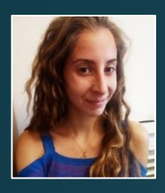

Dengue infection modulates host attraction in female *Aedes aegypti* mosquitoes

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BACKGROUND

For vector mosquitoes, pathogen infection has been demonstrated to induce behavioural changes[1-3]. As with malaria-infected mosquitoes, dengue infection induces reduced reproductive capacity and survival, and increased flight activity, nectar seeking and probing for a blood meal likely leading to higher transmission rates[4-7].

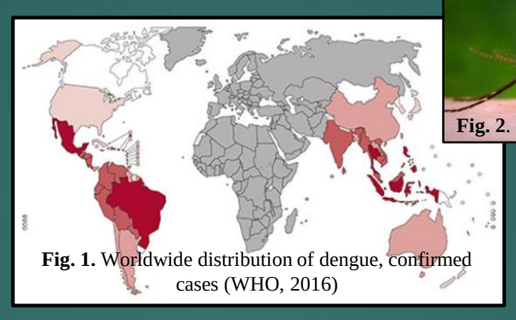


Fig. 1. Worldwide distribution of dengue, confirmed cases (WHO, 2016)

Fig. 2. Female *Ae. aegypti*

However, unlike in *Plasmodium*-infected mosquitoes, in which feeding and the likelihood of approaching a host have been shown to be dependent on the developmental stage of the parasite[8-9], nothing is known about the modulation of host seeking by the dengue virus.

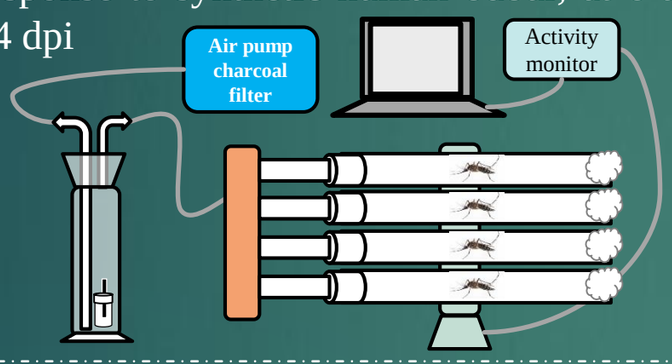
AIMS

In this study, we investigated dengue virus (DENV-1)-induced modulation of basal and odour-mediated locomotion, as well as of the physiological response to human odour, in female *Ae. aegypti*, at 4-to-6 and 14-to-16 days post-infection (dpi).

METHODS

I - Locomotor activity between 4-6 and 13-16 dpi (Trikinetics)

II - Odour-mediated behaviour (Manifold) in response to synthetic human odour, at 6 and 14 dpi



III - Electrophysiological response (EAG) of the antennae to synthetic human odour, at 6 and 14 dpi

