Bacterial symbioses and heat protection in aphids: a partnership story

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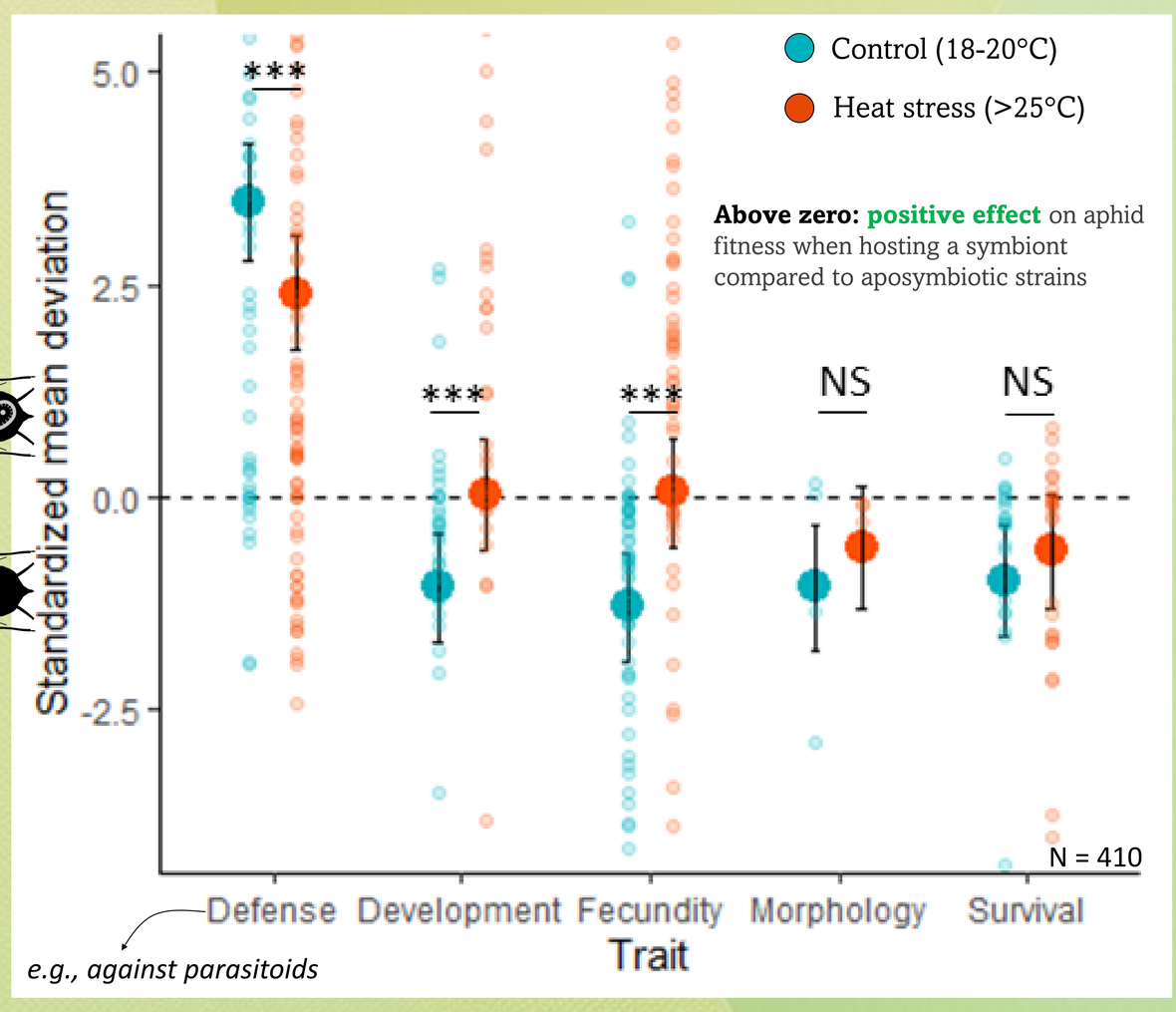
BACKGROUND

Temperature variations are **shaping** the **ecology** and **evolution** of insect-symbiont mutualisms
Considering the **cost-benefit balance** of hosting a symbiont under various environmental conditions is **key**
Sap-sucking insects such as **aphids** are interesting models to **demonstrate** symbiotic implication in heat resistance

SYNTHETIC DEMONSTRATION

Meta-analysis on the effects of 'protective' symbionts of aphids (*Hamiltonella defensa, Serratia symbiotica, Rickettsia* sp., *Fukatsuia symbiotica, Regiella insecticola*) on fitness-related traits under heat stress



Symbiotic infection has either positive, neutral or negative outcomes depending on the traits

