

# Do locust hoppers follow their faeces odours ?

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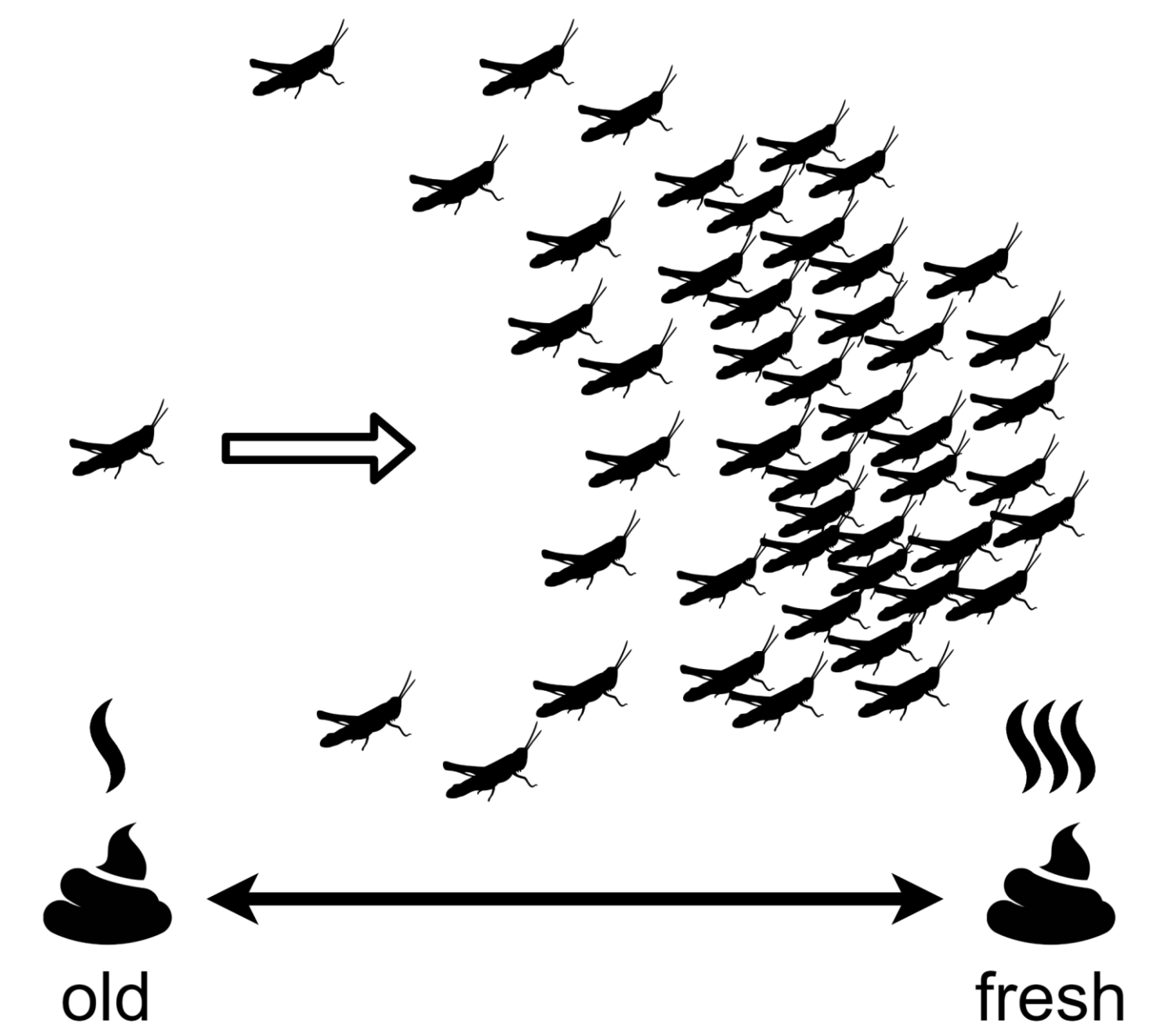
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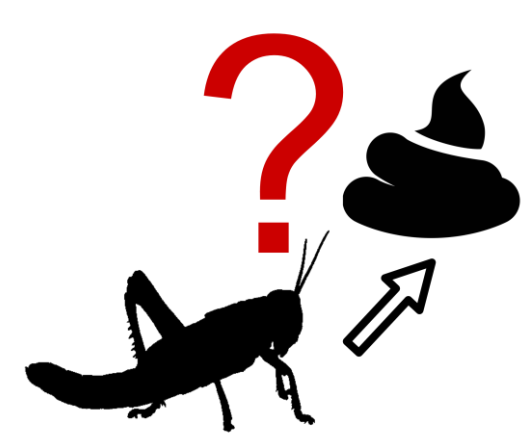
## Introduction

Locusts hoppers are acridians able to form huge marching bands when they are gregarious. Collective motion emerge from inter-individual interactions, but at a larger scale, individuals that have been isolated from the rest of the band are able to get back to the group [1]. In previous studies, two volatile compounds implicated in aggregative behaviours were found in faeces of two species of locusts : guaiacol and phenol [2,3].



