Biphasic vocalizations in canids: considering anatomical sources of frustration calls

Volodin Ilya1,2, Frey Roland3, Volodina Elena2, Gogoleva Svetlana1
1 Lomonosov Moscow State University, Russia   volodinsvoc@gmail.com
2 Moscow Zoo, Russia
3 IZW-Berlin, Germany
http://www.bioacoustica.org

Two-frequency calls (biphasic)

Single-frequency calls

Asiatic wild dog (doge) (Volodin, Volodina 2002)
Domestic dog (Volodin et al. 2005)
African wild dog (Wilden et al. 1999)
Timber wolf (Nikolsky, Formalin 1980)
Red dog (Schneider, Anderson, 2011)

What morphological structures are responsible for high-frequency calls of canids?

Asiatic wild dog
1 male, 3 females

Red fox
1 male, 1 female

Reconstruction of vocal apparatus

Larynx
Nasal vocal tract

Call frequency values

9.32±0.78
9.41±0.86
1.01±0.12

0.89±0.09 1.0

Call frequency values

n=98
n=69
n=104

Conclusions:
1. Vocal anatomy (larynx and vocal tract) of Asiatic wild dog and red fox are very similar.
2. Differences in calls are related to physiology (functioning of the anatomical structures) rather than anatomy.
3. Frequency range of calls corresponds to a species hearing range. The peak of hearing sensitivity in domestic dog is 8 kHz (Heffner 1983), whereas in red fox 2 kHz (Peterson et al. 1969).
4. Biphasic calls may function for individual recognition (Volodina et al. 2006) and for estimating orientation of the caller towards a listener (Volodin et al. 2006) by obligatory pack-living Asiatic wild dogs but not by solitary foxes.

Financial support: The Russian Scientific Foundation, grant No 14-14-00237

Also, spectrograms of 12964 whines from 75 individuals were inspected.

Call frequency values

0.66±0.21