



Sexually transmitted parasites and post-copulatory sexual selection in the *Drosophila-Gamasodes* system

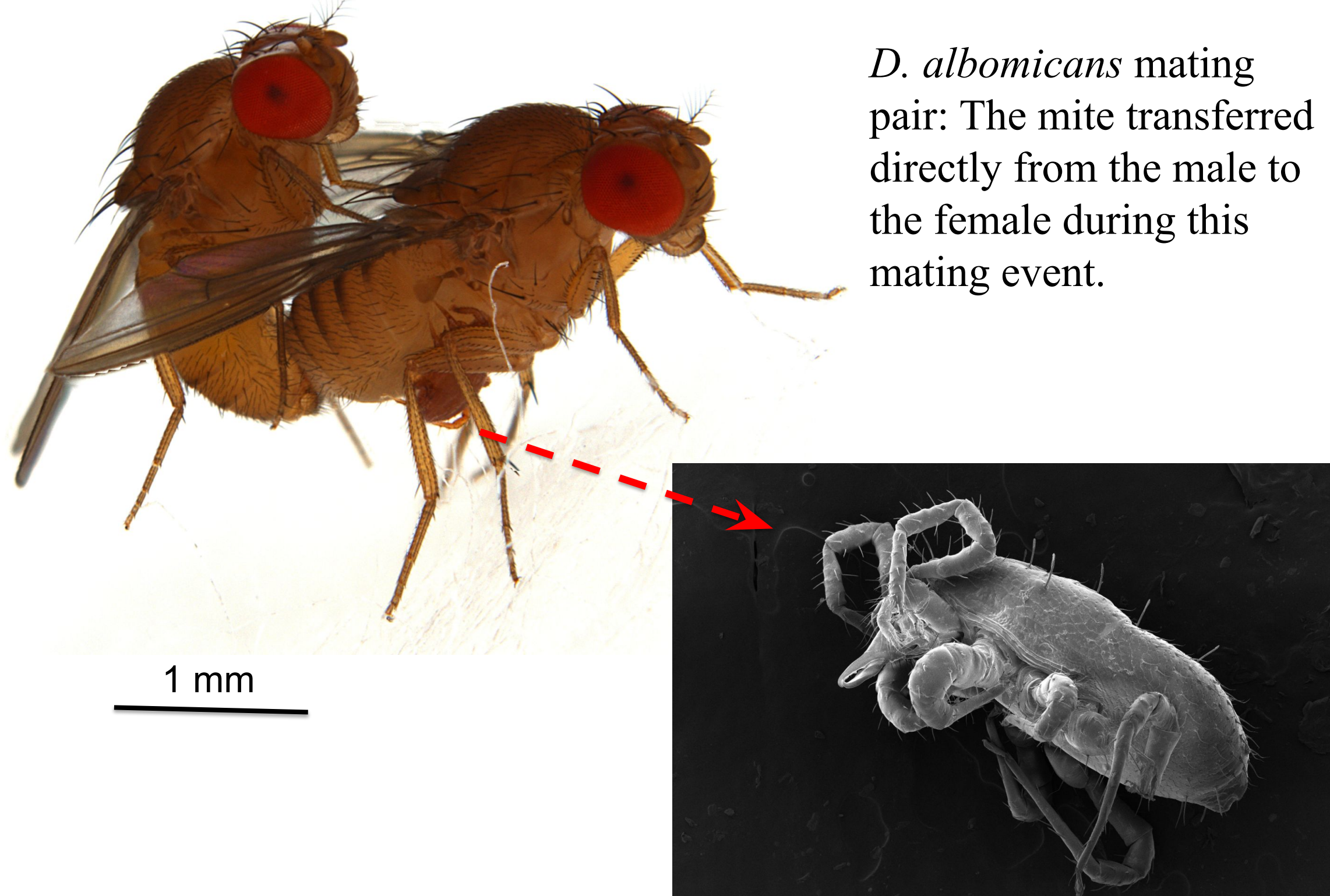
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Introduction