RESULTS I - Locomotion

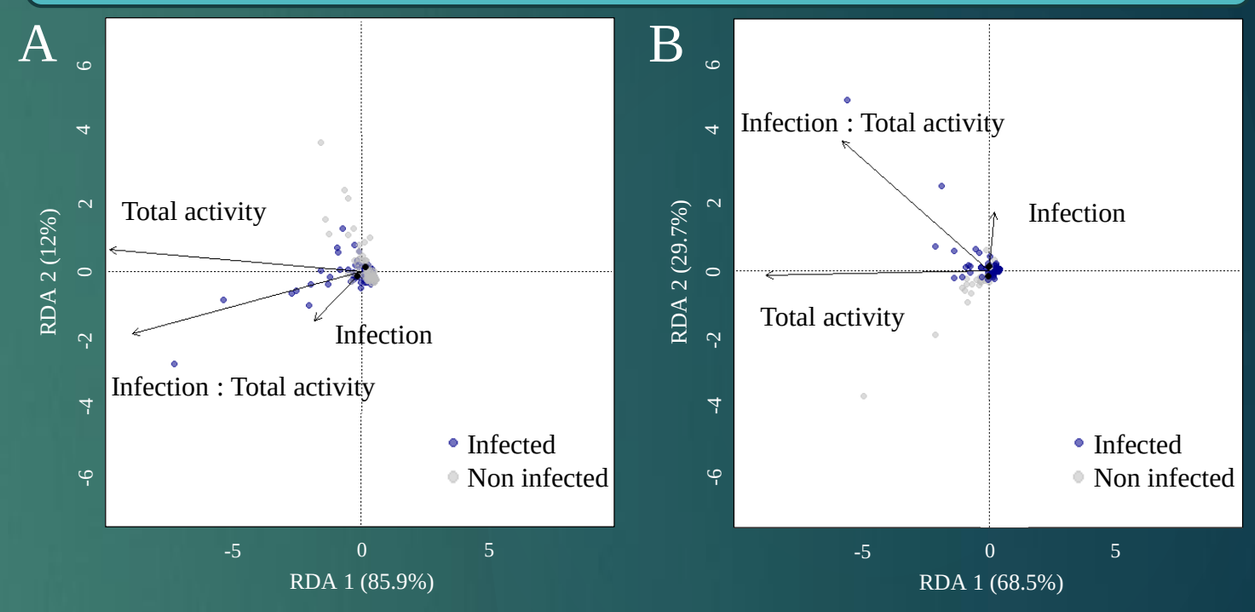
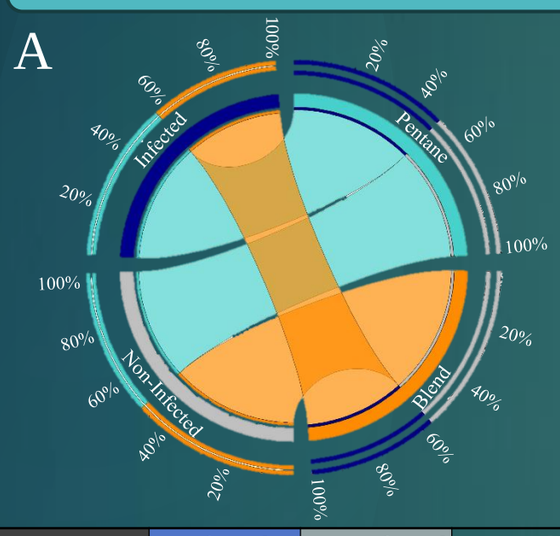
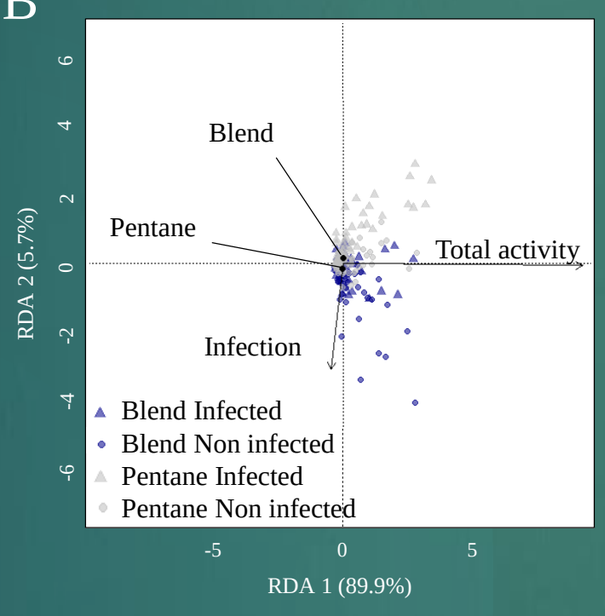


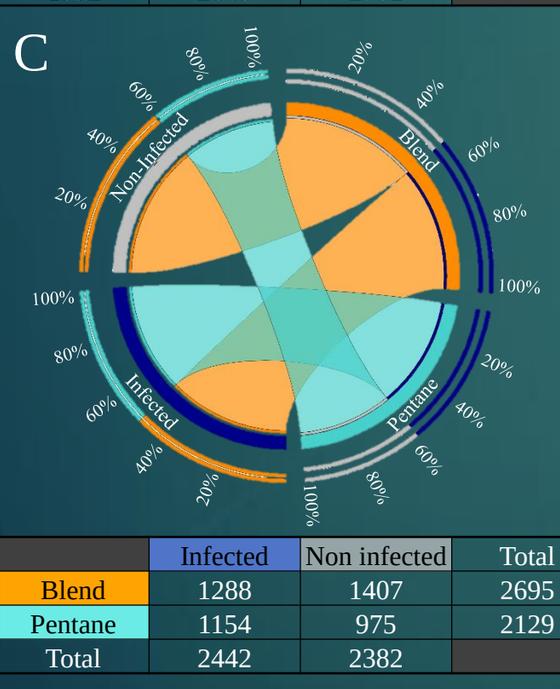
Fig. 3. Through a redundancy analysis assessing the variation in total locomotor activity, dengue-infected females (blue) were found to be significantly more active (P = 0.0136) than their non-infected counterparts (grey) at 4-to-6 dpi (A), while profiles of locomotion activity did not differ at 14-to-16 dpi (B)

RESULTS II - Manifold



	Infected	Non infected	Total
Blend	1200	1550	2750
Pentane	1468	1351	2819
Total	2668	2901	





	Infected	Non infected	Total
Blend	1288	1407	2695
Pentane	1154	975	2129
Total	2442	2382	

