

2024_50_DoLS_LC: Predicting the thermal adaptation of a disease vector in a changing world

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Insects are highly diverse and constitute almost half of the biomass of all animals on earth, fulfilling critical roles as prey, predators, decomposers, pollinators, pests, and disease vectors in virtually every terrestrial ecosystem. Therefore understanding how these animals will respond to climatic warming is critical for economic and health security. We recently reported (<https://www.biorxiv.org/content/10.1101/2023.01.18.524448v2>) that the rate of thermal adaptation of an arthropod population is predicted to be limited by changes in the temperatures at which performance four key life-history traits peak, in a specific order of declining importance: juvenile development, adult fecundity, juvenile mortality, and adult mortality. Critically, we also found evidence that thermal adaptation is constrained due to differences in the temperature of the peak performance of these four traits, with these differences expected to persist because of energetic allocation and life-history trade-offs. We used a large scale data synthesis to show that over evolutionary time these predictions hold up. This project aims to whether we use this approach to predict shorter term responses of insect populations.

The student will undertake a series of experiments working with the important and globally distributed mosquito, *Aedes albopictus*. They will combine field work and laboratory experiments with mathematical modelling to develop a mechanistic understanding of how the responses of individual life history traits to temperature regime shifts combine to affect population fitness and transmission potential. Through the project we hope to gain insights into how this disease vector will respond to a changing climate. Project outputs could be used to inform mechanistic forecasts of *Aedes albopictus* in future temperate climates

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