

## Asaia bacteria in sand flies and their impact on Leishmania transmission

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### Abstract

Midgut microbiome was demonstrated to affect the transmission of vector-borne pathogens. In sand flies, *Asaia* bacteria was found as a part diet and midgut microbiome. Here, we have investigated the effect of two *Asaia* species on the development of *Leishmania major* in *Phlebotomus duboscqi*. The sand flies were first infected with bacteria via sugar meal and then membrane-fed on blood containing *Leishmania* promastigotes. Following this superinfection, the development of *Leishmania* infection was examined. Particularly, we studied changes in localization and intensity of infection and examined *Leishmania* morphological forms on midgut smears. Both tested bacteria species, *Asaia siamensis*, and *Asaia krungthepensis*, colonized the intestine of female *Ph. Duboscqi* for up to 8 days after infection and were transmitted vertically to the next generation through contamination of the egg surface. The presence of *Asaia* within *Ph. Duboscqi* negatively affects the intensity of *Leishmania* late-stage infections. In addition to the wild type, we tested a strain of *Asaia* engineered for the expression of a protein of *Wolbachia* (WSP). This strain of *Asaia* also readily survives in *Ph. duboscqi* midgut and experiments on its effect on *Leishmania* infection are in progress.

Keywords: *Phlebotomus*, *Asaia*, superinfection, microbiome

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