Biphonic vocalizations in canids: considering anatomical sources of frustration calls

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Two-frequency calls (biphonic)

Asiatic wild dog (dhole) (Volodin, Volodina 2002)
Domestic dog (Volodin et al. 2005)
African wild dog (Wilden et al. 1998)
Timber wolf (Nikolsky, Frommolt 1989)
Red wolf (Schneider, Anderson, 2011)

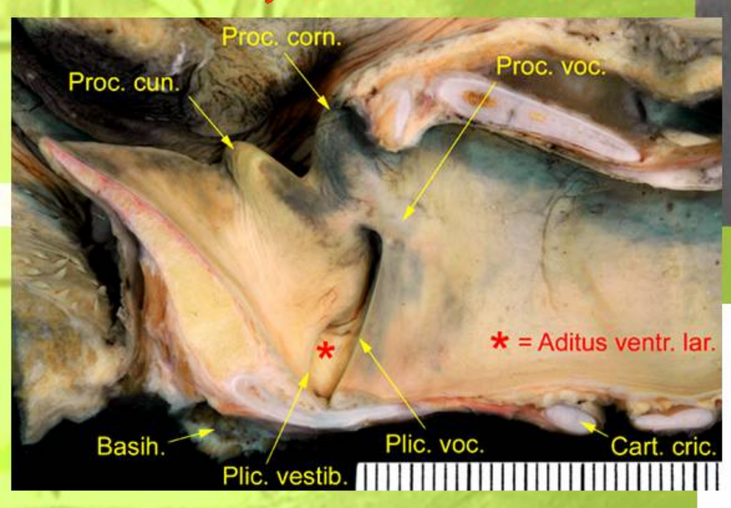
Single-frequency calls

Red fox (Gogoleva et al. 2008)
Polar fox (Ovsyanikov et al. 1988; own data)
Bush dog (Brady, 1981; own data)

