

The Role of Scent-marking in Patchy and Highly Fragmented Populations of the Cabrera Vole (*Microtus cabreræ* Thomas, 1906)

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Rodent scent-marking is often used for territorial defence and self-advertisement, and both functions often entail the continuous scent-marking of a large area with high costs. In species with highly-fragmented populations and low density, in which the likelihood of social encounters is low, the costs of continuous scent-marking might exceed the associated fitness benefits; therefore, less intensive scent-marking only to signal presence to the opposite sex may be used. This hypothesis was tested in captivity with the Cabrera vole, a species with highly fragmented and low-density populations. Firstly, to assess the unknown scent-marking behaviour of the Cabrera voles, we conducted an assay wherein voles could scent-mark a clean substrate. Both sexes marked with urine and faeces, but never with anogenital secretions, and the amount of scent-marks was not different between sexes. In the subsequent assay, voles of each sex were given the choice of scent-mark on clean substrates or on substrates previously scent-marked by males or females. Both sexes marked with urine a larger area on substrates pre-marked by the opposite sex than on substrates pre-marked by the same-sex and clean substrates; however, no differences were found in the frequency of fecal boli deposited on the three types of substrate, and no anogenital secretions were found. The clear preference of receivers to scent-mark with urine the substrate pre-marked by the opposite sex strongly suggests that Cabrera voles use urine scent-marking for inter-sexual communication, probably to increase mate-finding likelihood, rather than for territorial defense and/or self-advertisement.

Key words: fragmented populations, mate-finding, *Microtus cabreræ*, patchy distribution, scent-marking, voles

INTRODUCTION

Scent-marking is used by a variety of animals to convey olfactory information to conspecifics even when the scent-donors are absent. Such behaviour has been studied extensively in mammals, particularly rodents (e.g., Johnston et al., 1993; Rich and Hurst, 1999; Thomas and Wolff, 2002; Wolff et al., 2002) that typically scent-mark by deposition of faeces, urine and/or dragging the anogenital region on the substrate (Ferkin and Johnston, 1995; Ferkin, 2001; Eisenberg and Kleiman, 1972). Scent-marking behaviour seems to serve multiple and overlapping functions (Ferkin et al., 2001;

Ferkin et al., 2004; Becker et al., 2012). For instance, both the prairie vole (*Microtus ochrogaster*) and meadow vole (*Microtus pennsylvanicus*) use scent-marking for territorial defense and for mate-advertisement (Ferkin et al., 2001; Ferkin et al., 2004). Other findings have indicated that scent-marking behavior in those same species is used also for advertise self-presence and, possibly, individual identity to conspecifics (self-advertisement) (Thomas and Kaczmarek, 2002; Thomas and Wolff, 2002; Wolff et al., 2002).

The use of scent-marking for self-advertisement and territorial defense implies that individuals spread continuously their marks across relative large areas (Brown and McDonald, 1985; Hurst, 1990; Johnston et al., 1994; Humphries et al., 1999; Thomas and Wolff, 2002) with high energetic costs and predation risk (Gosling et al., 2000; Koivula and Korpimäki, 2001; Mason et al., 2005). Both functions appear to be

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