impeltatum* 1 (0.7%); *H. anatolicum* 3 (2.1%) and *H. turanicum* 3 (2.1%).

Finally, 701 ticks were coming from humans and identified as: *R. sanguineus* 562 (80.17%); *R. bursa* 23 (3.28%); *R. turanicus* 34 (4.85%); *R. annulatus* 5 (0.71%); *H. marginatum* 30 (4.28%); *H. excavatum* 2 (0.28%); *H. rufipes* 11 (1.57%); *Dermacentor marginatus* 2 (0.28%); *Ixodes ricinus* 6 (0.85%); *I. gibosus* 6 (0.85%) and *Rhipicephalus* nymphs 20 (2.85%).

In conclusion, the majority of ticks found in both animal species and humans examined belonged in the *Rhipicephalus sanguineus* group which is the main vector of *Rickettsia conorii*, while *Hyalomma marginatum*, the vectors of CCHF virus, were also present. The above results were more or less anticipated given the climatic conditions of the area, fact that also explains the low prevalence of *Ixodes* spp.

02

Risk assessment for West Nile Virus in Northern Greece (2010-2013)

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Parasites & Vectors 2014, **7(Suppl 1)**:02

Since the large WN fever epidemic in Central Macedonia in 2010 caused by WNV Lineage 2, with a total of 262 cases (197 neuroinvasive, incidence rate 1:140), WNV cases are reported every year from different areas throughout Greece (2011: 100 cases/75 neuroinvasive, 2012: 161/109, 2013: 86/51). WN fever has become one of the most important issues for the National Health Authorities in terms of vector-borne diseases.

From 2011 and onwards, for the surveillance of WNV in Central Macedonia, two major networks were established by Ecodevelopment in

collaboration with the Hellenic CDC, the region of Central Macedonia and four specialized laboratories: 1) A network of 60 CO₂-traps for adult mosquitoes at fixed sites monitored biweekly for 4 months every year. Pools of 10-50 *Culex* spp. are forwarded weekly to the laboratories for the detection of WNV. 2) A network of sentinels (domestic pigeons and/or backyard chickens, 40 -50 hencoops or pigeon coops, 400-450 samples/year) for blood sampling in early summer and/or at the end of the hot season.

In the plain of Thessaloniki, in early summer (June) the seroconversion in chickens reached 11,9% (28 positive/236 chickens) in 2011 versus 4,1% (8 positive/197 chickens) in 2013. The corresponding average weekly Minimum Infection Rate (M.I.R.) for the period mid June-end August was 1.73 in 2011 and 0.39 in 2013 respectively. These data seem to support the hypothesis that it is possible to relate the level of WNV circulation (infected mosquitoes and animal sentinels) with the upcoming human WNV cases: 16 human neuroinvasive cases were recorded in 2011 versus 5 cases in 2013. The follow up of the epidemiological risk through these two networks in combination with the weekly epidemiological reports of the Hellenic CDC and the results of larval habitat monitoring are permanently used to optimize vector control measures that are implemented in the region of Central Macedonia.

Funding: Ecocodevelopment, Hellenic Center for Disease Control & Prevention, Integrated Surveillance and Control Programme for West Nile Virus and Malaria in Greece

O3

Outbreaks of blackflies and related problems in Serbia: past and present situation

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Parasites & Vectors 2014, **7(Suppl 1)**:O3

Due to the repeated outbreaks of blackflies, consequent economical losses and health problems, Serbia was considered as the most threatened European country in the past. During the last century (up to '60s), *Simulium colombaschense* caused enormous losses of livestock. Significant losses in poultry production caused by *S. maculatum* were also reported in 1958, while *S. erythrocephalum* caused severe dermatological problems in humans in 1965 and 1970.

In the last fifteen years, repeated outbreaks of blackflies and reemerging of bite related problems in humans were recorded in some parts of Serbia.

The research objective was to update the knowledge of blackfly pest species distribution in Serbia, with a special attention to endangered regions in the present and the past. Samplings were conducted in the period 2003-2012. Immature stages were collected from submerged substrates: in the Danube river and its tributaries, the Nera river and the Nišava river. Adults were sampled close to the breeding sites by application of CO₂ baited traps or by light traps.

