Probing Pain?

ASSESSING ANTENNAL GROOMING AS A FLEXIBLE SELF-PROTECTIVE BEHAVIOUR IN TWO-SPOTTED CRICKETS (*GRYLLUS BIMACULATUS*)

Image Credit: Diapteron

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INTRODUCTION

Sentience and pain underpin animal welfare but remain contested in insects.

Traditionally viewed as nociceptive reflexes, insects behaviours such as grooming may also reflect flexible self-protective behaviour; antennal grooming provides a tractable way to test responses to noxious vs non-noxious stimulation.

Understanding these behaviours informs debates on invertebrate sentience and welfare protections.

OBJECTIVE

To test whether antennal grooming in *Gryllus bimaculatus* can function as a flexible, self-protective response to noxious stimulation consistent with pain-like processess.

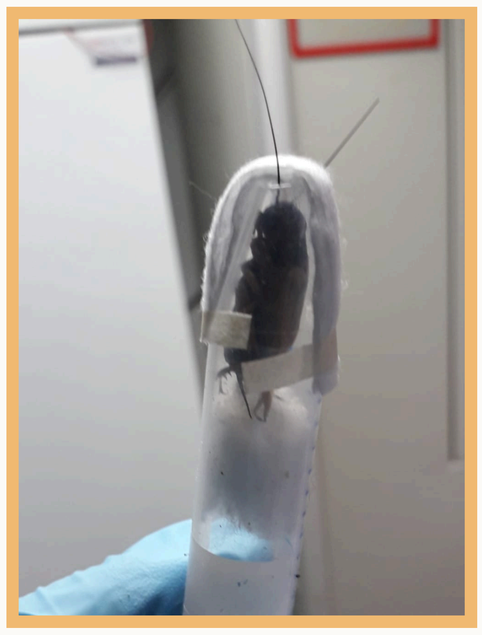

Image Credit Mark Taylor

METHODOLOGY

Design: Within subjects, repeated measures (4 trials per cricket across 2 days)

Stimuli: Heated probe (70 C, noxious) vs unheated probe (ambient temp) applied to left or right antenna.

Novel method of restraint (pictured left). Antennae prevented from retraction.

Analysis: Generalised Linear Mixed Models (GLMMS) + Repeatability (ICC analysis in rptR)

RESULTS

Bout Duration

Stimulated antenna under noxious conditions = significantly longer bouts ($p < 0.001$)
Present in both sexes; stronger in females
No lateralisation effect

Bout Count

Females ↑ stimulated antenna grooming under noxious, ↓ under control ($p < 0.05$).
Males: no significant contrasts
Right-side bias significant ($p = 0.002$).

