WHAT MAKES ALARM CALLS UNDISTINGUISHABLE BETWEEN AGES IN GROUND SQUIRRELS?

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INTRODUCTION

In most mammals, adults produce relatively low vocalizations compared to those of juveniles. This rule is not maintained at least in four species of ground squirrels, whose juveniles produce fundamental frequency as adults. These findings have been obtained with separate sets of juveniles and adults. No data was available on ontogenesis of vocal features.

Purpose: we analyze the acoustic structure of alarm calls of the same individual yellow and speckled ground squirrels, recorded twice, first as juveniles and then as adults, after hibernation .

ANIMALS AND METHODS

Alarm calls were recorded from individually marked animals when captured singly in live-traps and calling toward a human.

Speckled ground squirrel (SGS)
(Spermophilus suslicus)

Moscow province, Zarajsk district (54° 47'68"N, 38° 42'23"E)

136 alarm calls,
68 for **juveniles**,
68 for **adults**,
up to 10 calls per animal

7 individuals
(1 male, 6 females)
x 2 recordings

Yellow ground squirrel (YGS)
(Spermophilus fulvus)

Saratov province, Village Djakovka (50° 43'88"N, 46° 46'04"E)

145 alarm calls,
76 for **juveniles**,
69 for **adults**,
up tp 10 calls per animal

8 individuals
(3 males, 5 females)
x 2 recordings

RESULTS

Both species showed **indistinguishable** *f0 max* and *f peak* frequencies between juvenile and adult ages. Individual trends for the *f0 max* showed a **decrease** with age in 4 of 8 yellow and in 2 of 7 **SGS** and an **increase** with age in the rest 8 of 15 study animals. In **YGS**, differences in *duration* between ages were non-significant. In **SGS**, the *duration* of alarm calls was significantly shorter in juveniles than in adults. At the same time, during the year-long maturation period passed between the two recording sessions, **body mass** increased significantly in both the species.

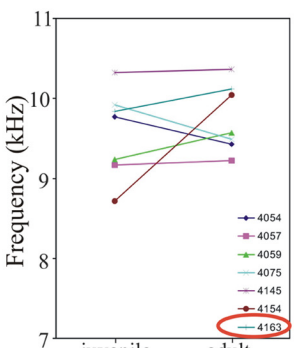
The between-species comparison for the age effects

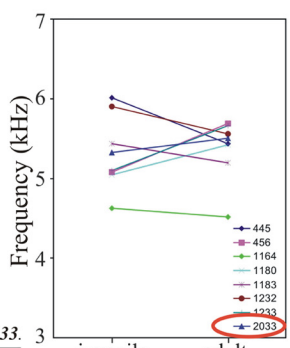
(*two-way repeated measures ANOVA*)

Frequency: non-significant differences in the fundamental (***f0 max***) and peak (***f peak***) frequencies ($F_{1,13} = 0.02$, $p = 0.90$ for both comparisons).

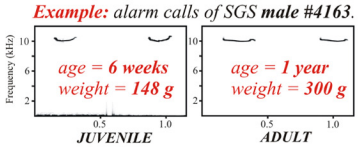
Duration: differed significantly between species ($F_{1,13} = 8.2$, $p = 0.013$). In **SGS,** the duration showed **increase with age**, whilst in **YGS retained unchanged**.

Body mass: the increase was stronger in YGS compared to SGS (2.9 **vs.** 2.1 times respectively), so the developmental trends of body mass differed significantly between species ($F_{1,13} = 8.0$, $p = 0.014$).

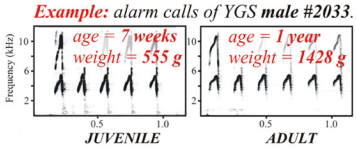




Example: *alarm calls of SGS* ***male #4163.***



Example: *alarm calls of YGS* ***male #2033.***



CONCLUSION

We documented irregular shifts in the fundamental frequency with maturation in two species of ground squirrels. As a result, juveniles of both species produced alarm calls within the same ranges of fundamental frequencies as adults, in spite of the large differences in body mass between ages.

For more details please reads the article: *Volodina E.V., Matrosova V.A., Volodin I.A. An unusual effect of maturation on the alarm call fundamental frequency in two species of ground squirrels. Bioacoustics, in press.*

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