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Dear Dr Pariente,

Please find accompanying this letter our manuscript, “A Meta-analysis of Longevity Estimates of Mosquito Vectors of Disease”. We hope that you will consider our submission for PLOS Biology.

Mosquito borne diseases afflict hundreds of millions of people each year, and, because it is only long-lived mosquitoes that can transmit pathogens, our ability to manage these diseases is closely tied to our understanding of the natural variation in mosquito longevity. Despite this, there remain many gaps in our knowledge about mosquito longevity despite numerous field experiments spanning at least a century. A difficulty is that individual studies are often small-scale and affected by idiosyncratic local conditions. In this manuscript, we bring together the data from a great number of studies in a common framework. This has enabled us to produce, to our knowledge, the first synoptic estimates of mosquito lifespan at the species, species-complex and genus levels.

Specifically, we applied Bayesian meta-analysis methods to three databases of field experiments, which each provides complementary information on mosquito lifespan: a dataset of 232 mark-release-recapture experiments and two datasets (comprising 131 and 1490 studies, respectively) of mosquito dissection experiments (the state of the reproductive system provides an estimate of age). Of relevance to human disease, we estimate the lifespan for some of the most important vector species of malaria, dengue virus and Zika virus. Our analyses indicate that the majority of malaria vectors live for fewer than 10 days, which, indicates that a small fraction of mosquitoes can transmit the disease. For *Aedes aegypti* and *Aedes albopictus*, key vectors of dengue virus, chikungunya and Zika, a larger proportion of mosquitoes survive to transmit the disease. By curating a fourth dataset of experiments which determined gonotrophic cycle duration – of direct import for transmission of disease – we produce estimates of this quantity in *Anopheles*, *Aedes* and *Culex* mosquitoes and conclude that it varies across genera.

Since our data also contains information on study-level covariates, we investigated the impact of several other factors on mosquito lifespan. We find that female mosquitoes outlive males by 1.2 days on average (to our knowledge, the first time this has been shown from field data), and mosquitoes which are sugar-fed prior to release live 0.6 days longer on average. By exploiting the different types of data inherent in each of the experiment types, we determine whether mortality rates increase with mosquito age in the wild. Overall, we find little evidence of mosquito senescence. We also critique the different methods used to estimate longevity as well as potential shortcomings of our metanalysis.

All authors have made a significant contribution to the work and have agreed to submit the paper in its current form to PLOS Biology. I can also confirm that the research has not been (and will not be) submitted simultaneously to another journal, in whole or in part.

Finally, we would like to suggest the following people as potential reviewers of our manuscript:

- Prof. Heather Ferguson, University of Glasgow, heather.ferguson@glasgow.ac.uk
- Prof. Nuno Faria, Imperial College London, n.faria@imperial.ac.uk
- Prof. David Smith, University of Washington, smitdave@uw.edu

We hope that you will find our manuscript suitable for consideration for publication and look forward to hearing from you in due course.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Ben Lambert', with a stylized flourish at the end.

Dr Ben Lambert
Senior lecturer
University of Exeter