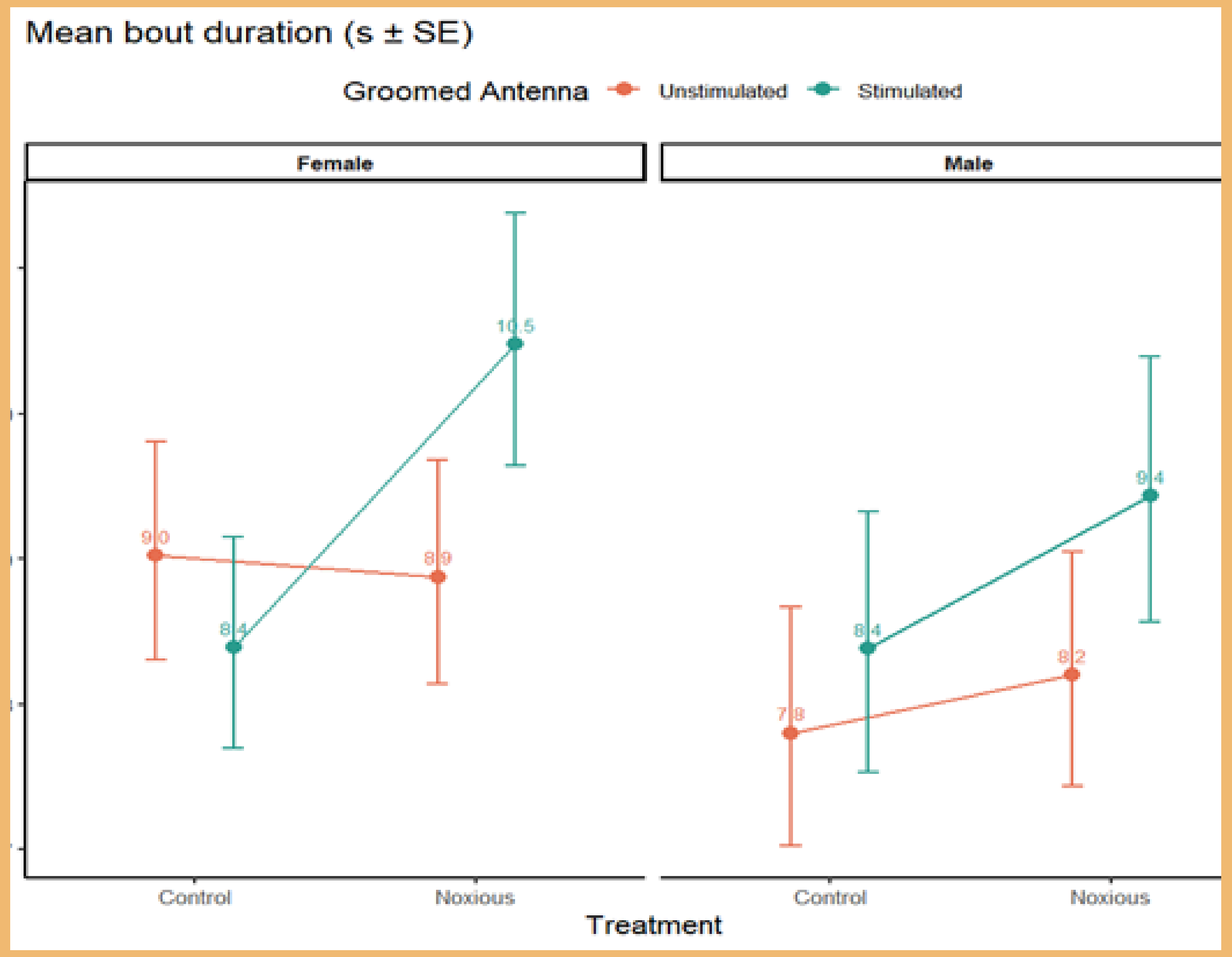

Figure 1, grooming bout duration (s, model-adjusted means +/- SE)) by treatment and stimulation, split by sex.

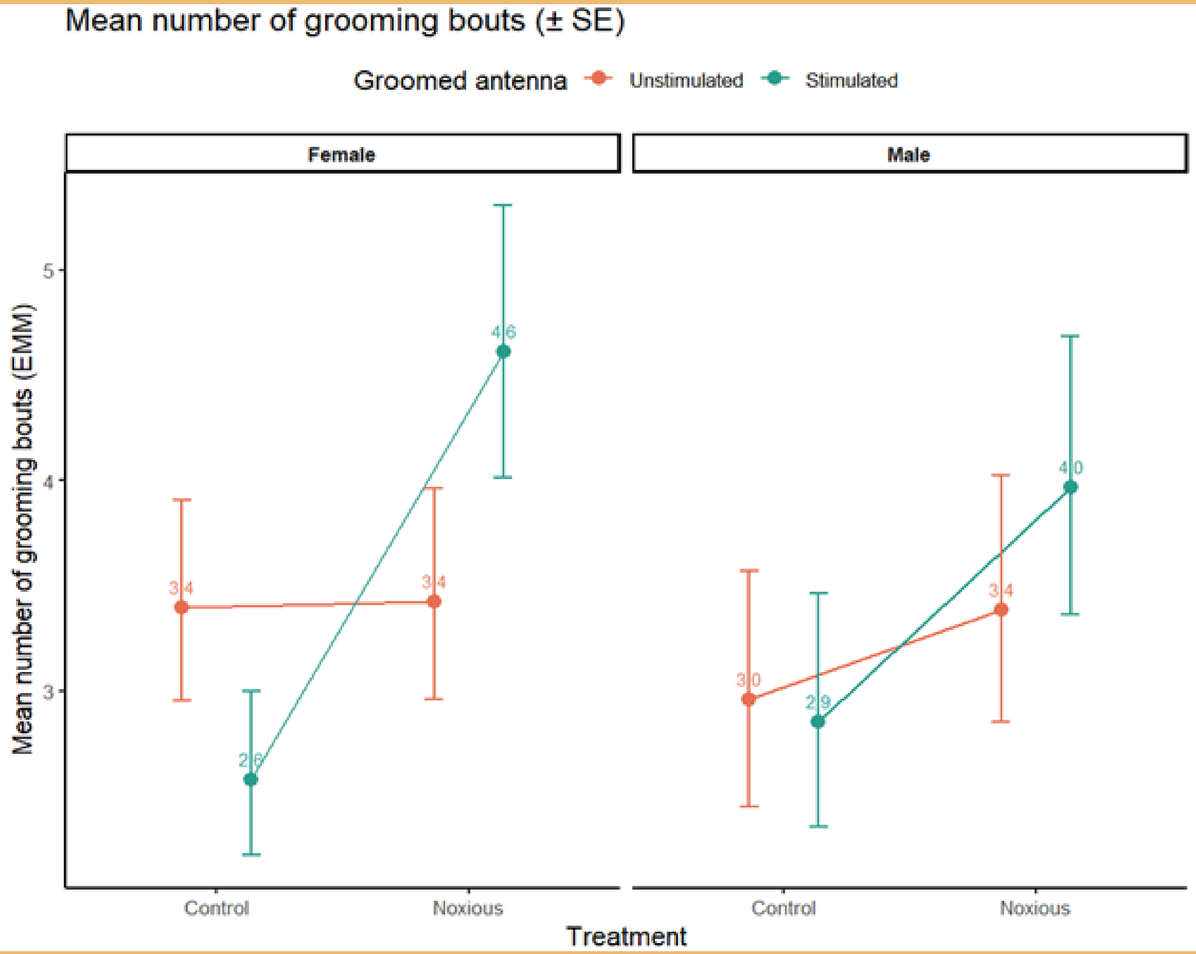

Figure 2, grooming bout count (model-adjusted means +/- SE) by treatment and stimulation, split by sex.

CONCLUSIONS

- Antennal grooming in *G. bimaculatus* is site-specific after noxious stimulation, supporting its role as a self-protective behaviour
- Grooming frequency was moderately repeatable for bout count (ICC = 0.455, $P < 0.001$), suggesting stable individual differences.
- Sex differences could indicate potential differences in nociceptive responses.
- Findings add to (but do not solve) the insect-sentience debate.

WELFARE IMPLICATIONS

- Findings strengthen the precautionary case for considering insect welfare.
- If grooming post-noxious stimulation reflects a pain-like process, routine practices (handling, crowding, slaughter) may impose overlooked welfare costs.
- Behavioural indicators like grooming could inform future welfare assessments in insects.

References
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