

## ELECTRONIC SUPPLEMENTARY MATERIAL 1

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### **Male-female interactions and assortative mating**

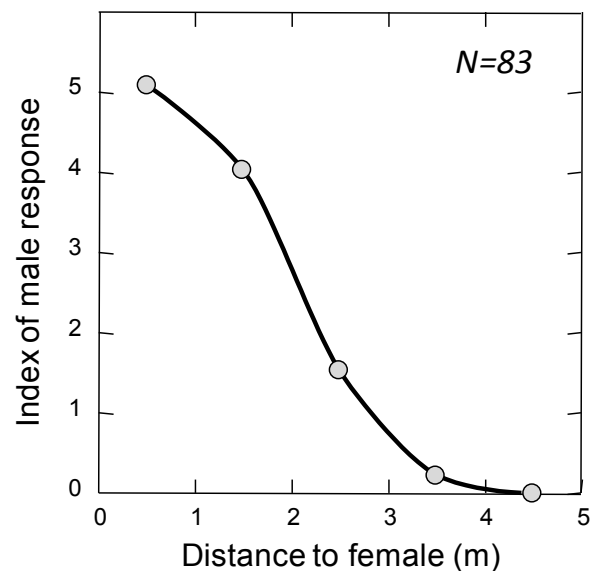
If matching habitat choice results in individuals with similar phenotypes frequenting the same habitats, then this could indirectly cause assortative mating if mating occurs more than randomly within the chosen habitat (Jiang et al. 2015). For our grasshoppers, we could not test this directly, since matings are very rarely observed, and genetic fingerprinting of adults and offspring is unfeasible. However, we did attempt to determine if mating is more likely than random to occur in the chosen habitat.

From observations in the field and the lab, it appears that females have a lower drive to mate than males. Females can fertilise several clutches with a single mating, although tend to mate again after each clutch deposition (about once a week). Since females are much bigger than males, females can prevent mating by kicking males away with their hind legs (pers. obs.). Males have a short display flight, in which they jump about one meter into the air and land at the same spot while making a clicking sound with their wings, possibly to attract females or to deter other males. Males respond towards movement of other grasshoppers (including males) by approach and investigation and, in case the other grasshopper is a female, males attempt to mate immediately after. Therefore, a successful mating starts with the detection of a female by a male.

To determine over which distances males detect females, we looked for a perched female on a pavement, and made her to jump and fly a few meters. As soon as she landed, we looked for any males that responded by movement, either by reorientation towards the female, or by walking or jumping into her direction. This would be complicated to do on a natural soil, but on the flat and unvegetated pavements of our study area it is rather straightforward to detect such movements. When a moving male was detected, we classified its initial distance to the female in 1 m categories. This flushing and observing sequence was repeated with the same female until we had data from a few different males, after which a new female was chosen and the sequence was repeated. We determined that there was no significant effect of female identity on the male response distances (as tested by a random effect in a mixed model), so for simplicity we treated all observations as independent. For the individual male response distances, we constructed a generalised response curve (see Fig. S1) plotting an index that is based on the number of males responding relative to the number of males available, taking

into account the surface of each one-metre wide circular area around the female, and assuming that initial male density was independent of female landing position.

This curve shows that the probability of detection and, therefore, of mating, declines rapidly, and is basically zero at distances greater than 4 metres. If we compare this with the width of asphalt pavement (7 m) and the pale pavement (5.5 m), then this limited detection range should indeed lead to a considerable degree of assortative mating between individuals sharing the same pavement and, presumably, having a similar colouration. This curve probably overestimates the probability of a mating as a function of initial male-female distance, since flying females are easier to detect than females just walking around, whereas females fly little unless disturbed. Hence, our estimate for the spatial scale over which matching habitat choice could indirectly cause assortative mating is probably conservatively large.



**Figure S1.** Male responsiveness to potential mates in relation to female proximity (see text for details).

## References

Jiang, Y., Bolnick, D. I., & Kirkpatrick, M. 2013. Assortative mating in animals. *The American Naturalist*, 181: 125–138.