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Publication Date

2023-08-21

Supplemental Material

<https://escholarship.org/uc/item/5zp1f28j#supplemental>

Exploring pilosity in the California native bee *Melissodes tepidus timberlakei* as an indicator of age and implications for pollinator response to climate change

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We found no significant relationship between pilosity (hairiness) and cold tolerance, i.e., the fluffy coats they have don't seem to affect how well they tolerate the cold. Bees lose hair (setae) throughout their lives like people and bees collected earlier in the year are hairier than those collected later (Fig. 1). Hairier bees tend to be heavier (Fig. 2); next we ask how well do heavier bees tolerate the cold?

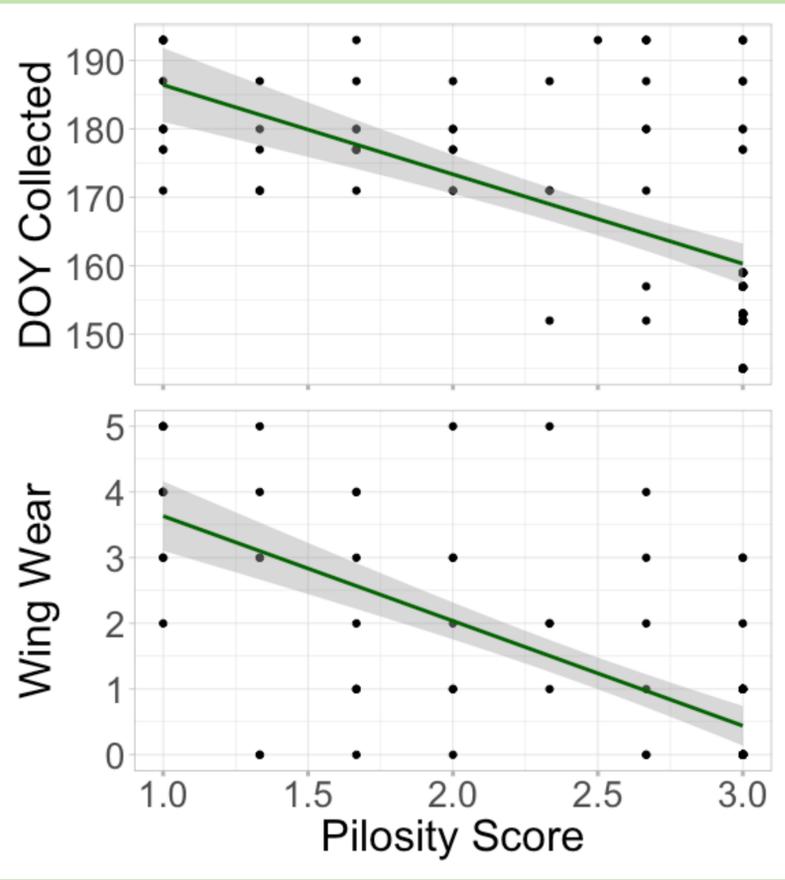


Fig. 1. Pilosity grade informs collection date of specimens and may serve as another proxy for bee age. DOY is day of year of collection. Designating wing wear is one method used for approximating age of bees. Using these findings natural history collections may better age their specimens using collection date, pilosity, and wing wear.



Fig. 3. Collection Site. UCSB Lagoon nest sites.



Fig. 4. Imaging Set Up. Canon EOS 6D Mark II, Macro Twin Lite MT-26EX-RT, and Cognisys Stackshot 3X Deluxe Kit. Images were focus-stacked on Zerene Stacker and put into Adobe Photoshop.

