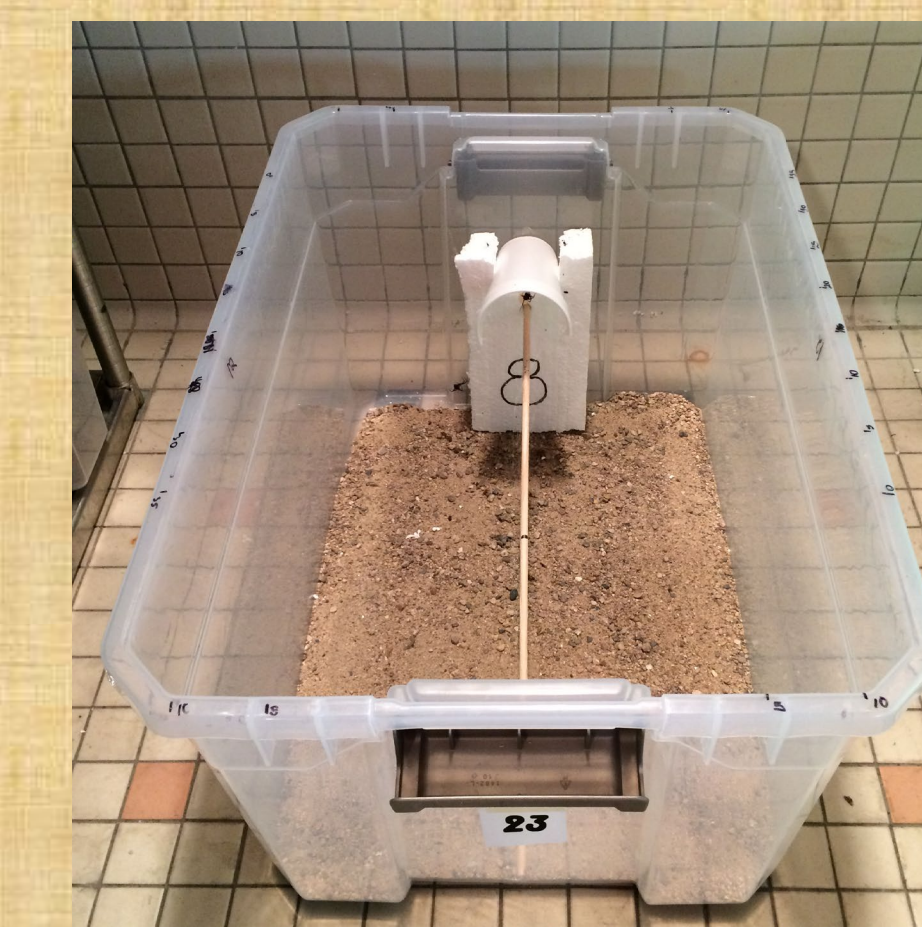


Urban vs Desert: Comparing Black Widow Boldness, Voracity and Social Tolerance

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INTRODUCTION

- Urbanization often eliminates native species diversity, while other species (e.g. pests) thrive [1].
- It is suggested that behavior of urbanophiles could explain their success, and that these successes may well add to the loss of urban biodiversity [2].
- The Black Widow spider, *Latrodectus hesperus*, is native to the Sonoran Desert but found at a much higher density in metro Phoenix, AZ [3].
- Studies indicate that urban birds display bolder suites of correlated behaviors (behavior syndromes), possibly due to habituation [4].
- We predict that urban spiders will be bolder, exhibit enhanced aggressiveness toward prey, but be more tolerant of conspecific individuals allowing them to form dense urban infestations.

METHODS

- We sampled a total of 26 adult female black widows collected from urban (N=13) and desert habitats (N=13).
- Assays were conducted in a 72-liter plastic tub (57 × 38 × 33 cm) where focal spiders were fed 1 cricket every 7 days on reverse photoperiod (see photo).
- Conspecific intruders were reared in the lab, at the same temperature (27°C), and fed 2 small crickets once a week, for 6 weeks prior to assay.
- **Boldness** was gauged by the distance (cm) spiders strayed from their refuge in the early dark cycle.
- **Voracity** was calculated as latency (secs) to attack artificial, standardized prey vibration.
- **Social Tolerance** of an unrelated, urban conspecific was measured once a day for 14 days and recorded as distance between individuals.

