The more you touch, the longer you wait: Investigating the effect of pre-mating contact on mating behaviors in the sea slug *Doto Chica*

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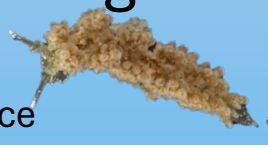
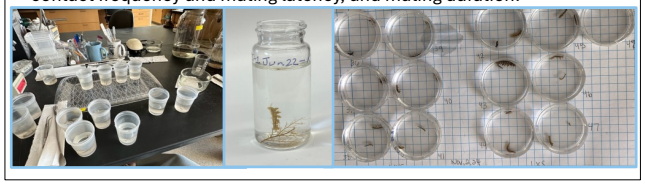


Introduction

- Understanding mating strategies is essential for reproductive success. Mixed evidence exists on whether body size or behavioral interactions drive mating success in hermaphrodites. For example, pre-mating behaviors like mate guarding (Zhu & Tanaka, 2002) can lead to longer mating periods, positively influencing offspring sired.
- While research often focuses on separate-sex animals, marine invertebrates like sea slugs are simultaneous hermaphrodites, possessing both male and female functions, enabling unique mating strategies such as reciprocal gamete exchange and flexible sex-role allocation.
- In some species, pre-mating contacts serve as mate assessment (Alcock, 1994), but their impact on mating outcomes in hermaphrodites remains underexplored.
- This study investigates how pre-mating contact and body size affect mating latency and duration in *Doto chica*, a local simultaneous hermaphroditic sea slug. Our research aims to improve understanding of how hermaphrodites navigate mate assessment and sexual selection.

Methods

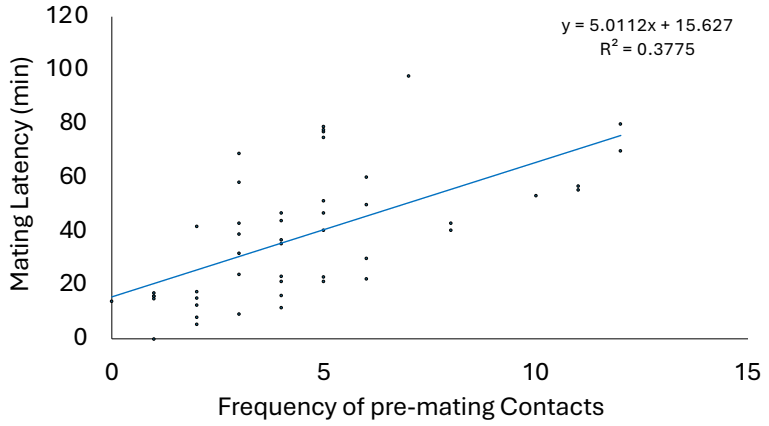
- Specimens of *Doto chica* were collected at the Gulf Specimen Marine Lab collection dock in Panacea, Florida.
- At the Levitan Lab at Florida State University they were kept in 20 mL aerated glass vials with filtered seawater maintained at 22°C and 25 ppt salinity.
- All slugs were isolated for 10 days before experimentation to allow for depletion of stored sperm.
- We conducted no-choice pairing experiments with animals from three size classes; small, 3-6.5 mm, medium, 6.5-9.5 mm, and large > 9.5 mm.
- At time of experiment each pair was placed in a small petri dish filled with fresh, filtered seawater and video recorded for 90 minutes.
- A regression analysis in Excel was used to analyze the relationships between length differences of pairs and contact frequency, and between contact frequency and mating latency, and mating duration.



Results

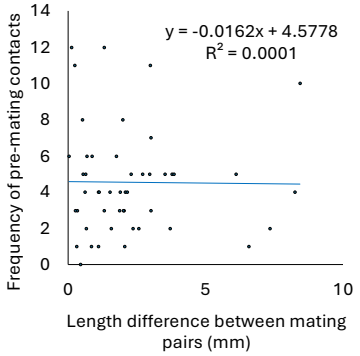
Relationship between frequency of precopulatory contacts and mating latency

A linear regression analysis was statistically significant ($F(1,46) = 27.89$, $p < 0.001$) and explained 37.7% of the variance in mating latency ($R^2 = 0.377$).



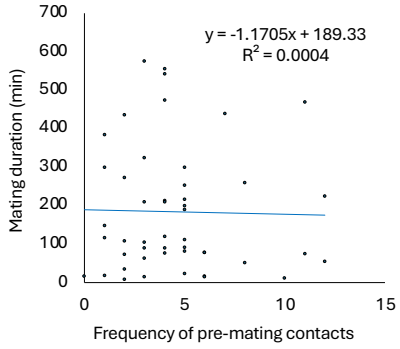
Relationship between size differences between pairs and frequency pr precopulatory contacts

A regression analysis showed no statistically significant ($F(1,46) = 0.021$, $p = 0.887$) relationship.



Relationship between frequency of precopulatory contacts and mating duration

A linear regression showed no significant association between the two variables ($F(1,46) = 0.021$, $p = 0.94$).



Conclusion

- Our findings reveal that increased pre-mating contact significantly increased the time it took for mating to begin. However, body size differences and copulation duration failed to show a significant relationship with contact frequency.
- This suggests that contact frequency plays a critical role in mate assessment, influencing reproductive decisions rather than being an incidental factor.
- Our results align with previous research showing mixed outcomes regarding the role of body size in hermaphroditic mating behavior yet emphasize the importance of behavioral interactions such as contact frequency in shaping mating dynamics.
- This study expands our understanding of mating strategies in simultaneous hermaphrodites.
- Future research is needed to fully understand the complex interactions at play. Investigating other behavioral cues that may affect mating success and exploring the mechanisms behind these behavioral patterns could further illuminate the complexities of reproductive behavior in hermaphroditic species.

Acknowledgements

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Resources

Zhu, D. H., & Tanaka, S. (2002). Prolonged Precopulatory Mounting Increases the Length of Copulation and Sperm Precedence in Locusta migratoria (Orthoptera: Acrididae). Annals of the Entomological Society of America, 95(3), 370-373.

Alcock, J. 1994. Post insemination associations between males and females in insects: the mate-guarding hypothesis. Annu. Rev. Entomol. 39: 11-21.