

The effect of pair bonding in *Cabrera vole's* scent marking

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Abstract The *Cabrera vole* (*Microtus cabreræ*) is a rare rodent living in patchy grassy areas of the Iberian Peninsula where unpaired individuals of both sexes use scent marking primarily to increase their mate-finding likelihood. *Cabrera voles* establish long-term pair bonds with opposite-sex conspecifics constituting a breeding pair, which is expected to reduce the efforts in searching for a new mate. Under such circumstances, scent marking as a strategy to increase mate-finding likelihood became useless. Accordingly, we hypothesise that pair bonded *Cabrera voles* suppress mate-finding scent marking to reduce energetic costs and predation risk. To test this hypothesis, we compared scent-marking behaviour towards a clean substrate, in both paired and non-paired voles. No differences were found in the scent marks' type and the amount of marks placed by voles in both conditions. We also analysed the scent-marking behaviour of both sex pair bonded voles when exposed simultaneously to a clean substrate, a substrate pre-marked by males and a substrate pre-marked by females. We found no significant differences in scent-marks (urine-marked area and number of faecal boli)

across the three types of substrate types. In accordance with our prediction, these results suggest that pair bonded *Cabrera voles* did not use scent marking for mate finding, thus providing further support to the existence of a monogamous mating strategy. Furthermore, our results fail to support the use of scent marking for territorial defence purposes.

Keywords Behaviour plasticity · *Microtus cabreræ* · Modulation · Pair bonding · Scent marking · Voles

Introduction

The placement of semiochemicals on the substrate to communicate with conspecifics, defined as scent marking, is a common trait among mammals (Johnson 1973). Scent marking typically entails faeces deposition, urine and/or dragging a particular region of the body with scent-producing glands (e.g. the anogenital region) on the substrate (Eisenberg and Kleiman 1972; Ferkin 2001; Ferkin and Johnston 1995), and seems to serve multiple and, occasionally, overlapping functions (Becker et al. 2012; Ferkin et al. 2001, 2004). Scent marking is used mainly for territorial defence, as well as mate advertisement and self-advertisement (Johnston 1983; Thomas and Wolff 2002). Given the high costs of scent marking for both scent donors and receivers (Gosling et al. 2000; Hughes et al. 2010; Koivula and Korpimäki 2001; Mason et al. 2005), it is not surprising that animals may modulate their scent-marking behaviour, reducing costs when scent marking is not profitable (Roberts et al. 2001). Notwithstanding, the plasticity of mammals' scent-marking behaviour at the species level is poorly studied. Only a few studies have focused on the intra-specific plasticity of scent-marking behaviour; these studies show that scent-marking behaviour may respond powerfully to changed social conditions (Becker et al. 2012; Le Roux et al. 2008). For instance, in yellow mongooses (*Cynictis penicillata*) the population density seems to affect the subordinates' intensity of

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