18th May 2022

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Dr Nonia Pariente

Editor-in-Chief

PLOS Biology

Dear Dr Pariente,

Please find included with this submission 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 mortality shapes the transmission intensity of mosquito-borne disease, yet there remains considerable uncertainty about the rate at which mosquitoes die and whether they senesce. In our article, we conduct meta-analyses of large databases of field experiments performed on wild mosquitoes which allows us to produce, to our knowledge, the first estimates of mosquito lifespan at the species, species-complex and genus levels. We are also able to pool information across studies to critically assess evidence for mosquito senescence.

We perform Bayesian meta-analyses using 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. Crucially, our study produces estimates of 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 other factors on mosquito lifespan, finding 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 that mosquitoes which are sugar-fed prior to release lived 0.6 days longer on average.

By exploiting the different types of data inherent in each of the experiment types, we were able to quantitatively determine whether mortality rates increase with mosquito age in the wild. Overall, we find little evidence of mosquito senescence.

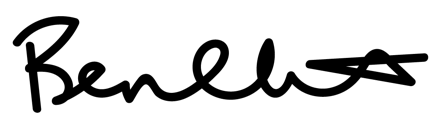
All authors have made a significant contribution to the work and have agreed to submit the paper in its current form to PLOS Biology. I can also confirm that the research has not been (and will not be) submitted simultaneously to another journal, in whole or in part.

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

* Dr Marianne Sinka, University of Oxford
* Prof. Nuno Faria, Imperial College London
* Prof. David Smith, University of Washington

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,



Dr Ben Lambert

Senior lecturer

University of Exeter