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The reproductive cost of *Drosophila melanogaster* : effects on cold tolerance

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Drosophila's winter strategy



In order to survive, species often make trade-offs between reproduction and survival, often resulting in reduced reproduction. During the cold and stressful winter months *Drosophila melanogaster*, like a lot of freeze avoidant insects, enters a reproductive dormancy. There could be a trade-off between reproductive activity and cold stress tolerance.



The responses to overwintering by oogenesis stop suggests a cost of reproduction and/or an increased cold tolerance by reduced reproductive activity in *Drosophila melanogaster*.



We compared fecundity and cold tolerance of gravid *versus* virgin females. We then attempted to artificially stop oviposition by pharmacological treatments : Rapamycin and Phloroglucinol. Our hypothesis was that virgin flies and chemical treated flies will lay respectively less or no eggs and this would affect cold tolerance.

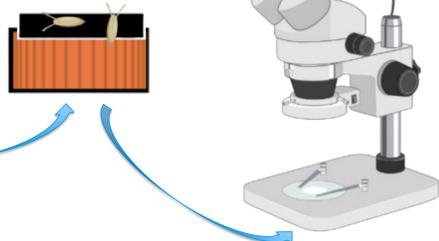


Fecundity

1. We put either one female (virgin/mated) or a pair of females (chemical treatments) in falcon tubes



2. Every 24h for 7 days we changed the charcoal medium filled caps and counted the eggs



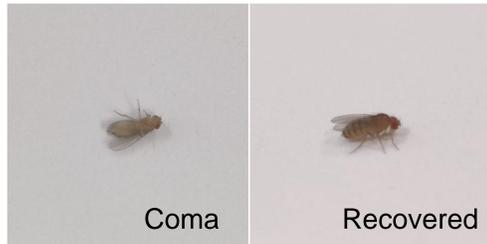
Cold tolerance

1. Chill-Coma Recovery Time



50 flies in ice slurry (0°C) for 3h

25°C room for 1h, register the time to recover from chill coma



2. Critical Thermal Minimum



We put about 120 flies in a refrigerating column set with a ramping rate of -0.5°C/min.

When flies enter chill coma they fell off the column and the temperature was individually registered

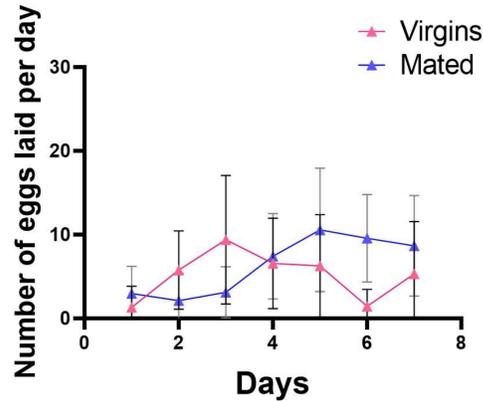
Take home message

- Virginity did quantitatively reduced egg oviposition, but it did not confer an advantage in cold thermal stress.
- Phloroglucinol completely stopped oviposition which conferred an advantage in cold thermal stress
- Phloroglucinol is considered a polyol, and thus might have some cryoprotective properties which are currently unknown

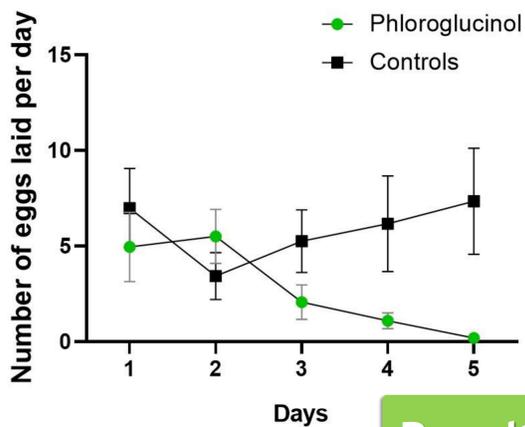


Results : fecundity

*We only show data for the phloroglucinol set as rapamycin showed no significant result

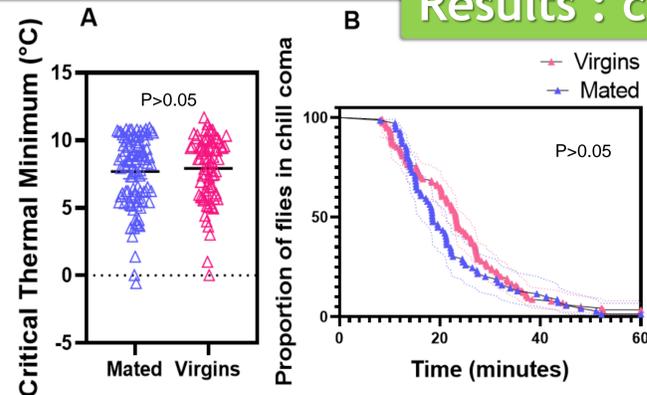


- Generally, mated flies laid more eggs than virgins
- The flies' temporal oviposition profile differs, there's a delay in peak egg laying activity for mated females compared to virgin ones

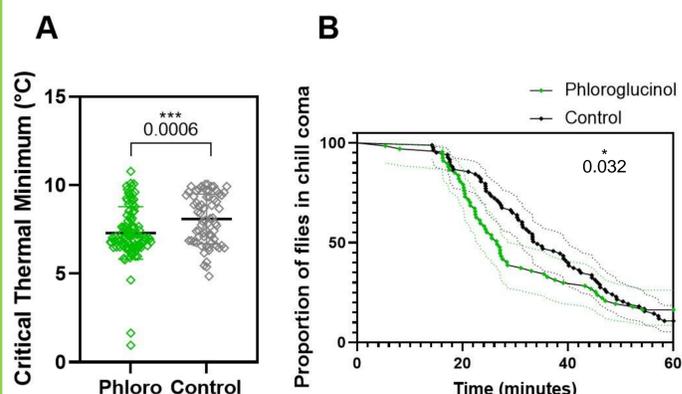


- Control flies laid eggs normally
- Phloroglucinol treated flies gradually stopped laying eggs after the second day

Results : cold tolerance



- No difference in cold tolerance assays between Virgin *versus* Mated



- Phloroglucinol-treated flies had better cold tolerance than control ones in both assays