In the lowlands 11 blackfly species were recorded. Two mammophilic species have been dominant: *S. erythrocephalum* in the Danube and *S. ornatum* (complex) in confluent streams. In 2010, *S. erythrocephalum* was recorded for the first time in the hilly area in southeastern Serbia. Periods of high adult population density of those two species coincided with the bite cases reports.

In the Iron Gate region, 21 mainly mammophilic species were recorded in the Danube confluents exclusively. *S. colombaschense*, the main pest species in the past, was detected only in the Nera river, about 30 km upstream from the entrance of the Iron Gate.

Present state of blackfly fauna composition indicates the existing risk of outbreaks of some species in the future.

Acknowledgements: The study was supported by The Ministry of Education, Science and Technological Development of the Republic of Serbia (projects TR31084 and III43007).

O4

Co-occurrence of *Babesia microti*, *Bartonella* spp., *Borrelia burgdorferi* s.l. and *Anaplasma phagocytophilum* in rodents from Lower Silesia, Poland

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Parasites & Vectors 2014, **7(Suppl 1)**:O4

This study aims to establish the relative contribution of rodent populations from diverse habitats to the occurrence of rodent-borne pathogens of public health significance. Rodents (n = 492) represented by *Apodemus agrarius*, *A. flavicollis* and *Myodes glareolus*, were captured in live traps in four localities of south-western Poland (2009-2012). For the analysis of co-occurrence of pathogens, *Babesia microti*, *Borrelia burgdorferi* s.l., *Bartonella* spp. and *Anaplasma phagocytophilum*, both blood and spleen samples were obtained from selected rodent specimens. The choice of genetic markers and primers was based on the literature data and our preliminary results. Conventional PCR was used for the detection of DNA of examined pathogens. Selected PCR positive products were purified and sequenced. BLAST searches were conducted in order to elucidate any homologies with previously deposited sequences in GenBank.

The DNA of pathogens was detected in 66.7% of the rodents tested. We observed that among infected rodents, 40.5% were infected with at least two pathogens, while only 4.7% with all four pathogens. All three of the rodent species were infected with each of the examined pathogens. In examined rodent populations the prevalence of *B. microti* was 40.0%, *Bartonella* spp. 37.7%, *B. burgdorferi* s.l. 28.2% and *A. phagocytophilum* 17.7%.

In each of the tissue samples (blood or spleen), the prevalences of *Babesia microti* and *Bartonella* spp. were recorded as comparable, on rather high levels. Interestingly, the occurrence of these pathogens in both blood and spleen was only detected in 13% of the rodents.

While examining the blood and spleen-derived DNA, it was found that as many as 92.7% of *A. agrarius* harbored at least one pathogen. Co-occurrence of 3-4 pathogens was most common in this rodent species (32.1% infected).

By examining the spleen and blood samples of rodents at the same time, we estimate that the prevalence of pathogens in these rodents is higher than the literature indicates. This would implicate the examined rodent species as a significant reservoir of pathogens with zoonotic potential. Additionally, the role of *A. agrarius*, now widespread in some regions of Europe, as a reservoir host needs to be emphasized. *A. agrarius* can act as a bridge between woodland habitats and periurban environments frequented by humans.

O5

The role of *Sergentomyia schwetzi* in epidemiology of visceral leishmaniasis in Ethiopia

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Parasites & Vectors 2014, **7(Suppl 1)**:O5

Leishmaniasis is caused by a protozoan of the genus *Leishmania* and transmitted by the bites of phlebotomine sand flies. During the blood feeding, sand fly females inject saliva into the host thus affecting *Leishmania* transmission; in a naive host saliva enhances parasite virulence, in preexposed host it acts as the protective immunogenic agent by eliciting anti-saliva specific cellular and antibody immune response. Interestingly, anti-saliva antibodies in bitten hosts can be used in epidemiological studies as the marker of exposure and the risk marker of *Leishmania* transmission.

Ethiopia is endemic for visceral leishmaniasis caused by *Leishmania donovani* and transmitted mainly by *Phlebotomus orientalis*. However, the most abundant sand flies in the area belong to the genus *Sergentomyia*. *Sergentomyia* females prefer to feed on reptiles, but several studies reported mammals as the additional blood source. The main aim of this