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Digest: Sexual selection in a multibrooded songbird: The social pair matters*

Stephen M. Salazar^{1,2,3} 

¹Department of Animal Behaviour, Bielefeld University, Bielefeld, Germany

²Behavioural & Physiological Ecology, Groningen Institute for Evolutionary Life Sciences, University of Groningen, Groningen, The Netherlands

³E-mail: stephenmarksalazar@gmail.com

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Which sources of variance in socially monogamous species offer the largest opportunity for sexual selection? Germain et al. study this question in a double-brooding songbird and find that male reproductive success gained within the social bond stands out as an important source of variance across years and lifetimes.

The degree of variance in reproductive success among individuals reflects the potential for sexual selection in a population. When few individuals sire many offspring, the opportunity for selection can be strong, but when all individuals share an even reproductive success, the opportunity for selection is low. Ever since molecular techniques have been applied in assigning parentage in field studies, true monogamy, particularly among birds, is found to be the exception rather than the rule (Brouwer and Griffith 2019). In socially monogamous (genetically polygamous) species, variance in overall male reproductive success may thus be influenced jointly by “within-pair” as well as by “extra-pair” reproductive success. Two active lines of inquiry in evolutionary ecology are whether some individuals are able to monopolize reproductive success via these different routes, and whether trade-offs exist between components of within and extra-pair reproductive success.

In a wild population of black-throated blue warblers (*Setophaga caerulescens*), Germain et al. (2021) studied sources of variation among components of within-pair and extra-pair male reproductive success to identify which of these could offer the greatest opportunity for sexual selection. Black-throated

blue warbler females may produce a second brood when conditions are favorable, which offers an interesting additional source of variation of male reproductive success. The authors’ comprehensive 16-year dataset provides a rare opportunity to partition annual as well as lifetime male reproductive success into their component sources of within and extra-pair (co)variance.

The authors found that the opportunity for selection in both annual and lifetime reproductive success was largely attributable to components of within-pair reproductive success. They also found that males gaining lifetime reproductive success via within-pair reproduction benefited from gains via the extra-pair pathway. A plausible explanation is that males establishing high-quality food-rich territories benefit from the increased likelihood of double-brooding by both their social mate as well as neighboring extra-pair females. Furthermore, rather than a trade-off, there was positive covariance between within-pair and extra-pair reproductive success across male lifetimes. A notable finding was that males may forego their annual reproductive gains to maximize their long-term reproductive success. This illustrates the value of longitudinal studies and their importance in discerning how selection may act differently across life-history stages.

There is more to be understood from the point of view of females. Germain et al. (2021) found that, when considering within or extra-pair reproductive success, females’ fecundity positively influenced male lifetime reproductive success more than their number of mates. The female influence on variance in male re-

*This article corresponds to Germain, R. R., Hallworth, M. T., Kaiser, S. A., Sillett, T. S. and Webster, M. S. 2021. Variance in within-pair reproductive success influences the opportunity for selection annually and over the lifetimes of males in a multibrooded songbird. *Evolution*. <https://doi.org/10.1111/evo.14166>.

productive success has been shown in earlier work (e.g., Kempenaers et al. 1992; Reid et al. 2014). Recent studies (Townsend et al. 2013; Both et al. 2019) also speculate that females are adaptively increasing their number of broods in response to lengthening and warming of breeding seasons.

As suggested by the authors, a way forward is identifying the precise phenotypic or environmental drivers of the (co)variance between within-pair and extra-pair reproduction in such a double-brooded mating system. Perhaps individual differences in male competitive ability are related to the quality of territories they establish and thus influence variance in their reproductive success.

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CONFLICT OF INTEREST

The authors declares no conflict of interest.

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