RESULTS

- Boldness displayed significant repeatability (Intraclass Correlation Coefficient ICC = 0.75, $F_{23,230} = 3.99$, $p < 0.0001$). Habitat origin had no significant effect on boldness behavior (Fig. 1; $F_{1,22} = 0.001$, $p = 0.97$).
- Voracity displayed significant repeatability (ICC = 0.79, $F_{24,48} = 4.9$, $p < 0.0001$). Habitat origin had no significant effect on voracity (Fig. 2; $F_{1,22} = 0.92$, $p = 0.35$).
- Social Tolerance displayed significant repeatability (ICC = 0.96, $F_{18,234} = 27.9$, $p < 0.0001$). Habitat origin had a marginally non-significant effect on tolerance (Fig. 3; $F_{1,20} = 3.83$, $p = 0.065$).
- Spider mass was used as a covariate in the above analyses, but never significantly predicted behavior.
- We found no significant correlations among voracity, boldness and tolerance.

DISCUSSION

- We found the black widow's behavior (regardless of habitat of origin) to be highly repeatable, and unrelated to a spider's mass.
- These data do not support the idea that urban pests thrive because of their behavioral plasticity.
- However, these three behaviors were not correlated with each other, rejecting the notion of a behavior syndrome.
- We were surprised to find no behavioral differences between urban and desert-collected spiders whatsoever.
- Notably, this was a common garden laboratory experiment, and it remains possible that urban and desert spiders show behavior differences in the field.
- Recently urban and desert black widows have proven to be highly diverged genetically [5].
- And yet those genetic differences led to no measured behavior differences.
- Future work should compare the field behavior of urban spiders, desert spiders and cross-fostered urban spiders in desert habitat and desert spiders in urban habitat.

