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COMPARISON THE ALARM CALL CHARACTERISTICS OF FREE-RANGING AND LIVE-TRAPPED YELLOW GROUND SQUIRRELS *SPERMOPHILUS FULVUS*

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Researchers in the field of alarm communication of ground-dwelling sciurids often apply a method of collecting acoustic recordings from animals, calling toward a human from wire-mesh live-traps. This method has been applied to speckled *Spermophilus suslicus*, yellow *S. fulvus*, California *S. beecheyi*, Richardson's *S. richardsonii*, Uinta *S. armatus*, Columbian *S. columbianus* and Wyoming *S. elegans* ground squirrels and to yellow-bellied marmots *Marmota flaviventris* (review: Matrosova et al. 2010, *Naturwissenschaften*, 97:741-749). However, alarm calls produced by captive sciurids may be different from alarm calls of free-ranging animals. We examined 10 individually identified dye-marked yellow ground squirrels for consistency of acoustic characteristics of their alarm calls recorded in Free-ranging and Live-trapped conditions. The alarm call notes of Live-trapped squirrels were longer and lower in end fundamental frequency compared to Free-ranging animals. It was due to environmental degradation because of larger distance to Free-ranging callers. End parts of alarm call notes are low-intensive and invisible on spectrograms of calls recorded distantly, what results in the lower fundamental frequency at the end of notes and in shorter duration of call notes. The values of all other 6 acoustic variables were not affected. The structural similarity of alarm calls produced by Free-ranging and Live-trapped animals suggests that the collection of calls from trapped ground squirrels may serve as a good alternative to the collection of acoustic recordings from free-ranging animals. Also, we examined 10 free-ranging individually identified dye-marked yellow ground squirrels to determine whether their alarm calls retain the cues to individuality between calling boots in two encounters of surrogate predators (humans), separated on average by 3 days. Discriminant function analysis showed that the individual alarm calls were very similar within calling boots, but in 6 of the 10 free-ranging animals, the alarm calls were unstable between the two encounters of predators. The instability of individual alarm calls precludes the attractive idea of censuses and individual vocal monitoring of rare species of ground squirrels in their highly fragmented colonies inhabited by a small number of individuals. Our data support the multiple calling hypothesis (Blumstein et al. 2004, *Proc. R. Soc. B*, 271:1851-1857; Sloan, Hare 2006, *Ethology*, 112:896-902) in that strong inter-individual differences in alarm call structure should allow ground squirrels to readily estimate the number of individuals calling simultaneously and to respond more urgently to multiple callers. However, our data only partially support the caller reliability hypothesis (Hare, Atkins 2001, *Behav. Ecol. Sociobiol.*, 51:108-112), because only 40% free-ranging animals retained their alarm calls characteristics stable between two different recordings, separated by 3-days time spaces. At the same time, the caller's reliability hypothesis assumes that individual alarms should retain their acoustic structure at least for some time, otherwise conspecifics will not be able to memorize individual characteristics of their voices and to distinguish between the reliable callers, producing alarms in response to real danger, and unreliable callers, calling to cows and other non-dangerous stimuli.

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