

# Keywords: Anopheles, Aedes, gut, larvae, blood meal

## Abstract

The digestive tract of a mosquito is home to bacterial community that is essential for normal development (1). In the larval stages, bacteria stimulate molting and growth (1). Some members of the larval gut community persist into the adult mosquito where they influence reproduction and ability to vector pathogens (2,3). Previous studies on the role of gutbacteria in development have focused on the genus Aedes, including *Aedes aegypt*i, which transmits the pathogens that cause Dengue fever and Zika virus syndrome. It is unknown if findings from *Aedes* species apply to all mosquitoes. Here, we address two important findings from *Aedes* in distantly related genus Anopheles by studying the malaria vectors An. gambiae and An. stephensi. First, we asked if Anopheles need bacteria to develop and if so, can we rescue development with individual bacterial species? Second, we assessed whether bacterial abundance in the guts of adult Ae. aegypti and An. gambiae differ before and after females blood feed. Like Ae. aegpyti, we find that bacteria free larvae cannot develop, however unlike Ae. aegypti some bacterial species cannot fully rescue larval development in Anopheles. Additionally the results were not equivocal between An. gambiae and An. stephensi. In adult mosquitoes, the bacterial community in the digestive tracts of Ae. aegypti and An. gambiae also responded differently to blood feeding. Collectively we find that that are commonalities between Aedes and Anopheles, however there were significant differences as well.

## Background

- Bacterial communities in Ae. aegypti have been well characterized (1,3).
- Bacteria are essential for Ae. Aegypti larval development and impact adult stages (1,3).
- Anopheles species, vectors of malaria (2), are distantly related to Aedes.
- It is unclear if findings in Aedes apply to Anopheles.

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# Acknowledgements

Thank you to REU advisors John Drake and Andrea Silletti, Jena Johnson for managing the insectary, and Luca Valzania for assisting with dissections.

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## Questions

- 1) Are bacteria required for normal larval development of Anopheles species? - If they are required, is development rescued only by specific bacterial species?
- 2) How do bacterial communities in Aedes and Anopheles change after the mosquito has taken a blood meal?



Figure 1: Life-cycle of *Anopheles* mosquitoes.

- Larval Development: 1)
  - Generated bacteria free mosquito larvae.

**Materials and Methods** 

- Inoculated different mosquito populations with different bacterial species or mixed communities.
- Observed growth and molting in each group.
- 2) Bacterial abundance in adult mosquitoes: • Used culture based methods to determine
  - abundance of bacteria before and after a blood meal in Ae. aegypti and An. gambiae.

## References

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Figure 2: Only some bacteria species can rescue development in Anopheles. Proportions of Anopheles larvae that molted to 2<sup>nd</sup> instar (grey) and pupation (red) when inoculated with listed bacteria.



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taking a blood meal. Black triangles = Ae.