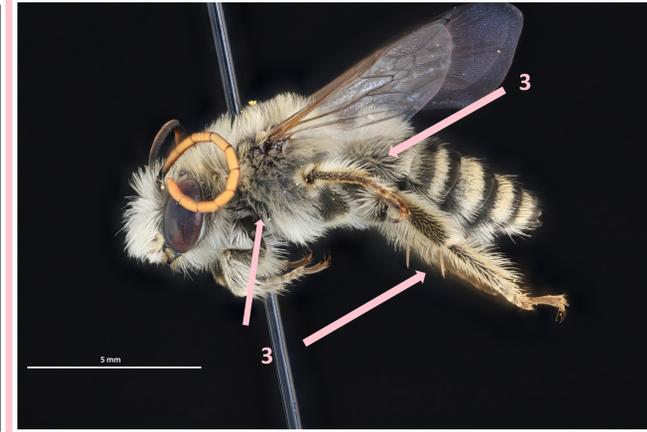
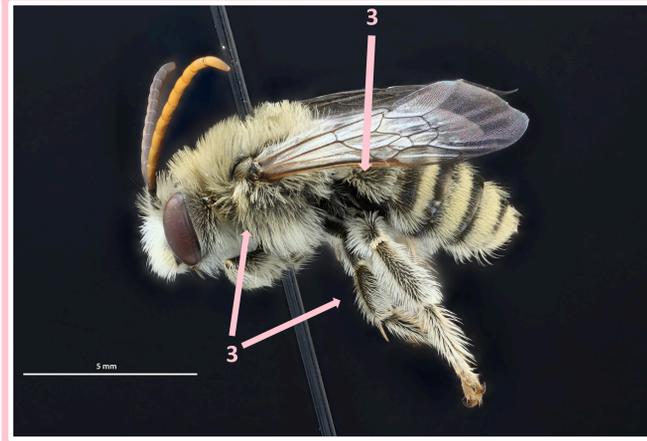


Fig. 5. Pilosity Scoring Examples. Male *M. tepidus timberlakei*. < 33% = 1, equal to 66% = 2, or > 66% = 3

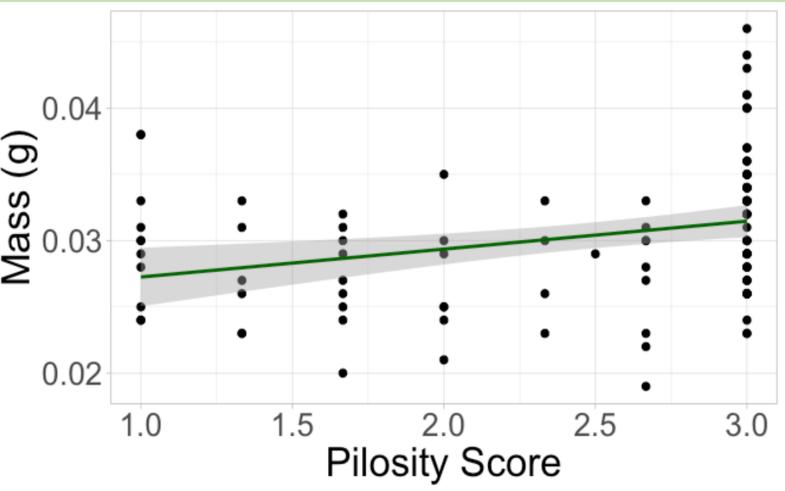


Fig. 2. Heavier bees are hairier. Investigating how body mass relates to cold temperature tolerance would be the next steps in learning how bees and other pollinators may respond to climate change.

Research Methods Collection: Male bees were collected at their nesting site and weighed to obtain mass. Next, they were chilled at 0°C for 60 min. Bees recovered from chill coma at 25°C. During recovery, bees were placed on their backs and recorded the number of seconds it takes for each bee to right itself. This time is the chill coma recovery time. **Imaging:** See Fig. 2. for equipment used. **Pilosity Grading:** See Fig. 5. **Analysis:** Analyses were performed in R.

Acknowledgements Special thank you to Valentina Venegas for their tireless work in collecting the bees and conducting the cold tolerance assays. Thank you to Elise Phan for her work on wing wear indexing. This project was supported by the National Science Foundation projects Extending Anthophila research through image and trait digitalization (Big-Bee) project (DBI2102006). This UCSB-Smithsonian Scholars Program received federal support from the Latino Initiatives Pool, administered by the Smithsonian Latino Center.

