Heat exposure and offspring

Effects of Heat Stress on Mating Behavior and Colony Development in *Bombus terrestris* (Hymenoptera: Apidae)

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Introduction

Climate change is characterized by an increase in the frequency and intensity of extreme events such as heatwaves. In insect pollinators, heat exposure is associated with direct **physiological perturbations**, and in several species, could lead to a decrease in fitness related to a decrease in fertility. In the present study, we present a new experimental approach to assess the impact of heat stress on the **attractiveness**, the **mating behavior** and the **offspring** of bumblebees.

Objectives

Does heat impact…

Attractivness of bumblebee males

Mating ability of males

Offspring's fitness of the stressed males

… ?

Figure 1: *Bombus terrestris*, the model species. Credits : Mandy Fritzsche

Methods

Bumblebee colonies

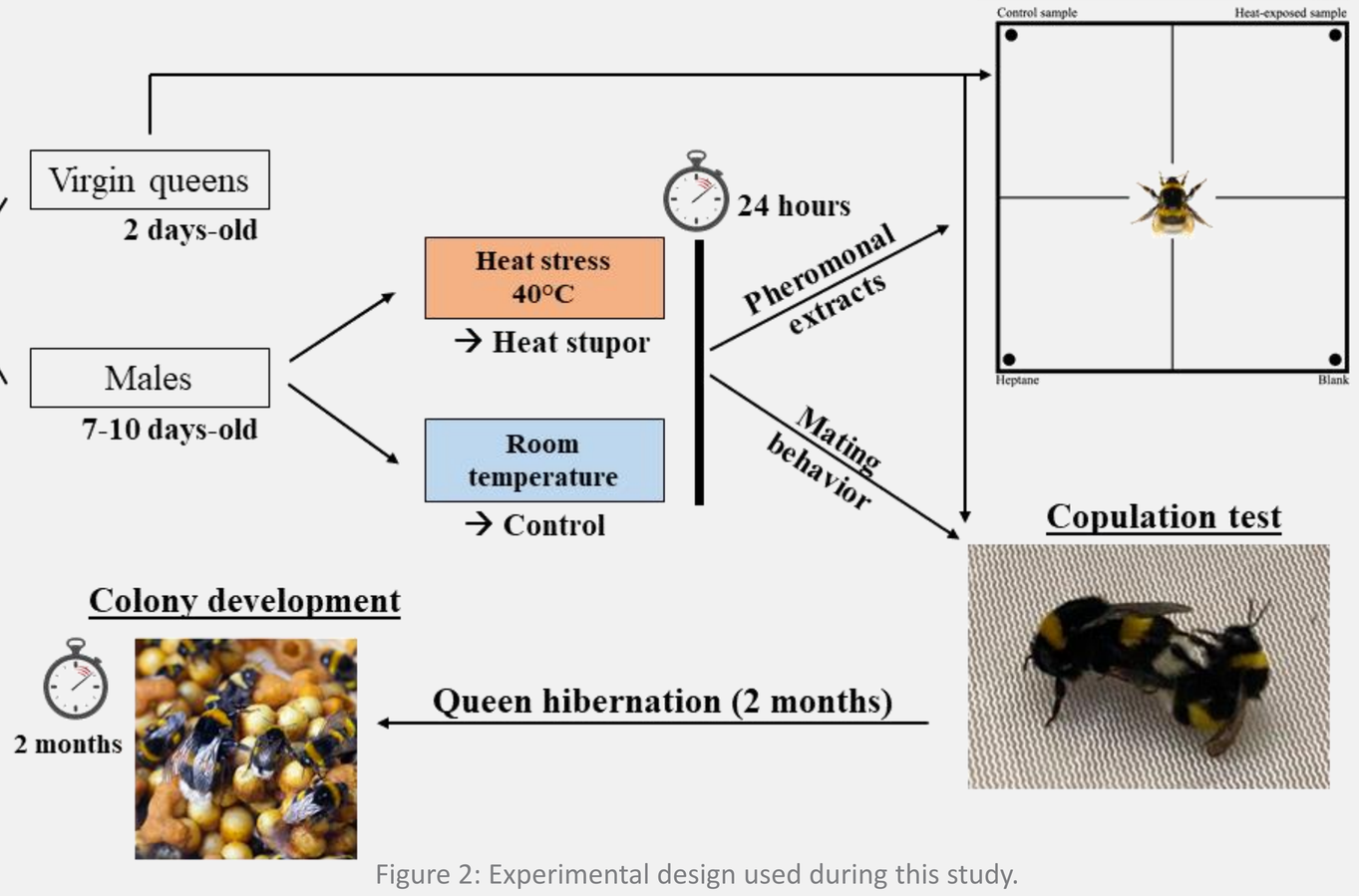

Figure 2: Experimental design used during this study.

