Designing LED lights that minimise the attraction of potential malaria vectors

Forty percent of the world’s population is considered at risk from mosquito-borne malaria, and up to 500 million cases occur, resulting in 2.7 million deaths annually. Mosquitos in the genus *Anopheles* transmit malaria and include a large number of cryptic species that cannot be distinguished by morphological characteristics. Only some of species host the *Plasmodium* parasite however, and unambiguous identification of these species is only possible by genetic methods. The recent sequencing of the genomes of 16 *Anopheles* mosquito species [1] allows potential for developing species-specific markers for the identification of vector species by DNA barcoding. We will investigate differences in the attraction of malarial vector mosquitos to domestic lights with different spectral properties. Specifically, we will test two hypotheses. 1. New LED domestic lights will attract fewer vector mosquitos than traditional light sources, reducing risks of malaria transmission. 2. The spectral content of LED lights can be manipulated to minimise the attraction of potential malaria vectors. In collaboration with the CASE partners Integral LED, we have recently shown that new LED lights attract fewer insects (including biting midges *Culicoides* spp.) than traditional domestic lights in the UK [2]. We will use a similar experimental design using simultaneous presentation of different light types with similar intensity but different spectral characteristics at replicate sites in the field, and will identify the mosquito species captured at traps placed at lamps by using DNA barcoding. Fieldwork will be based in Africa, where nine-tenths of malaria deaths occur (World Health Organisation 2015) at sites used by Jones's former PhD students working in Malawi and southern Africa. The Bristol supervisor (Jones) pioneered methods for identifying insects DNA in bat droppings by using DNA barcoding ([3], and has more recently used high-throughput Illumina sequencing to identify insect DNA from short mtDNA fragments amplified using arthropod-specific primers [4]. We will also use direct shotgun sequencing (metagenomic) approaches to identify insect pests in catches. Lighting technologies are changing rapidly on a global scale, and using lighting that minimises attraction of insect disease vectors while simultaneously reducing energy consumption is an important global challenge.


The award has been made, and the studentship will begin in September 2018. Some of the project will be based at Integral LEDs laboratories in London.
Funding is for 3.5 years. Please apply via [http://www.bristol.ac.uk/study/postgraduate/apply/](http://www.bristol.ac.uk/study/postgraduate/apply/)

Experience in molecular ecology essential, and a Masters-level qualification is desirable.

**Deadline Friday 15 December 2017**

*Photos: Dr Andy Wakefield*