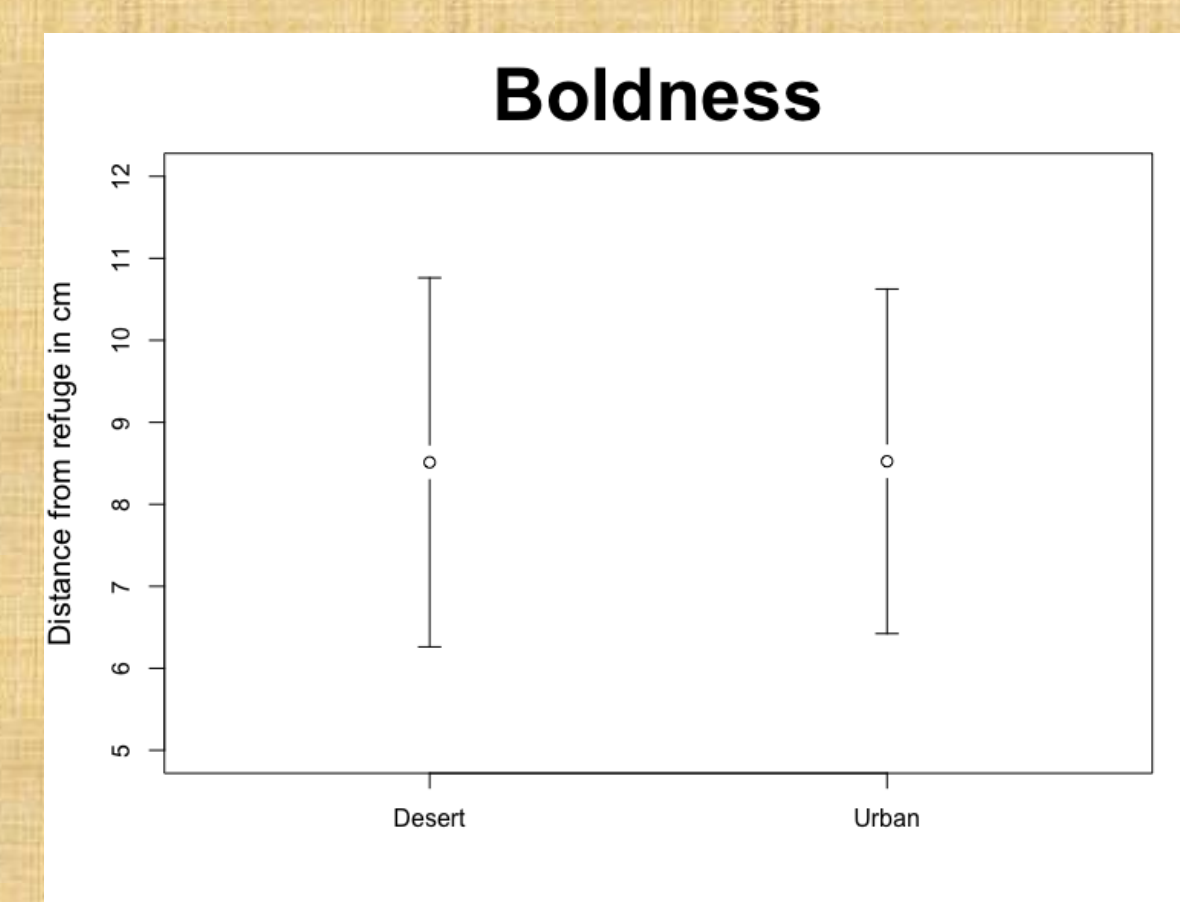


Figure 1

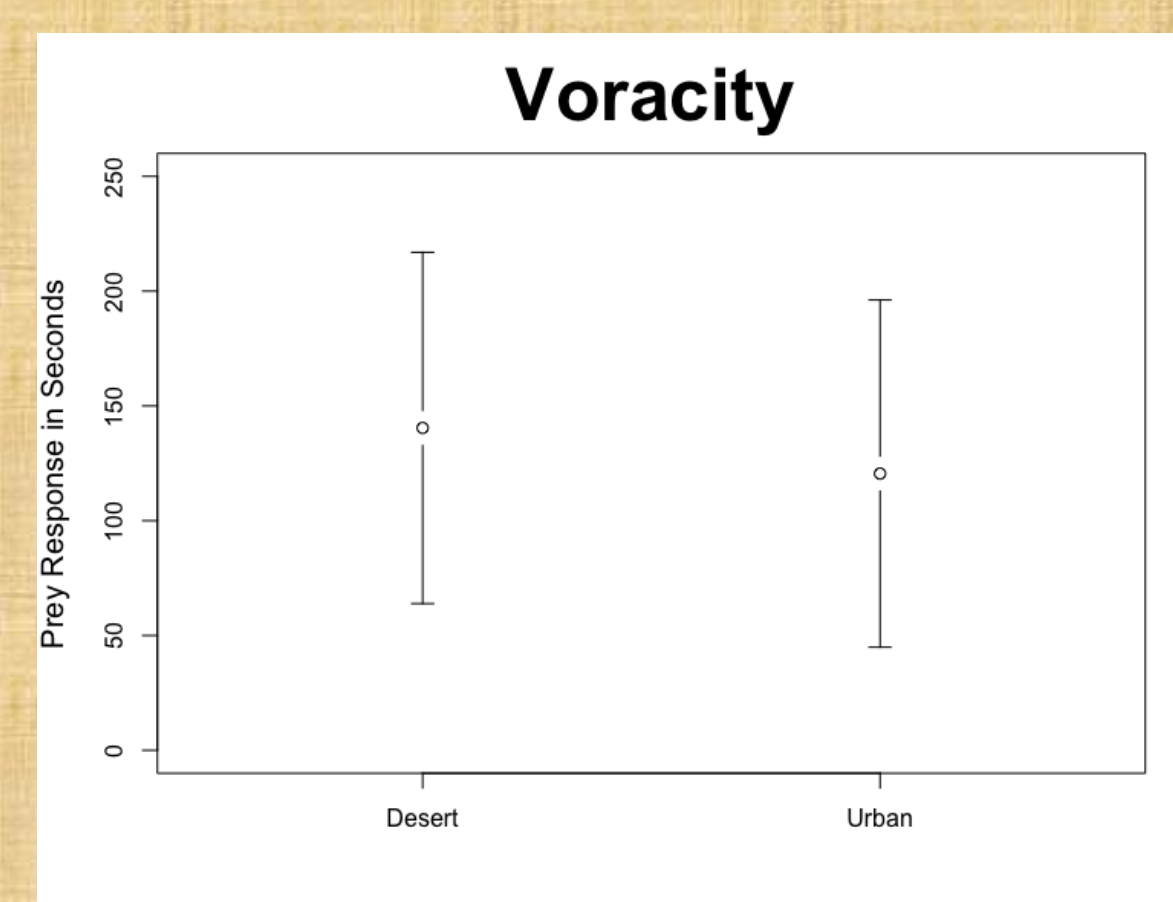


Figure 2

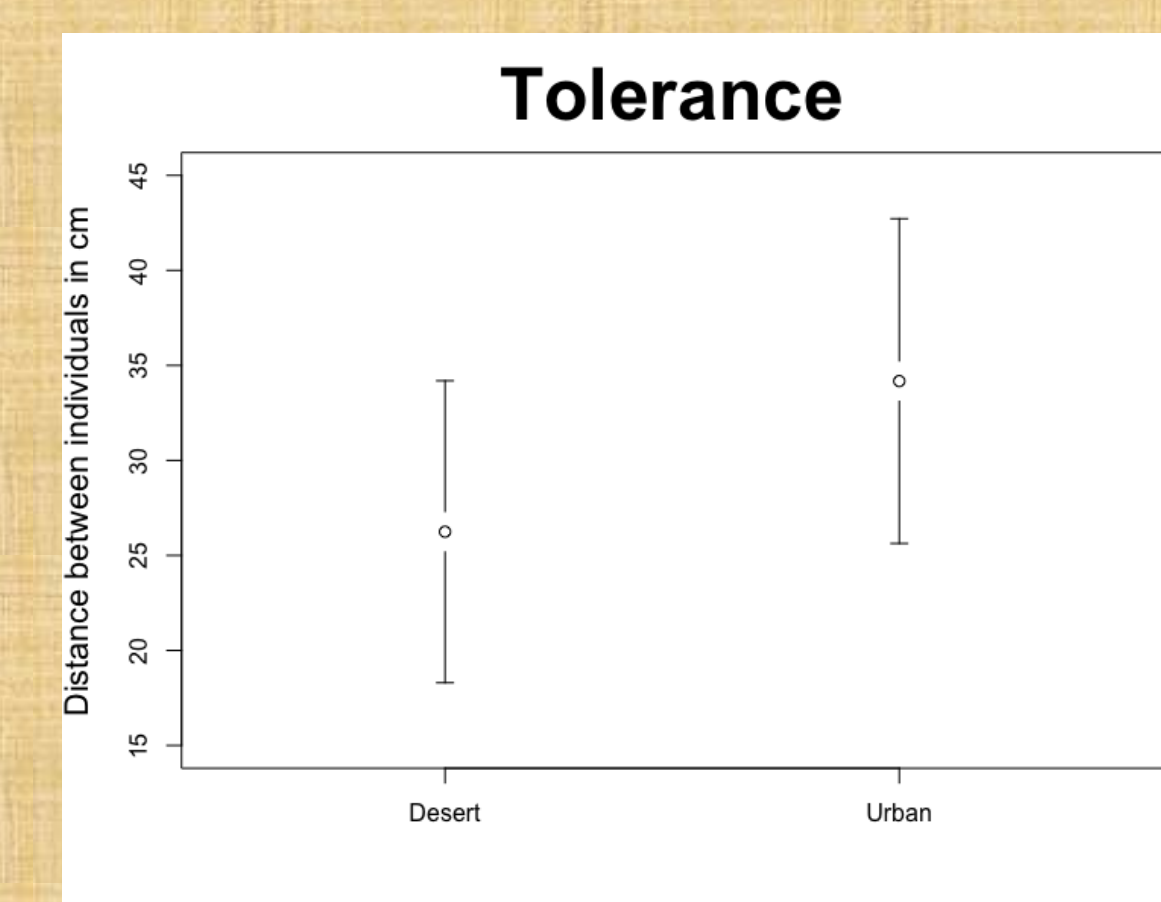


Figure 3

Figure 1: Distance away from back of refuge for desert and urban lineages. Points indicate the mean distance in centimeters and brackets show the standard error of the mean.

Figure 2: Response time to artificial prey stimulations for desert and urban lineages. Points indicate the mean response in seconds and brackets show the standard error of the mean.

Figure 3: Distance between individuals in the same arena for desert and urban lineages. Points indicate the mean distance in centimeters and brackets show the standard error of the mean.

LITERATURE CITED

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ACKNOWLEDGEMENTS

Special thanks to Christopher de Tranaltes, Colin Clay, Keaton Coker, Marko Meric, Destiny Ryan and Sarah Lindley for their assistance in spider rearing and data collection.