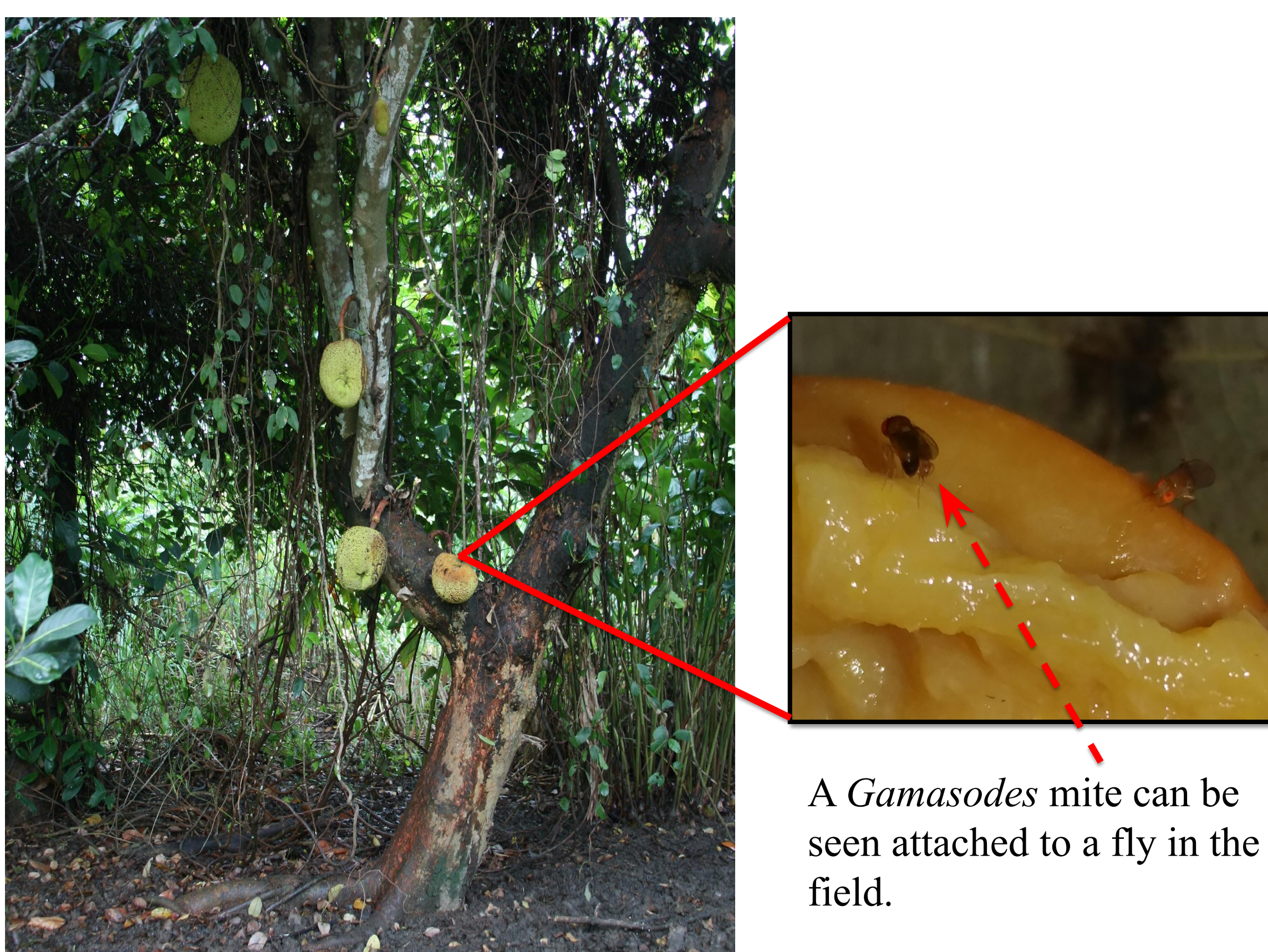
- Parasites can generate host sexual selection through effects on male-male competition and female choice.
- Female choice for parasite-free males may evolve by several mechanisms, involving direct and/or indirect fitness benefits received by females¹.
- For example, female choice for parasite-free males may be favored through avoiding sexually transmitted parasites (STPs) or passing genetic resistance to offspring.
- Whereas a great deal of research has been conducted on the effects of parasites on female mate choice and male mating success, relatively little is known about the role of parasites in host post-copulatory sexual selection².
- Here, we tested for the effects of a sexually transmitted ectoparasitic mite, *Gamasodes pachysetis*, on female post-copulatory responses in the host *Drosophila albomicans*.

Study system

- The *Drosophila-Gamasodes* mite association is naturally occurring in Australia and SE Asia. Our lab has demonstrated that mites consume fly tissue while attached to their host. Mites are therefore ectoparasitic, and not merely phoretic.