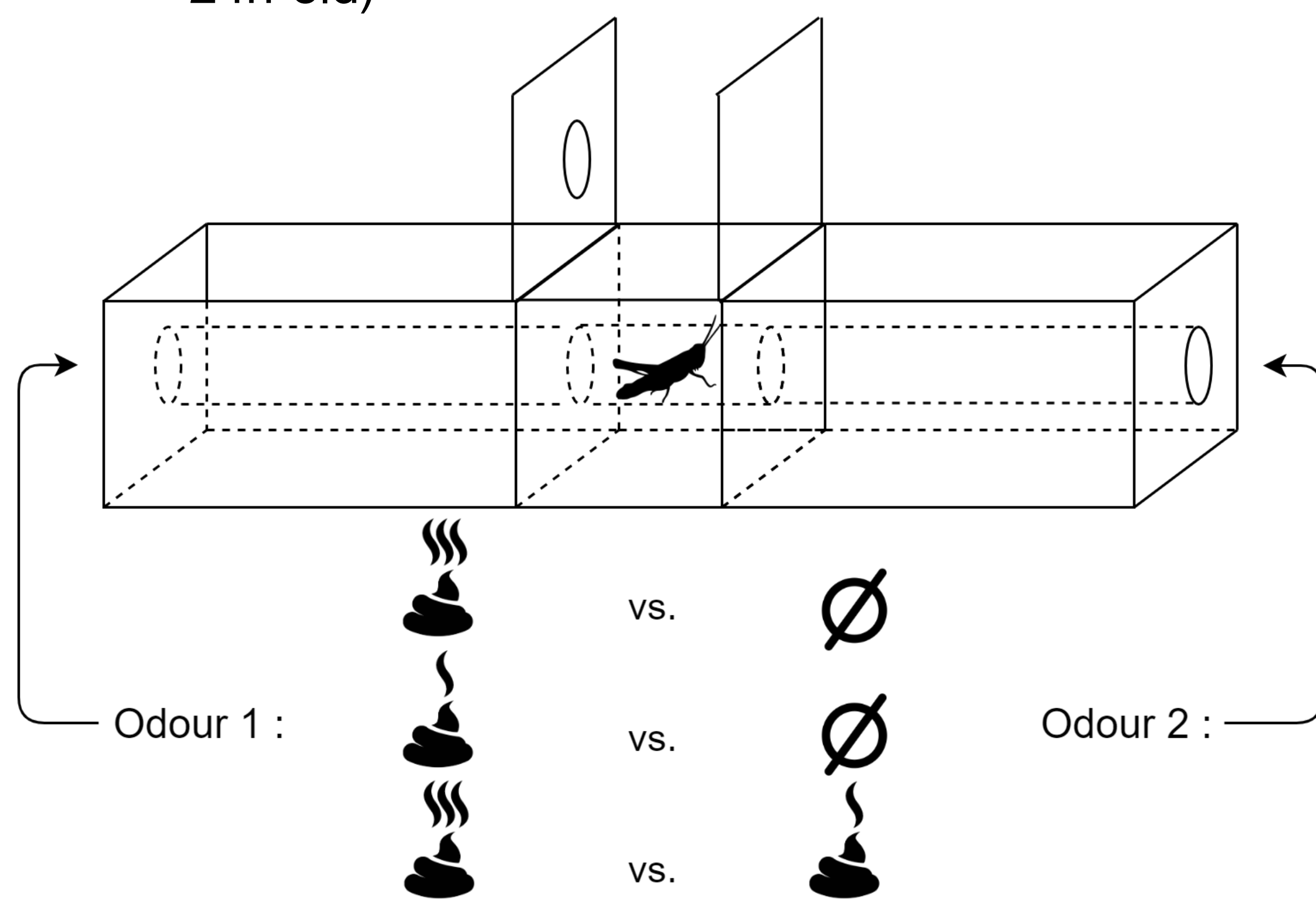
## Do faeces play a role in maintaining gregarious marching bands ?

