Ref: 06/MN
Closing Date: 16.02.26 (close of business)

Project Title: Environmental drivers of Culicoides behaviour and disease persistence

Supervisors: Melanie Nicholls and Marion England
Research group: Vector Ecology

Project Summary:
Bluetongue virus (BTV) causes a haemorrhagic disease affecting most ruminants and is spread by *Culicoides* biting midges. In 2023 BTV arrived in the UK from infected *Culicoides* blown over from continental Europe for the first time since 2007, and since then has successfully persisted over the winter months The exact mechanisms by which it achieves this are unclear, and the student recruited to this project will be joining an established Defra-funded research program looking into potential mechanisms for the persistence of BTV through the winter in temperate zones. At the same time another related disease, epizootic haemorrhagic disease virus (EHDV), is also spreading northwards throughout Europe, posing a risk of introduction to the UK.

Culicoides behaviour and survival is influenced by temperature, which in turn affects their ability to transmit viruses like BTV and EHDV. *Culicoides* are thought to overwinter as larvae, and vertical transmission of BTV from adults to their progeny has not been demonstrated experimentally. It is uncertain whether the survival of infected adults together with replication of the virus over the winter months is possible. There is a chance that adult *Culicoides* may be able to take advantage of microclimates (sheltered habitats with warmer temperatures) within the farm environment to increase their survival rates through to the spring, thus enabling overwintering of BTV.

The student will join a project aiming to define the temperature limits, behaviours and habitats that may facilitate the survival and activity of *Culicoides*. Adult *Culicoides* activity will be monitored both indoors and outdoors at five dairy farms in the south-east of the UK, and within those farms, the use of microclimates by *Culicoides* will be characterised. Alongside this we will also look at the impact of cold exposure on *Culicoides* survival, longevity and fitness by exposing different life stages (egg, larvae, pupae and adults) of field-caught and colony individuals to varying time periods at sublethal cold temperatures.

To support all these activities the intern will receive training from members of the Vector Ecology group in:

- *Culicoides* trapping methods
- Morphological and molecular identification techniques
- Use of refrigerated water bath to expose *Culicoides* to sub-zero temperatures
- *Culicoides* colony rearing
- Measuring biometric features of *Culicoides*
- Statistical analysis of data

Further Details:
This project will involve a substantial amount of fieldwork, and the recruited intern must be confident with driving independently to farm sites where the monitoring work is taking place. To support this they must hold a full UK driving licence to be insured on our Insectary car.

The intern will be supervised by the Defra-funded postdoc (Dr Melanie Nicholls), with oversight and support from Dr Marion England. The student will be encouraged to own and drive some aspects of the project, namely field collections of *Culicoides*. The work will produce publishable results, providing the opportunity for co-authorship for the intern. Additionally, the intern will have the opportunity to shadow and assist with other research projects within the group, depending on their specific area of interest.

References for Suggested Reading:

Devlin, L. M., Cuthbert, R. N., Nicholls, M., Murchie, A. K., Bamford, C. G., Dick, J. T., ... & England, M. (2025). Substantial cold tolerance in all life stages of the biting midge Culicoides nubeculosus (Diptera: Ceratopogonidae). *bioRxiv*, 2025-12.

Groschupp, S., Kampen, H., & Werner, D. (2024). Winter activity of Culicoides (Diptera: Ceratopogonidae) inside and outside stables in Germany. *Medical and Veterinary Entomology*, *38*(4), 552-565.

McDermott, E. G., Mayo, C. E., & Mullens, B. A. (2017). Low temperature tolerance of Culicoides sonorensis (Diptera: Ceratopogonidae) eggs, larvae, and pupae from temperate and subtropical climates. Journal of Medical Entomology, 54(2), 264-274.

To Apply: See How to apply. Closing date: 16.02.26 (close of business)