

Letter to the editor

Male mating strategies: models of roving and residence

Hal Whitehead *

Department of Biology, Dalhousie University, Halifax, Nova Scotia, B3H 4J1 Canada

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In the past 8 years there have been three fairly substantial attempts to model the relative benefits of ‘roving’ (or ‘searching’ or ‘roaming’) between groups of females and ‘residence’ (or ‘harem-holding’ or ‘staying’) with a female group as alternative male mating strategies (Whitehead, 1990; Sandell and Liberg, 1992; Magnusson and Kasuya, 1997). As none of these papers cite each other, it is worth summarizing the similarities and differences in their methods and conclusions. In particular, I note the importance of the relationship between the receptive period of the females and the travel time of males—a result common to all three studies, differences between female-based and male-based models, the effects of female group size, and the possibility of evolutionarily stable mixed strategies.

Whitehead (1990) models the expected benefits to a male of adopting either roving or residence as mating strategies, and considers how situations

such as dominance hierarchies, variable female group size, oestrous synchrony and sperm competition influence the choice of optimal strategy. Magnusson and Kasuya (1997) use a similar model to that of Whitehead (1990) but the perspective in this case is that of the female: how her pregnancy rate changes with mating strategy. The Sandell and Liberg (1992) model differs from those of Whitehead (1990) and Magnusson and Kasuya (1997) in several ways, including that it assumes solitary and stationary females. Like Whitehead (1990), Sandell and Liberg (1992) model from the perspective of male fitness, and consider the results of interactions between resident and roving males.

The relationship between the receptive (oestrous) period of the females and the average time males take to find groups of females is particularly important in determining the relative benefits of roving and residence for both males (Whitehead, 1990; Sandell and Liberg, 1992) and females (Magnusson and Kasuya, 1997). Roving is optimal for both sexes when travel times are relatively short compared with receptive periods.

* Tel.: +1 902 494 3723; Fax: +1 902 494 3736; e-mail: hwhitehe@js.dal.ca

There are some small but interesting differences between the perspectives of the sexes indicated by differences between the results of the models. In some circumstances when travel times are slightly longer than receptive periods, females may have greater fitness if males are resident, although an individual male might benefit by roving (Whitehead, 1990; Magnusson and Kasuya, 1997). Male mating strategies are expected to have evolved to optimize male fitness. Thus, the male-based models of Whitehead (1990) and Sandell and Liberg (1992) would be more appropriate for predicting which mating strategy is found in a population than the Magnusson and Kasuya (1997) female-based models. However, Magnusson and Kasuya (1997) suggest that in some situations females may be able to manipulate male behaviour to their benefit by tactics such as providing non-reproductive matings, so that male mating behaviour evolves to optimize female fitness. Also, female-based models are generally more useful for management and conservation, as population dynamics is usually more closely related to female fitness.

Counter intuitively, in neither the models of Whitehead (1990) nor those of Magnusson and Kasuya (1997) does female group size directly affect the optimal mating strategy. However there

can be indirect effects. When females are more gregarious, groups will be fewer and larger, so males will have longer travel times between groups, promoting residence. With larger groups, males may also face increased competition with other males, which can also promote residence if resident males have a competitive advantage (Whitehead, 1990).

The models of Whitehead (1990) and Sandell and Liberg (1992) do not indicate any true evolutionarily stable mixed strategies for males, with frequency dependent equilibrium of roving and residence. However, males may adopt different short-term tactics depending on the information available to them (e.g. staying with relatively large groups) or their status (e.g. low-ranking males continuing to search for unaccompanied groups when residence is favoured) (Whitehead, 1990).

References

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