G. pachysetis is a natural parasite of flies in Thailand, SE Asia.



Methods

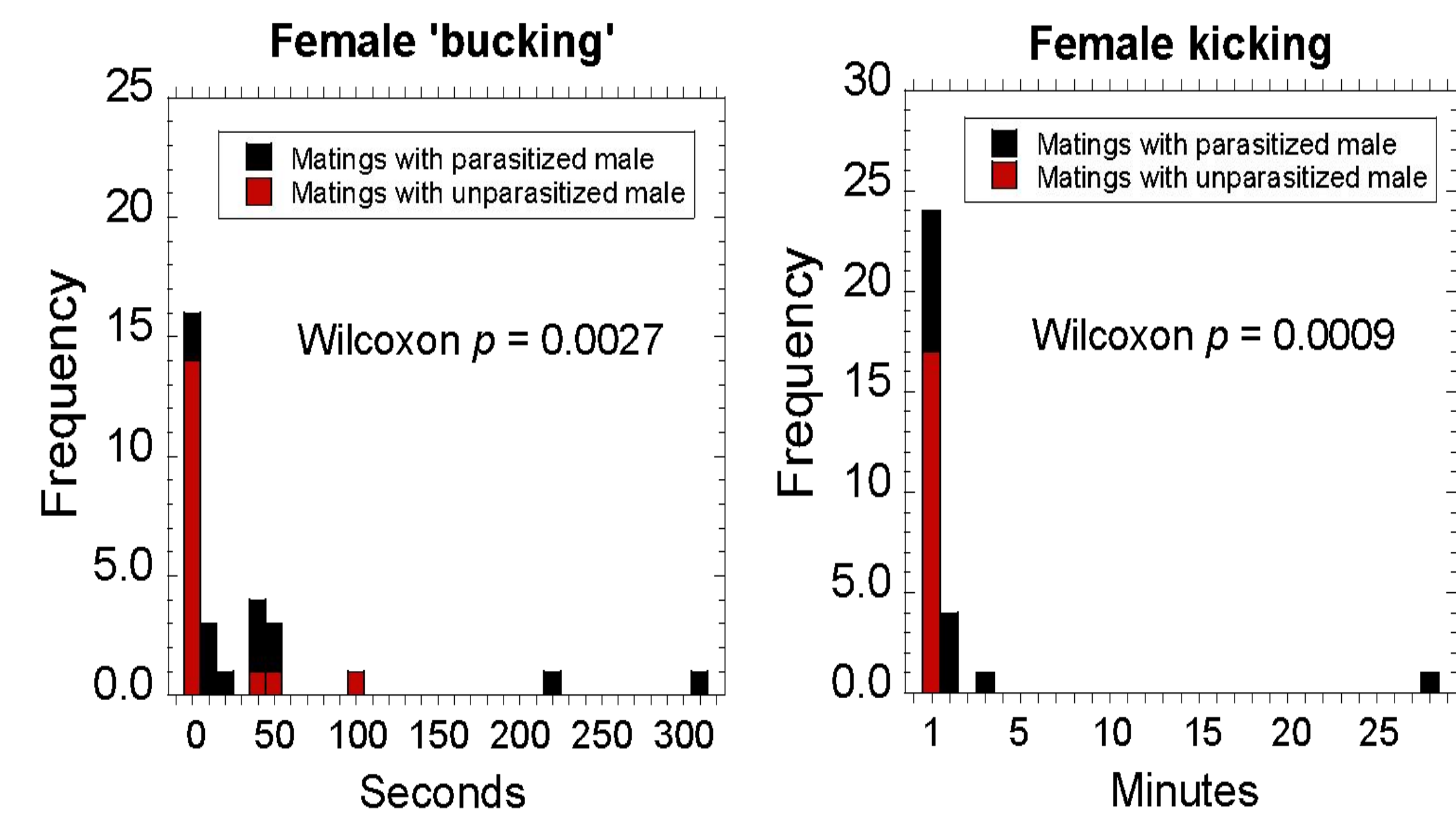
- In the laboratory, male and female *D. albomicans* were individually paired in observation chambers. Total number of pairs set up = 419.
- The male in a given chamber was either experimentally parasitized by mites (1 to 3), or he was an unparasitized control.
- All copulations that occurred were noted, and copulation durations measured.

Copulating pair in an observation chamber.