### Attraction to fresh faeces and/or repulsion to older ones ?

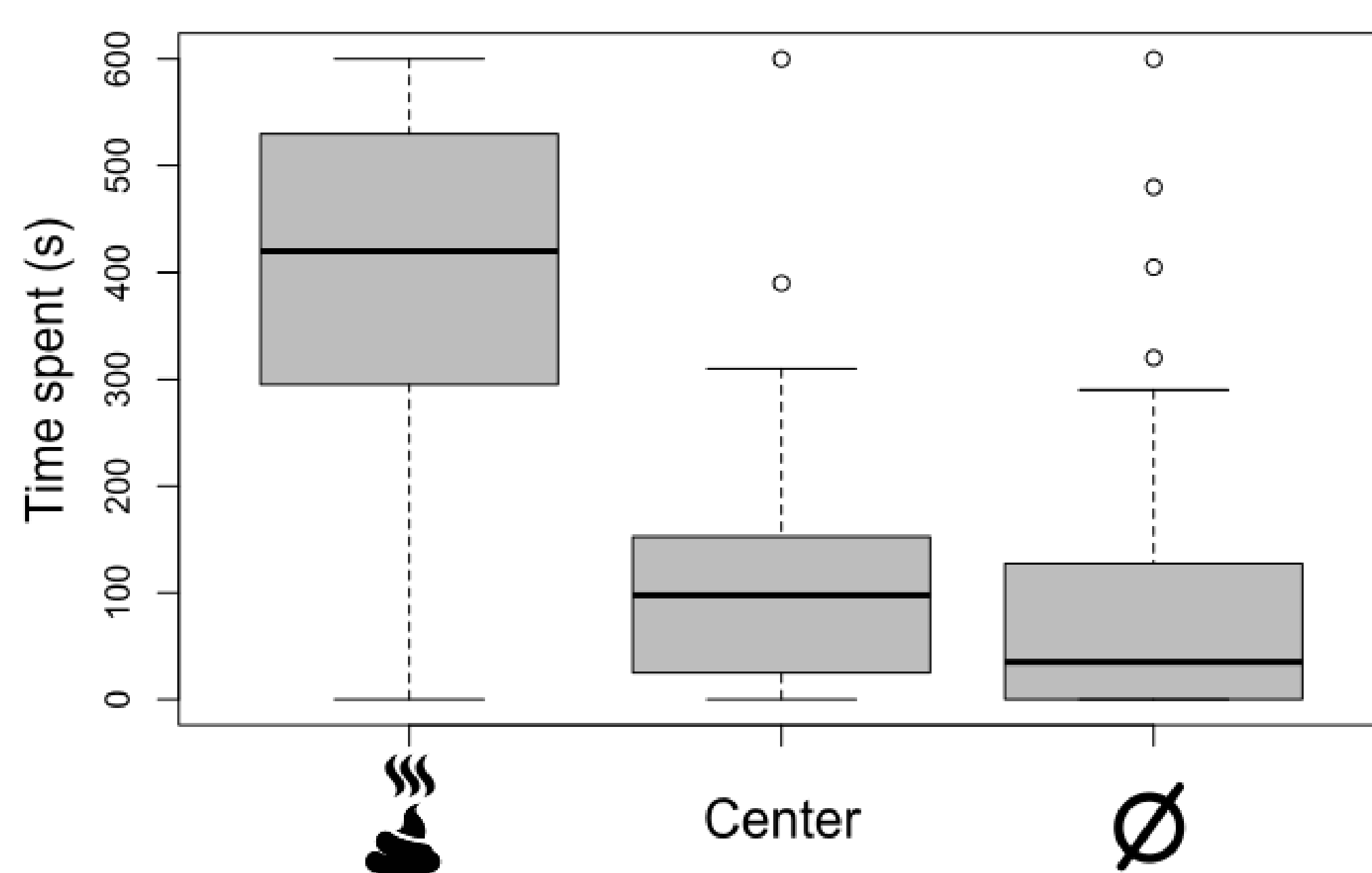


## 1- Behavioural assays

Individual assays: 3<sup>rd</sup> instars of *Schistocerca gregaria* exposed to odours of faeces (1h-old and/or 24h-old)



We recorded the first side chosen and the time spent in each part of the arena.



Time spent in each part for individuals exposed to 1h-old faeces odours.

- Faeces' side was chosen first most of the time (>70%)
- Individuals spent more time in the faeces side ( $P < 0,05$  on Wilcoxon signed-rank test)
- No preference observed between fresh and old faeces