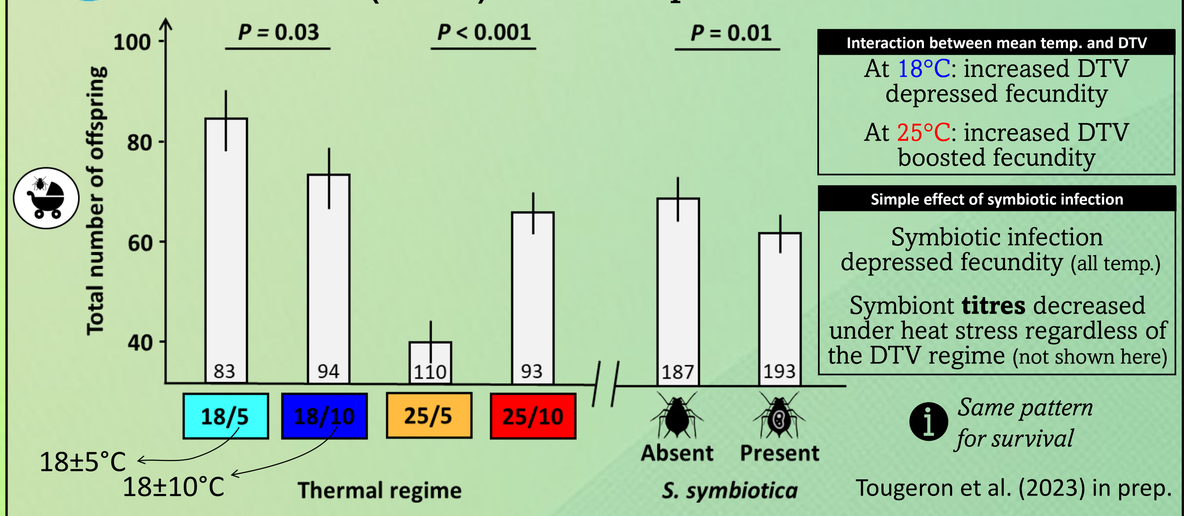
➡ **Effect modulated by temperature conditions**

Symbiont **defensive** potential **decreases** under heat stress compared to permissive temperatures, while symbiotic infection shifts from **costly** to **neutral** outcome for **development** and **fecundity**

Tougeron & Iltis (2022) Proc. Roy. Soc. B.

EMPIRICAL DEMONSTRATION

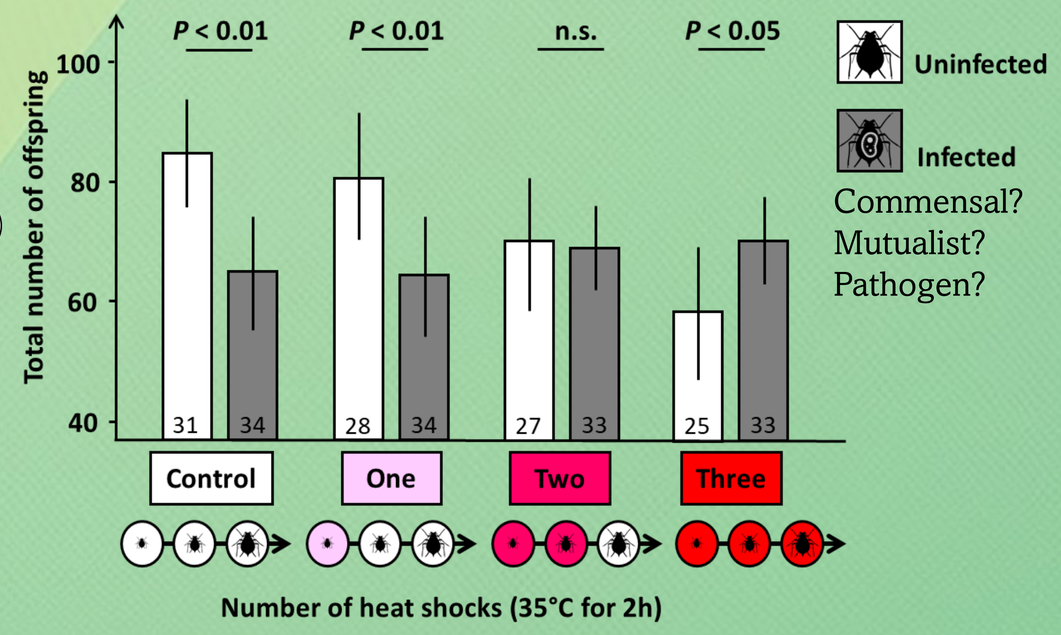
Effect of mean temperature and daily thermal variations (DTV) on heat-protective mutualism



Tougeron et al. (2023) in prep.