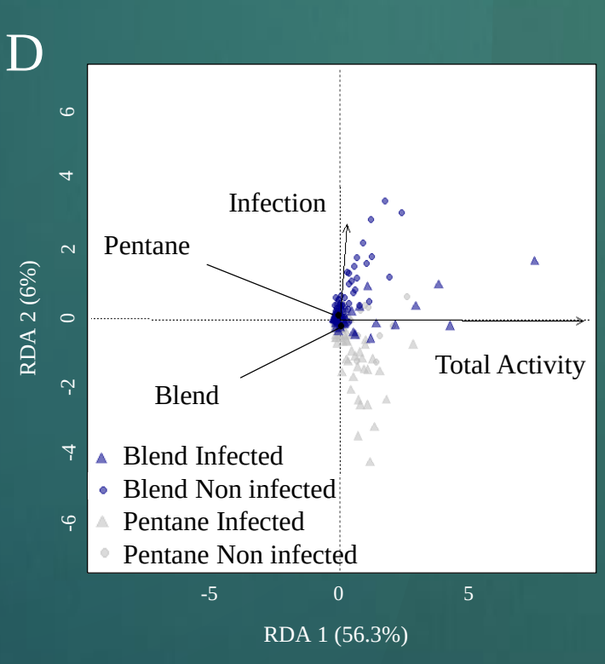


Fig. 4. The average locomotor activity was not significantly different between infected (blue) and non-infected (grey) females, in response to either human odour (golden) or pentane (turquoise) at both 6 (A) and 14 dpi (C). Unlike at 6 dpi (B), the infection status and the nature of the stimulus, sufficiently described the individual activity profiles at 14 dpi (D)

RESULTS III - EAG

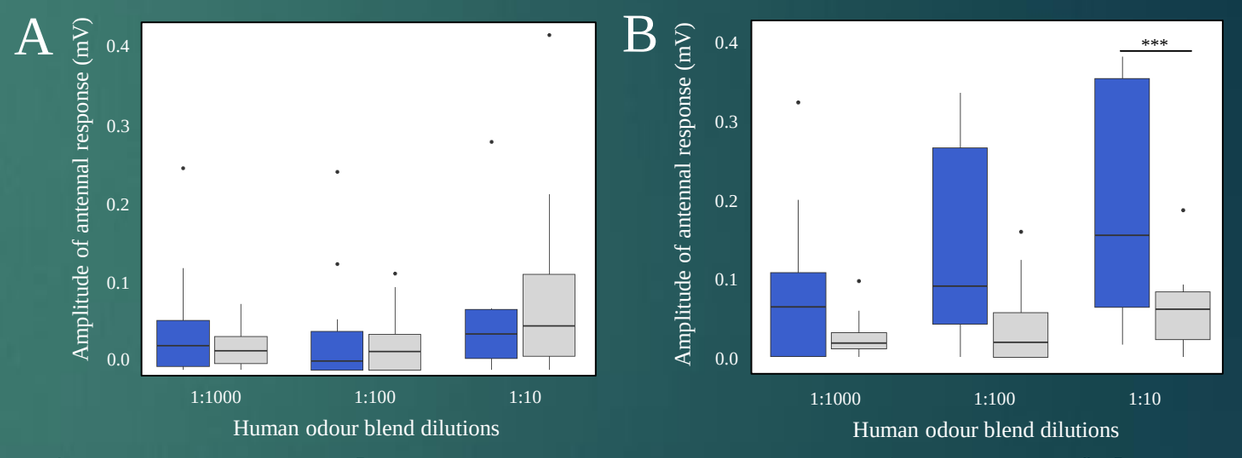


Fig. 5. Repeated measurements ANOVA (95% confidence intervals; p-value < 0.001 ***) revealed that unlike at 6 dpi (A), infection significantly increased the antennal response to human odour at 14 dpi (B)

DISCUSSION & PERSPECTIVES

- ❖ 6 dpi : increased locomotion activity
- ❖ 14 dpi : increased sensitivity and tuning to host cues
- ➢ Two different strategies of active manipulation; search more vs. search better
- ➢ Stage-specific modulation of host seeking coincides with the extrinsic incubation period of dengue[10-11] (similar to *Anopheles* infected with malaria[12])
- ➢ Likely benefits the mosquito's competence, pathogen's survival and disease transmission
- ➢ Correlation with changes in transcript abundance of the main chemosensory-related genes upon dengue infection (*ongoing*)

ACKNOWLEDGEMENTS

We are keen to thank Luis E. Martinez Villegas (Fiocruz) and Adam Flöhr (SLU) for sharing their skills in statistical analysis and torturing our datasets.

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