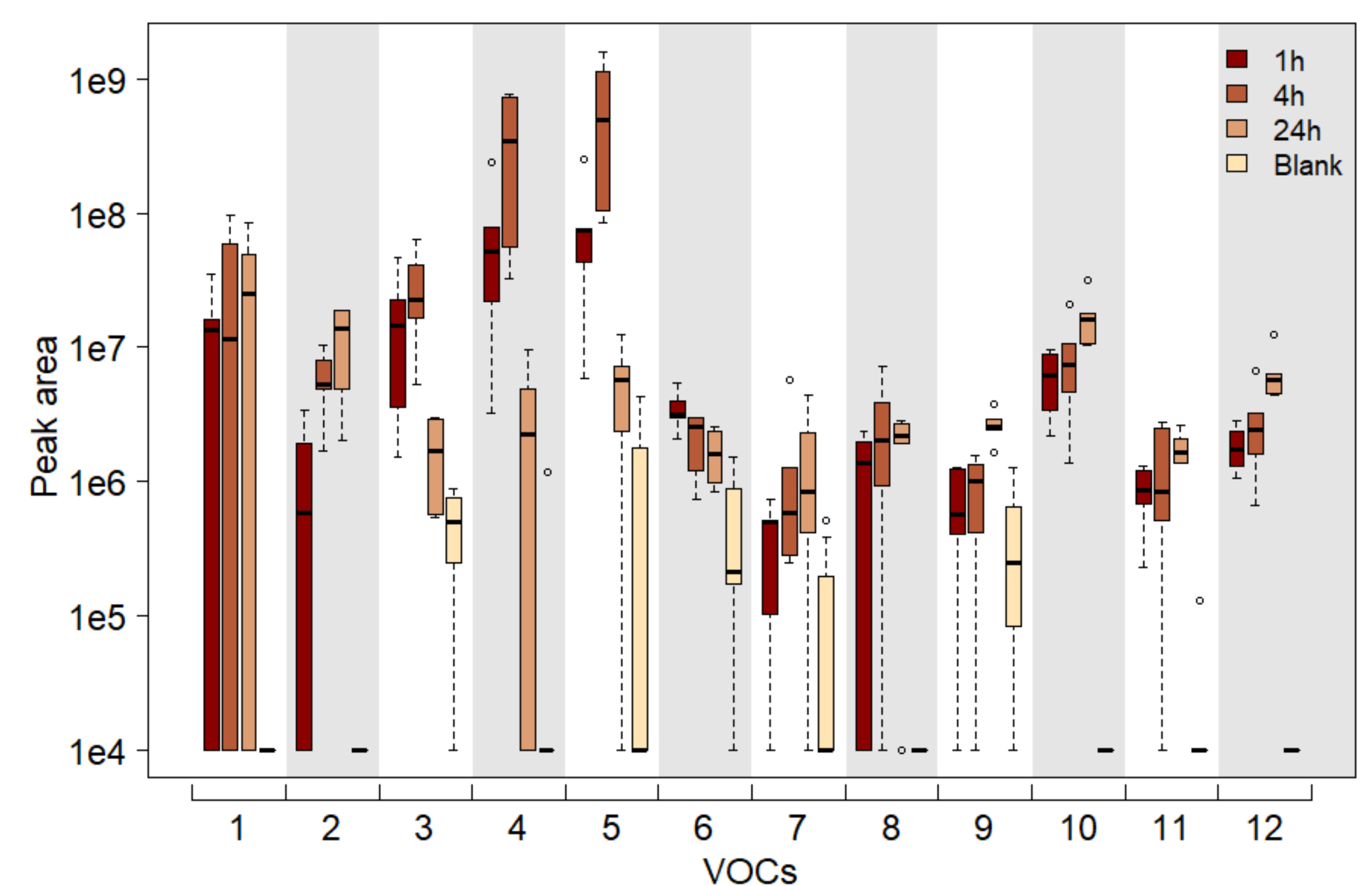


## 2- Chemical analysis

Detection and identification of volatile organic compounds (VOCs) present in faeces by Gas chromatography mass spectrometry (GC-MS)



6 replicates by class of faeces analyzed (1h-old, 4h-old, 24h-old) + 7 blank samples to control odours from the laboratory



Selection of VOCs (1) little or none present in blank samples and (2) present in fresh and old faeces, i.e. possibly linked to observed behavioural responses.

- 12 VOCs potentially responsible of attraction detected, including phenol (n°4) and guaiacol (n°5)

We report neither evidence of a repulsive effect nor a preference between fresh and old faeces but an attractive effect of both fresh and old faeces that may be involved in maintaining bands. More tests are needed to identify which of these compounds are responsible of attraction. Particularly, it could be interesting to explore hoppers' response to guaiacol and phenol.

## References

- [1] Ellis, P.E., Ashall, C., *Field Studies on diurnal Behaviour, Movement and Aggregation in the Desert Locust (Schistocerca gregaria Forskål)*, 1957
- [2] Fuzeau-Braesch, S. et al. *Composition and role of volatile substances in atmosphere surrounding two gregarious locusts, Locusta migratoria and Schistocerca gregaria*, 1988, J Chem Ecol.
- [3] Shi, W.-P. et al., *Fecal volatile components elicit aggregation in the oriental migratory locust, Locusta migratoria manilensis (Orthoptera: Acrididae)*, 2011, Insect Science