New native Culicidae species records to Belgium validated using DNA-based techniques

Nathalie Smitz, Royal Museum for Central Africa; Katrien De Wolf, Institute of Tropical Medicine (ITM); Isra Deblauwe, ITM; Ingrid Verlé, Institute of Tropical Medicine; Anna Schneider, ITM; Adwine Vanslembrouck, Royal Belgian Institute of Natural Sciences Jacobus De Witte, ITM; Wouter Dekoninck, Royal Belgian Institute of Natural Sciences; Kenny Meganck, Royal Museum for Central Africa; Sophie Gombeer, Royal Belgian Institute of Natural Sciences; Ann Vanderheyden, Royal Belgian Institute of Natural Sciences; Marc De Meyer, Royal Museum for Central Africa; Thierry Backeljau Royal Belgian Institute of Natural Sciences, University of Antwerp; Wim Van Bortel, ITM

Background- The most recent revised Belgian culicid fauna checklist reported the occurrence of 28 native species, belonging to six genera (Boukraa et al., 2015). In addition, three invasive species were found to be introduced or established. This species list was built based on a literature review, on the revision of the Royal Belgian Institute of Natural Sciences culicid collection, and on a nationwide inventory of mosquitoes performed in the framework of the MODIRISK project (2007-2011). During two following monitoring projects (EXOSURV and FASFC), aiming to detect the occurrence of exotic mosquito species (EMS), no new species were detected. Since 2017, a fourth EMS monitoring project is running (MEMO). Apart from monitoring EMS, the study also provides valuable information concerning the overall mosquito fauna and its distribution. To discriminate between species, both morphology and DNA-based identifications are performed. Results- Besides the identification of 19 native species or complexes collected in 2017 and 2018, and the identification of four EMS (Aedes koreicus; Ae. japonicus; Ae. albopictus; and Anopheles pharoensis), this monitoring project allowed for the identification of three new native species records for Belgium. Culiseta longiareolata (Macquart, 1838) was discovered at one site in 2017 and at three locations in 2018 (Nind=7). Its recent detection can potentially be linked to its increasing spread at the edge of its distribution range. Anopheles daciae (Linton, Nicolescu & Harbach, 2004) is a newly described member of the An. maculipennis complex and was recently reported from western, southern and eastern Europe. It is morphologically undistinguishable from the other members of the complex, and was discovered at multiple locations (Nind=35). In addition, the presence of An. atroparvus, one of the four native species of the complex, was re-confirmed using the same DNA-based identification techniques (ITS2, RFLP). Culex modestus Ficalbi (1890) was found at one site in 2018 (Nind=1), and validated using COI sequences. Its presence in Belgium was suspected since the species is found in all surrounding countries, but was never confirmed so far. Significance- Cs. longiareolata does not appear to have any epidemiological relevance for human or zoonotic diseases. However, mosquitoes of the An. maculipennis group are of public health concern since at least five of the 11 morphologically indistinct species have been historically considered as vectors of malaria in Europe. Also, Cx. modestus is considered to be a competent bridge vector of the West Nile virus.