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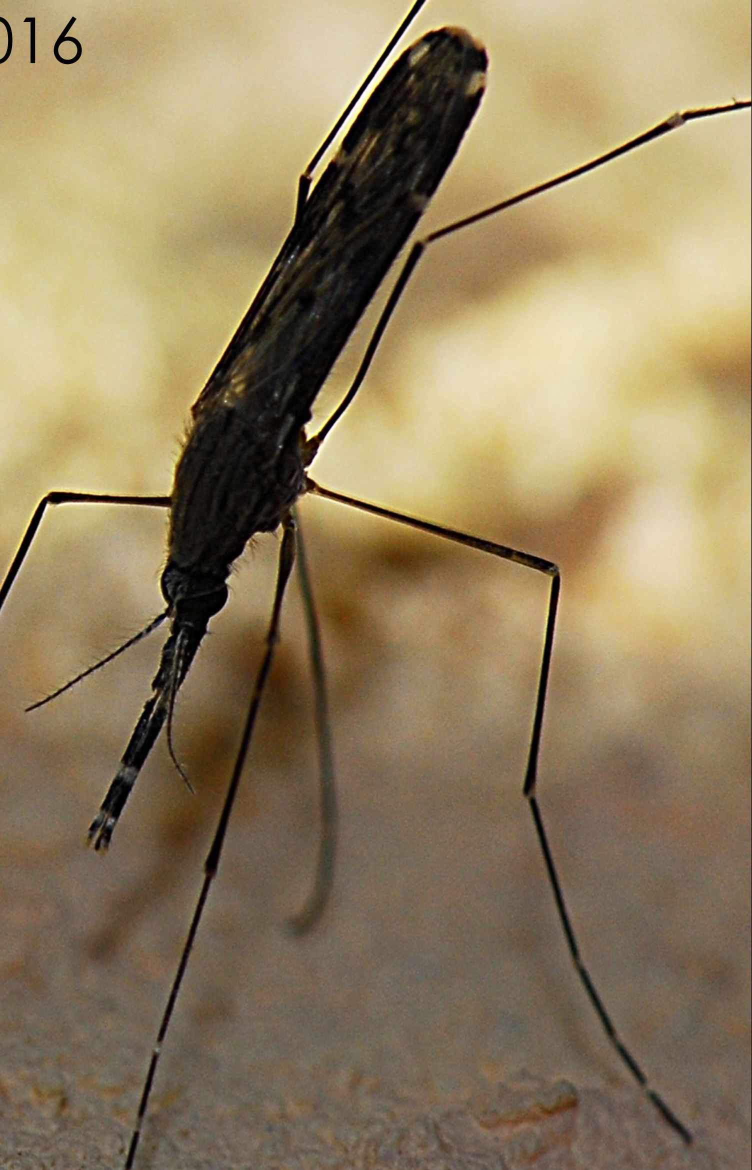
ABSTRACT BOOK



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WG 1

The “One Health” concept in the ecology of vector-borne diseases

ORAL PRESENTATIONS

MICROCLIMATIC TEMPERATURE PLAY A VITAL ROLE FOR VECTOR BORNE DISEASE TRANSMISSION IN THE COOL SCANDINAVIAN CLIMATE

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Temperature is a key driver of vector-borne disease transmission. Approximately 15^{0} C is a threshold temperature for Bluetongue virus development in *Culicoides* vector. Most of the mathematical models for virus development time in vectors use standard meteorological temperature instead of the temperature in the microclimatic environment actually surrounding the vectors. The objectives of this study were to quantify the difference between the meteorological and the microclimatic temperature of *Culicoides* habitats, to develop a model able to predict the microclimatic temperature of an area based on available parameters from meteorological institutes, and to compare the impact of microclimatic and meteorological temperature on bluetongue virus development and the potential number of infectious bites produced by a *Culicoides* vector in its lifetime. We recorded half-hourly temperature in four microclimatic habitats; dry meadow, wet meadow, hedges, and trees at Strødam in Denmark from May-October 2015 by setting temperature data loggers in triplicates and at different heights in each habitat. From the same area we also recorded meteorological temperature, solar radiation, wind speed, humidity, and precipitation using a portable meteorological weather station. We performed multiple linear regressions to predict the microclimatic temperature of different habitats based on the parameters collected from meteorological weather stations. Finally, we modelled the bluetongue virus development time and number of infectious bites produced by a *Culicoides* infected with bluetongue virus in an hourly model. Compared to meteorological temperature, microclimatic temperature had more hours with >15^{0}C in May to October 2015. Compared to meteorological temperature, microclimatic temperatures of dry meadow showed faster bluetongue virus development in *Culicoides* (median: 13 vs 18 days) and showed a higher number of infectious bites (median: 0.83 vs. 0.22 bites/infected *Culicoides*). In the multiple linear regression analysis, the

microclimatic temperature in different habitats was expressed as a function of meteorological temperature, solar radiation, wind-speed, precipitation, humidity, types of habitats, heights of loggers, months, and time of the day with an R^2 value of above 0.80. Temperature is much higher in the microclimatic habitats; therefore virus development time in the vectors is much shorter than previously anticipated. The microclimatic temperature could explain why the relative cold Scandinavian countries experience *Culicoides* borne diseases in late autumn. The microclimatic models will allow us to predict the microclimatic temperature in Denmark using Danish meteorological data and thereby perform risk assessment of mosquitoes and *Culicoides* borne diseases.