Results

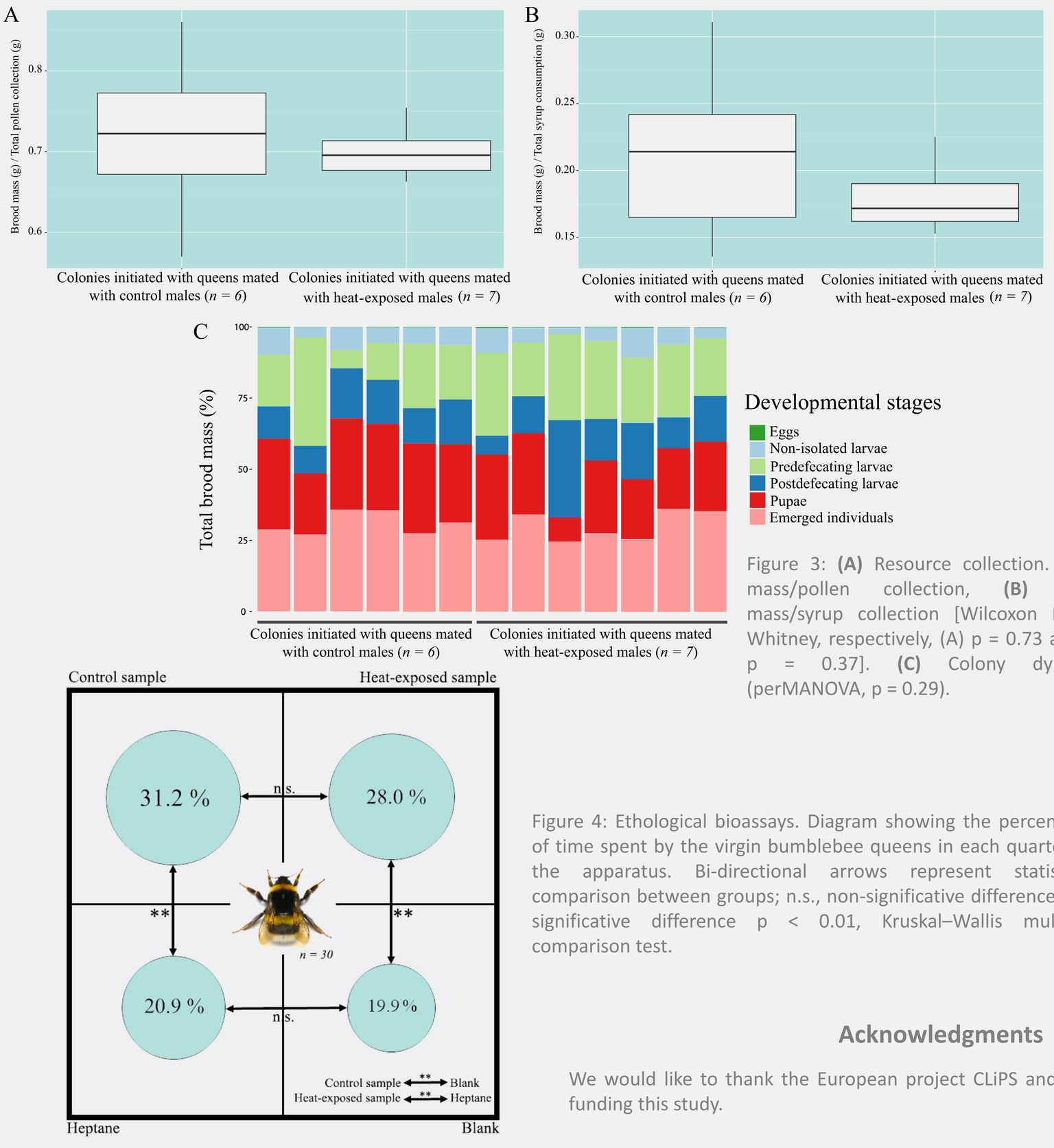

Figure 3: **(A)** Resource collection. Brood mass/pollen collection, **(B)** brood mass/syrup collection [Wilcoxon Mann–Whitney, respectively, (A) p = 0.73 and (B) p = 0.37]. **(C)** Colony dynamics (perMANOVA, p = 0.29).

Figure 4: Ethological bioassays. Diagram showing the percentage of time spent by the virgin bumblebee queens in each quarter of the apparatus. Bi-directional arrows represent statistical comparison between groups; n.s., non-significative difference; **, significative difference p < 0.01, Kruskal–Wallis multiple comparison test.

Discussion

- *B. terrestris* is a very heat **resistant** bumblebee species
- Heat exposure **did not impact** the pheromonal secretions of males
- Queens were **not able** to differenciate heat exposed males
- Mating ability was not influenced by heat shock
- Colonies **did not grow differently** between the two conditions

References

Przybyla K, Michez D, Zambra E, Anselmo A, Hennebert E, Rasmont P and Martinet B (2021) Effects of Heat Stress on Mating Behavior and Colony Development in *Bombus terrestris* (Hymenoptera: Apidae). Front. Ecol. Evol. 9:748405. doi: 10.3389/fevo.2021.748405

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Acknowledgments

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