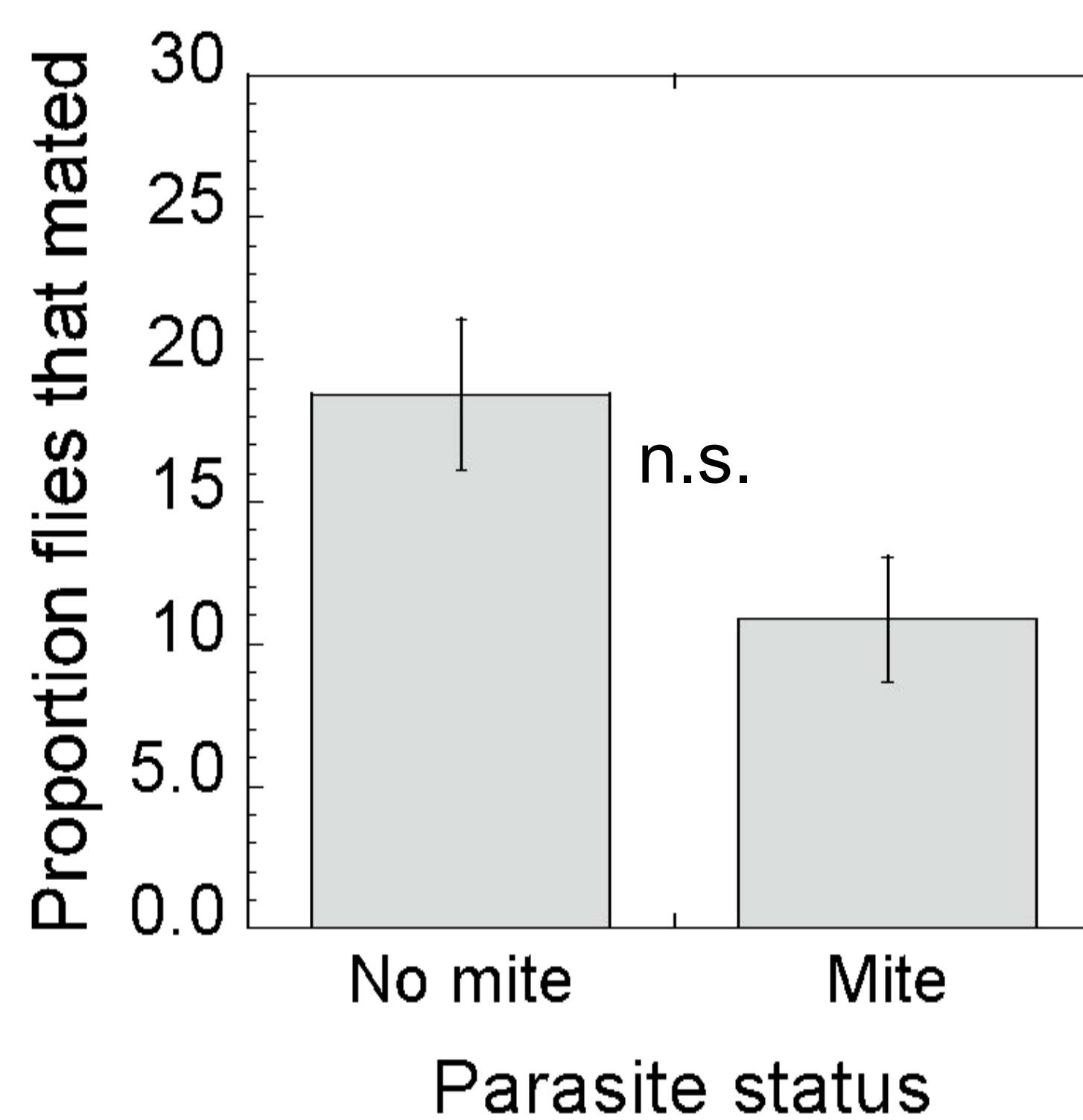
- A haphazardly chosen subset of copulations with parasitized and control males were video-recorded under magnification, and analyzed.

- In matings with parasitized males (n=14), females exhibited increased frequency of rejection behaviors, as 'bucking' and kicking, compared to matings with control, unparasitized males (n=17).

