Current Zoology, 2020, 66(2), 215–216
doi: 10.1093/cz/zoz033
Advance Access Publication Date: 13 June 2019
Letter to the Editor

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Demonstrating mate choice copying in spiders requires further research

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Handling editor: Zhi-Yun Jia

Received on 27 April 2019; accepted on 6 June 2019

Key words; invertebrates, mate choice copying, *Schizocosa*, sexual selection, speciation, spiders

Mate choice copying—when individuals learn to prefer mates or mate types that have been chosen by others—can influence trait evolution and speciation (Varela et al. 2018; Dion et al. 2019). Most examples of mate choice copying are from fish, birds, and mammals including humans (Varela et al. 2018). However, 2 invertebrate examples—fruit flies and wolf spiders—have been used to argue that the phenomenon may be phylogenetically widespread, and perhaps the rule rather than the exception in nature (Varela et al. 2018). Here, we revisit the evidence for mate choice copying in wolf spiders (Fowler-Finn et al. 2015) in light of new data (Gilman et al. 2018). Then, we discuss why mate choice copying is a phenomenon that is likely to occur in wolf spiders, and why this deserves attention.

In a study reported in *Current Zoology*, Fowler-Finn et al. (2015) tested for mate choice copying in a population of *Schizocosa* wolf spiders that includes two genetically indistinguishable male morphotypes that differ in sexual ornamentation and courtship behavior. In this population, "ornamented" males have black brushes on their forelegs and "non-ornamented" males lack foreleg brushes (Hebets and Vink 2007). Fowler-Finn and colleagues tested for mate choice copying by allowing "observer" females to watch age-matched 'actor' females choose between the two male morphotypes. Observer females tended to mate with the same male morphotype they had seen the actors choose, suggesting mate choice copying.

A recent study of the same population of wolf spiders offers an alternative explanation for the pattern Fowler-Finn et al. (2015) reported. Gilman et al. (2018) analyzed maturation times and mate preferences in *Schizocosa* females. Females fell into one of two partly overlapping maturation groups: 1) early-maturing females that were more likely to choose non-ornamented males and 2) late-maturing females that were more likely to choose ornamented males. The authors proposed that the population includes two previously unrecognized species or incipient species: an early-maturing non-ornamented species and a late-maturing ornamented species. By age-matching females, Fowler-Finn et al. (2015) may have unknowingly matched observer and actor females from the same maturation groups. These pairs of females would have been likely to choose the same male morphotypes regardless of experience, resulting in a mating pattern identical to that of mate choice copying.

Given these results, we believe that whether mate choice copying exists in *Schizocosa*, and more generally in spiders, is an open question and one that demands further investigation. It is plausible that mate choice copying could exist in *Schizocosa*. Learned mate preferences have been demonstrated in the clade (Hebets 2003), suggesting the capacity for other types of learning. Moreover, many of the conditions that are predicted to favor the evolution of mate choice copying are present in *Schizocosa*. First, the high density of some *Schizocosa* populations (Fowler-Finn et al. 2015) and long copulation durations (generally 1–4 h; Stratton et al. 1996) provide abundant opportunity for females to be exposed to the choices of other females. Second, the presence of male sexual ornamentation and complex male courtship displays in *Schizocosa* suggests that selection imposed by female choice may be strong (Stratton 2005), and strong sexual selection can facilitate the evolution of mate choice copying (Servedio and Kirkpatrick 1996). Third, because most *Schizocosa* females mate only once, and because males are also predators that can be sexually aggressive (Norton and Uetz 2005), poor mate choice can be especially costly for female *Schizocosa*. By copying others, females could reduce the time, energy, and risk involved in assessing a large number of males with potentially aggressive, complex, and competing courtship displays (Varela et al. 2018).

Schizocosa has become a widely used system for researchers studying the evolution of sexual signaling, mate choice, and speciation (Stratton et al. 1996; Hebets 2003; Norton and Uetz 2005; Stratton 2005; Hebets and Vink 2007; Fowler-Finn et al. 2015; Gilman et al. 2018), and mate choice copying can profoundly affect all of these processes (Varela et al. 2018). Understanding whether mate choice

copying occurs in this important and well-studied model clade may be critical to understanding how the clade evolved. Furthermore, because *Schizocosa* is a clade in which theory suggests we might see mate choice copying, asking whether we do see it can help us to understand how broadly the theory applies. Finally, understanding whether mate choice copying occurs in spiders, or occurs broadly in invertebrates, may be critical to understanding how and when mate choice copying itself evolved (Varela et al. 2018). Notably, many other spider groups similarly share conditions predicted to favor the evolution of mate choice copying. Thus, we believe there is a strong need for the more extensive study of mate choice copying both in *Schizocosa* and in other arachnid and insect groups.

Funding

R.T.G. was partially supported by Natural Environment Research Council (grant no. NE/L002469/1).

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