Highlights the role of realistic thermal variations; reaching **suboptimal conditions** at night or allowing physiol. **recovery** periods to face daytime heat stress

Effect of repeated heat-shocks on symbiont-mediated heat protection (*S. symbiotica*)



Symbiotic infection turns **beneficial** for fecundity as the number of heat shocks increases. Same goes for size and development

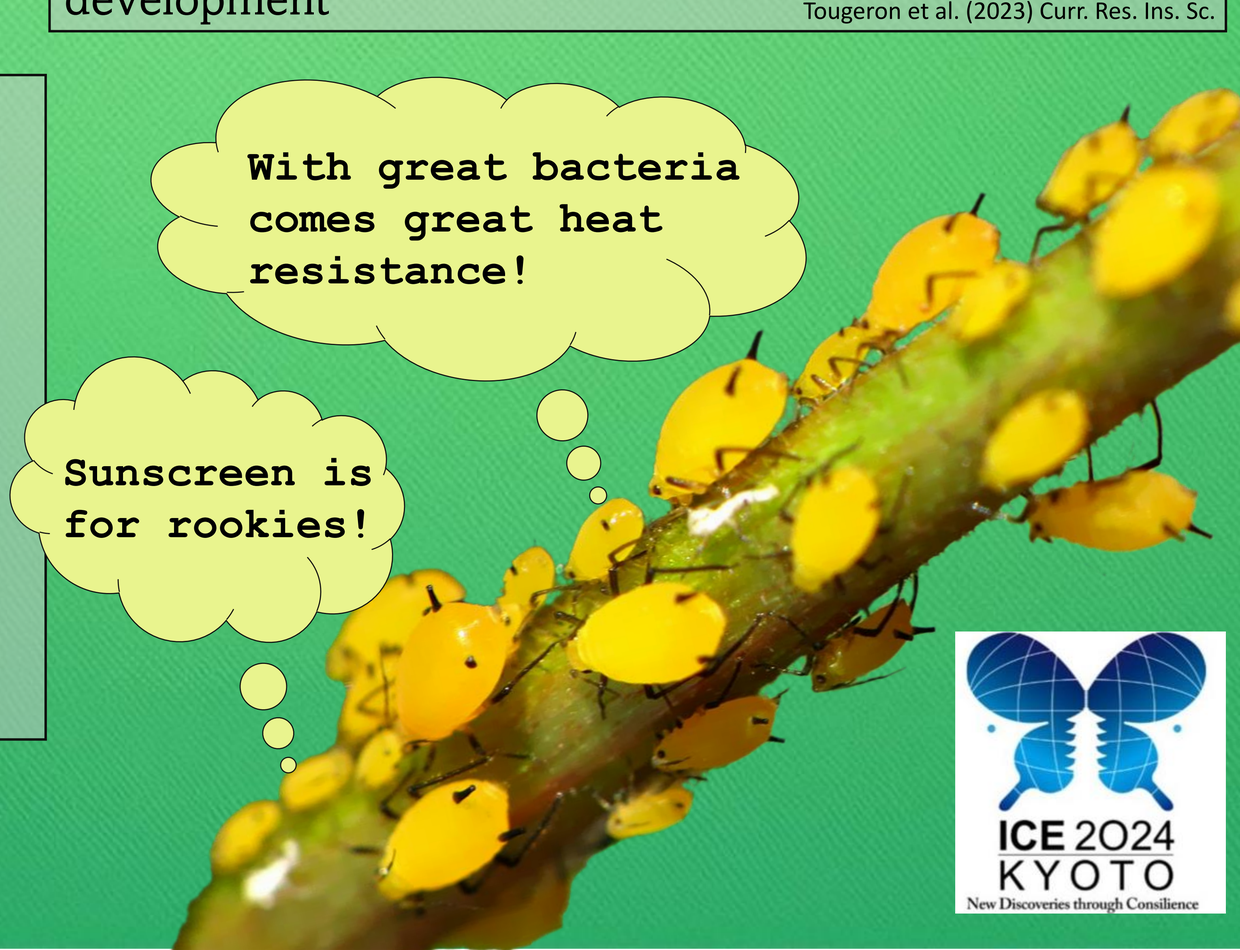
Tougeron et al. (2023) Curr. Res. Ins. Sc.

CONCLUSION

Symbiosis outcome is highly **context-**, **species-** and **trait-dependent,** but overall **beneficial** under heat stress

Evolution of insect-microbe interactions in diverse environmental contexts; **complex mechanisms involved**

Implications under **global change** and for resistance to **multiple stressors** (heavy metal exposure, pesticides, light pollution, heat waves, droughts ...) to be determined



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