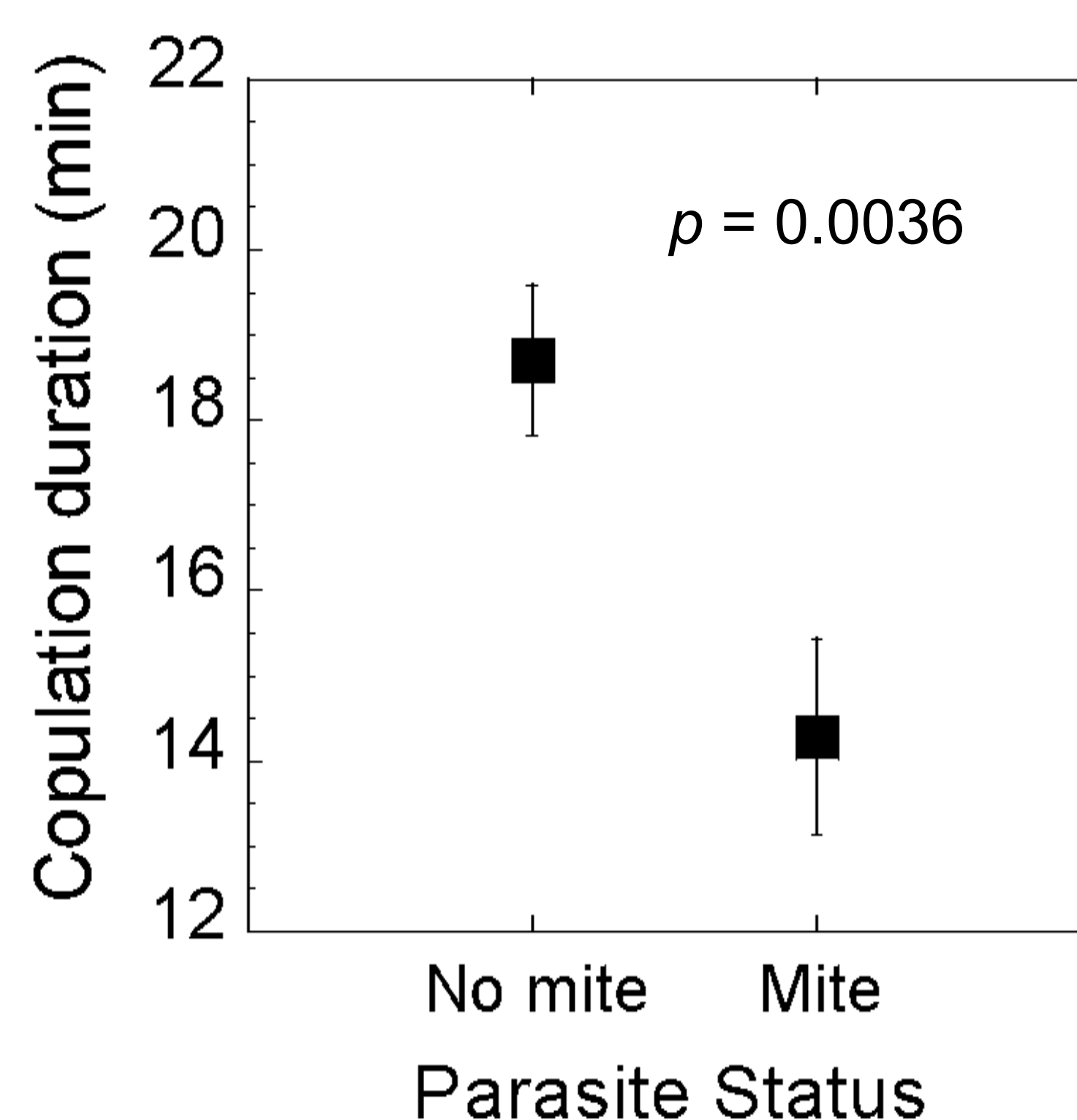


Results

- 18.8 % unparasitized flies mated, while 10.9 % parasitized males mated. The difference, however, was not statistically significant ($p > 0.05$).



- Among males that mated, copulation duration was significantly shorter for parasitized males than for unparasitized males.



Conclusions

- No significant effect of parasitism on female pre-copulatory mate discrimination was detected.
- In contrast, we found evidence for post-copulatory sexual selection operating in this system.
- The duration of copulation with parasitized males was significantly reduced.
- Matings with parasitized males elicited strong female 'rejection' responses, potentially accounting for the shortened copulation duration.
- The results suggest that post-copulatory ('cryptic') female choice has evolved in this host species, reducing insemination by parasitized males.

Future Directions

- Determine whether observed female rejection behaviors are causally related to the shortened copulation duration we observed.
- Test whether the reduced copula duration limits sperm transfer.
- Ascertain whether rejection behaviors also reduce incidence of parasite transmission to the female.

References

- ¹Borgia, G., & Collis, K. (1988). Female choice for parasite-free male satin bowerbirds and the evolution of bright male plumage. *Behavioral Ecology and Sociobiology* 25(1):445-454
- ²Hamilton WD, Zuk M (1982). Heritable true fitness and bright birds: A role for parasites? *Science* 218(2):384-387

Acknowledgements

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