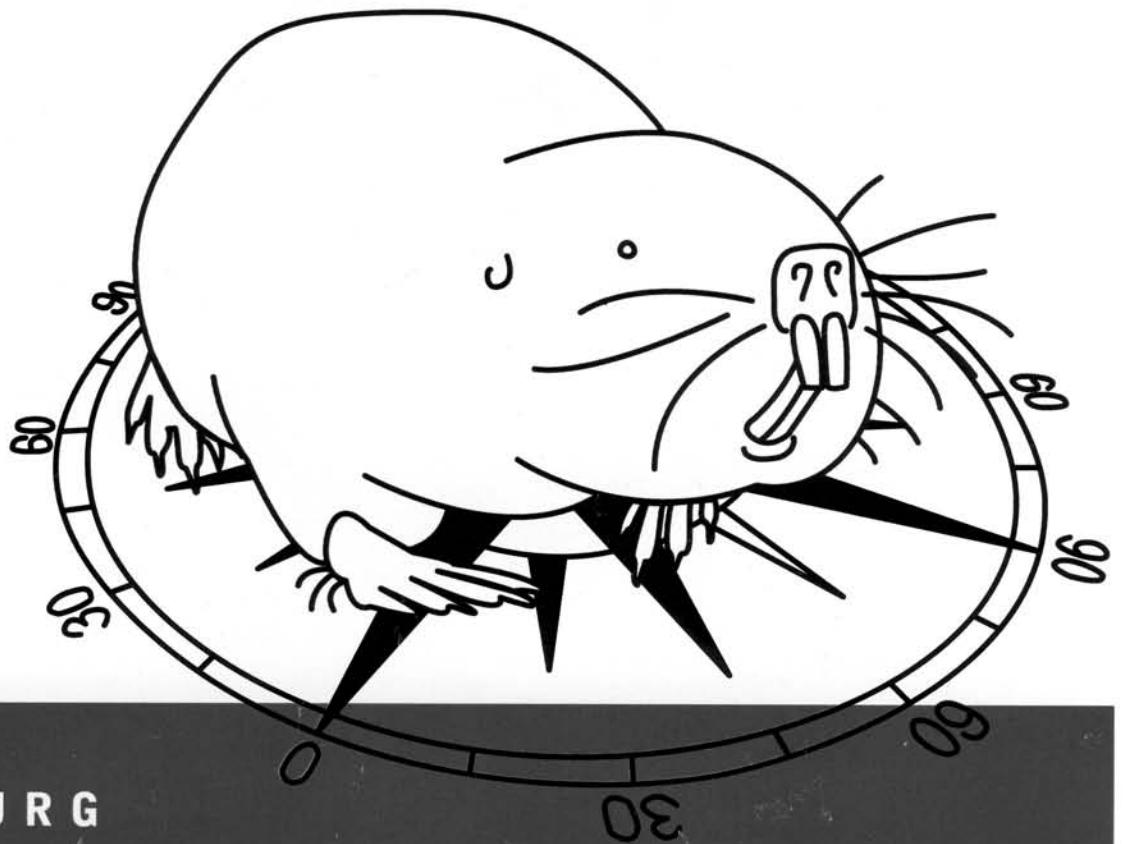


# Book of Abstracts

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## Functions of song motifs in noctule bats (*Nyctalus noctula*)

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The dual function of bird song has been studied in manifold aspects; in contrast, the mechanisms and functions of song in mammals have so far received little attention. Here, we conducted a playback experiment to elucidate the function of two different motifs in the song of noctule bats (*Nyctalus noctula*). Male noctule bats establish mating roosts in autumn that they acoustically defend against other males and/or display to females with songs consisting of up to 8 motifs. We presented three different playbacks to roosting, territorial males: (1) whistles, that are probably used for long distance attraction of females, (2) complex trills, that we have observed to be used in male-male territorial interactions, and (3) the song of another, unfamiliar bat species as a control. We found that test males reacted most to a playback mimicking a noctule male singing complex trills, significantly less to a whistle playback and almost never to the control sound. In addition, test males generally responded with relatively more complex trill motifs to a simulated trilling intruder, underlining our assumption that the complex trill plays a crucial role in territorial interactions. Our results demonstrate that different motifs carry different functions in the noctule song, and most likely play a role in both, mate attraction and territorial defence.

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## Seismic body vibrations in a sand-dwelling species, the piebald shrew (*Diplomesodon pulchellum*)

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Self-produced seismic vibrations are known for some rodents but not for insectivores, although sand-dwelling chrysochlorid golden moles are capable of seismic sensitivity. In experiments with captive piebald shrews, 11 (5 male, 6 female) of 19 animals placed singly on a drum membrane produced seismic vibrations by the whole-body wall muscles. The airborne waves of the vibratory drumming were digitally recorded and then analyzed spectrographically. The mean frequency of vibration was  $160.5 \pm 15.0$  Hz (min-max 132-174 Hz). This frequency matched the periodicity of the deep sinusoidal frequency modulation ( $159.4 \pm 6.1$  Hz, min-max 148-170 Hz), found in loud screech calls of the same subjects. The body vibration was not related to thermoregulation, hunger-related depletion of energy resources or fear, as it was produced by well-fed, calm animals, at warm ambient temperatures. We hypothesize, that in the solitary, nocturnal, digging desert piebald shrew, body vibrations may serve for seismic exploration of substrate density, to avoid energy-costly digging of packed sand for burrowing and foraging. At the same time, the

piercing quality of screech calls due to the deep the sinusoidal frequency modulation, matching periodicity of body vibration, may be important for agonistic communication in this species. Supported by RFBR grant 12-04-00260.

Keywords: Insectivora, piebald shrew, seismic vibration, vocalization, exploring behaviour, screech call

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## Estimating degrees of discomfort in silver fox vocalization using “joint calls”

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Negative emotional arousal impairs welfare and decreases productivity in farm, zoo and shelter animals. Call-based automated monitoring of emotional arousal STREMODO has proved to be useful for farm pigs. The search of universal across mammals vocal characteristics of emotional arousal should help to create software for automated measuring discomfort also in other animals. With a human-approach test, we designed the steady increase and decrease of fox-human distance and registered vocal responses of 25 farm silver vixens. The foxes displayed high vocal activity toward humans, producing calls of five types: whines, moos, growls, coughs and snorts, strongly different in their acoustic structure. We analyzed vocal features, produced by the foxes at different fox-human distances, assuming that changes in vocal responses reflect the degrees of human-related discomfort. For revealing the discomfort-related vocal traits, we proposed and tested the algorithm of „joint calls“, equally applicable for analysis of all calls independently on their structure, either tonal or noisy. We discuss that the increase in proportion of time spent vocalizing and the shift of call energy towards higher frequencies may be integral vocal characteristics of short-term welfare problems in farm silver foxes and probably in other captive mammals. Additional tests, conducted with silver foxes, selected for tameness and for aggressiveness to people, showed that the method, that has been developed initially for unselected for behaviour farm silver foxes, is equally applicable for any kind of emotional arousal, either positive or negative. Supported by RFBR grants 09-04-00416 & 12-04-00260, and NIH grant R01 MH077811.

Keywords: welfare indicators; emotional arousal; vocalization; acoustic analysis; farm animals; *Vulpes vulpes*