Female reproductive state affects male's response to same- and mixed-sex over-marks in meadow voles, *Microtus pennsylvanicus*

Nicholas Hobbs & Michael Ferkin
University of Memphis. Dept. of Biological Sciences, Memphis, 38152

Background

• Many terrestrial mammals use scent marks and over-marks to communicate with opposite-sex conspecifics.

• Upon encountering an over-mark where the two scent donors are of similar condition, individuals of several species will later spend more time investigating the scent mark of the top-scent donor (Johnston et al., 1995).

• Factors that affect how individuals respond to the scent donors of an over-mark include the gonadal hormone status of the scent donors, and the nutritional condition of the scent donors and the subjects (Leonard et al., 2001; Hobbs & Ferkin, in press).

•Females of several species, including meadow voles, enter a heightened state of sexual receptivity relative to control females (REF) for 8-24 hours after parturition, known as postpartum estrus (PPE) (Dewsbury, 1990).

•It is not known how the reproductive state of female scent donors of an over-mark affects a male's response to these scent donors in same-sex and mixed-sex over-marks.

Objective

To examine how a male's response to female scent donors of same- and mixed-sex over-marks is affected by the females' reproductive states

Hypotheses

Exp. 1: The reproductive state of female scent donor's affects a male's preference for the top-scent donor of a same-sex over-mark.

Exp. 2: A male's response to the female scent donor of a mixed-sex over-mark is affected by her reproductive state.

Methods

•48 male voles were exposed to 1 of 4 different over-mark combinations in each experiment (n=96 total voles)

•Anogenital odors were transferred to clean glass microscope slides, with a fresh slide for each subject. Odors from PPE females were collected within 8 hours of parturition. Odors were placed on the slide as shown in Fig. 1.

•Slides were placed in the home cage of subjects using a metal clasp and hook. Subjects were allowed to investigate the slide for 5 min during the exposure phase and 3 min. during the preference test.

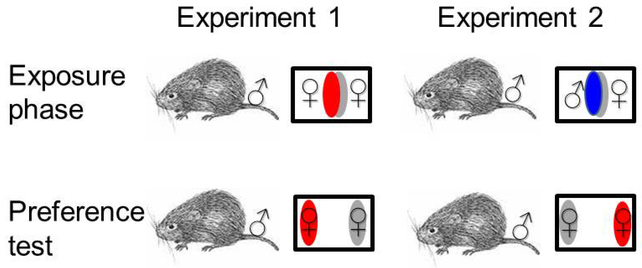

Figure1: Schematics of the 2 phases of testing for each experiment. Only 1 of the 4 over-mark combinations for each experiment is shown. Red oval= PPE female scent mark, gray oval= REF female scent mark, blue oval= Male scent mark.

Results

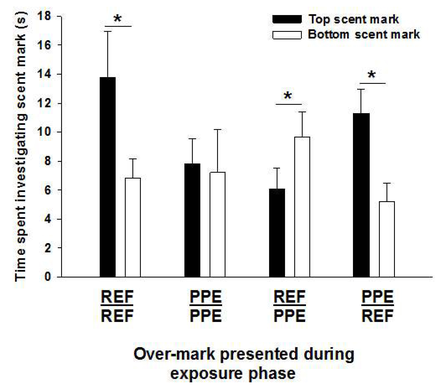

Figure 2: Time (Mean ± SEM) that male meadow voles spent investigating the scent donors of a same-sex over-mark.
* indicates statistical significance at p<0.05 level

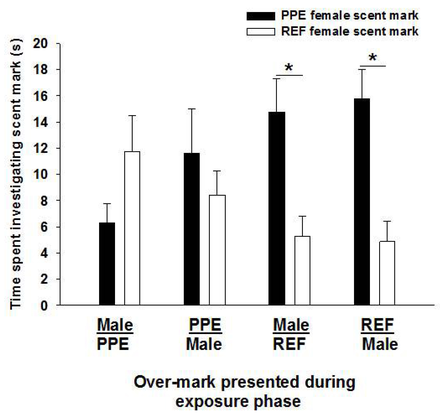

Figure 3: Time (Mean ± SEM) that male meadow voles spent investigating the scent mark of a female from a mixed-sex over-mark and that of a novel female.
* indicates statistical significance at p<0.05 level

Discussion

• Male voles spent more time investigating the scent mark of the PPE female compared to that of the REF female, independent of its position in the over-mark, supporting our hypothesis for experiment 1.

•Males spent more time investigating the scent mark of a novel PPE female compared to that of a REF female that was part of a mixed-sex over-mark.

•Males may be more interested in PPE females because they mate sooner relative to REF females. Similarly, copulatory bouts with PPE females are shorter than those with REF females (delBarco-Trillo & Ferkin, 2007).

References

delBarco-Trillo, J., & Ferkin, M. H. (2007). Female meadow voles, *Microtus pennsylvanicus*, experience a reduction in copulatory behavior during postpartum estrus. *Ethology*, *113*, 466-473.

Dewsbury, D. A. (1990). Modes of estrus induction as a factor in studies of the reproductive behavior of rodents. *Neuroscience & Biobehavioral Reviews*, *14*, 147-155.

Hobbs, N. J., & Ferkin, M. H. (in press). Dietary protein content affects the response of meadow voles, Microtus Pennsylvanicus, to over-marks. *Acta Ethologica*.

Johnston, R. E., Munver, R., & Tung, C. (1995). Scent counter marks: selective memory for the top scent by golden hamsters. *Animal Behaviour*, *49*, 1435-1442.

Leonard, S. T., Ferkin, M. H., & Johnson, M. M. (2001). The response of meadow voles to an over-mark in which the two donors differ in gonadal hormone status. *Animal Behaviour*, *62*, 1171-1177.

Acknowledgements

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