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

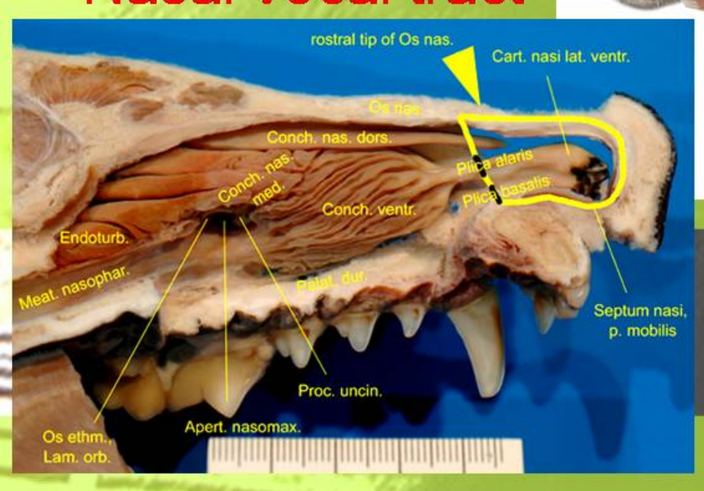
Asiatic wild dog

1 male, 3 females



Larynx

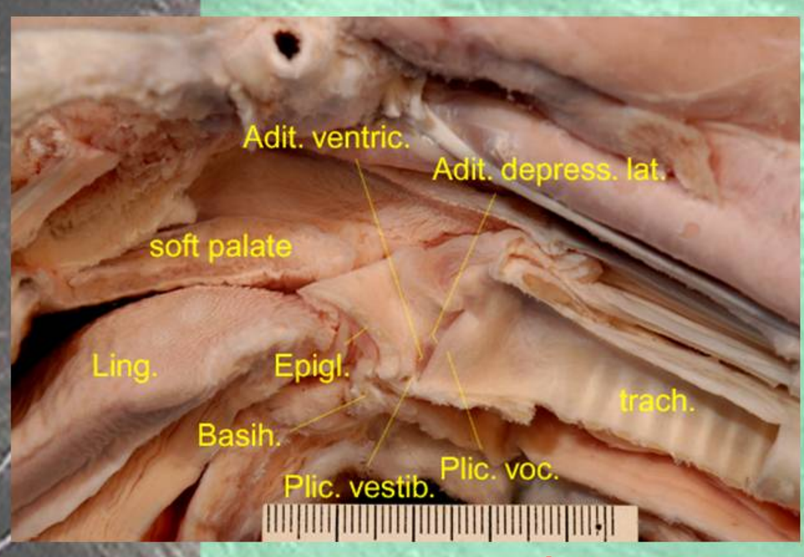
Nasal vocal tract



Reconstruction of vocal apparatus

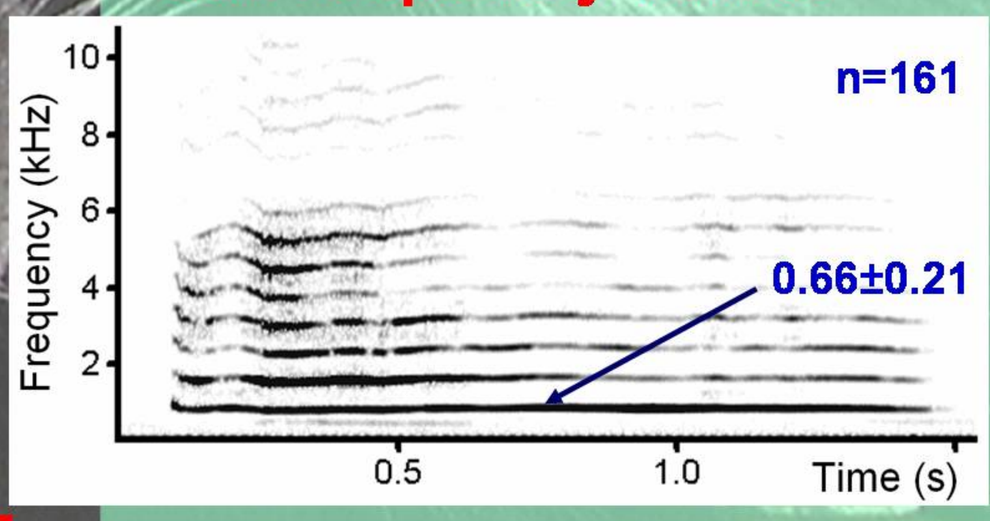
Red fox

1 male, 1 female



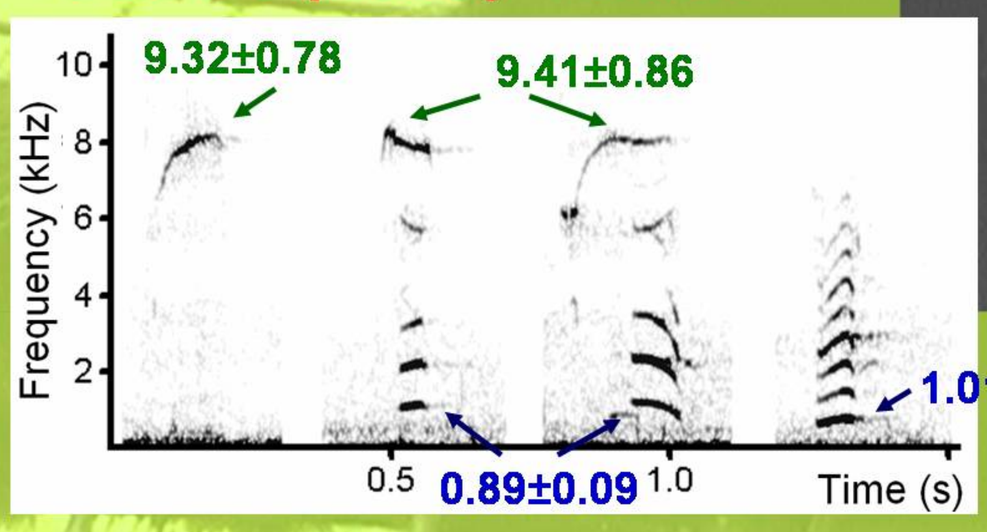
Larynx

Call frequency values



Also, spectrograms of 12964 whines from 75 individuals were inspected

Call frequency values



n=98 n=89 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 the dog is 8 kHz (Heffner 1983) . whereas in red fox 2 kHz (Peterson et al. 1969).

4. Biphonic 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.

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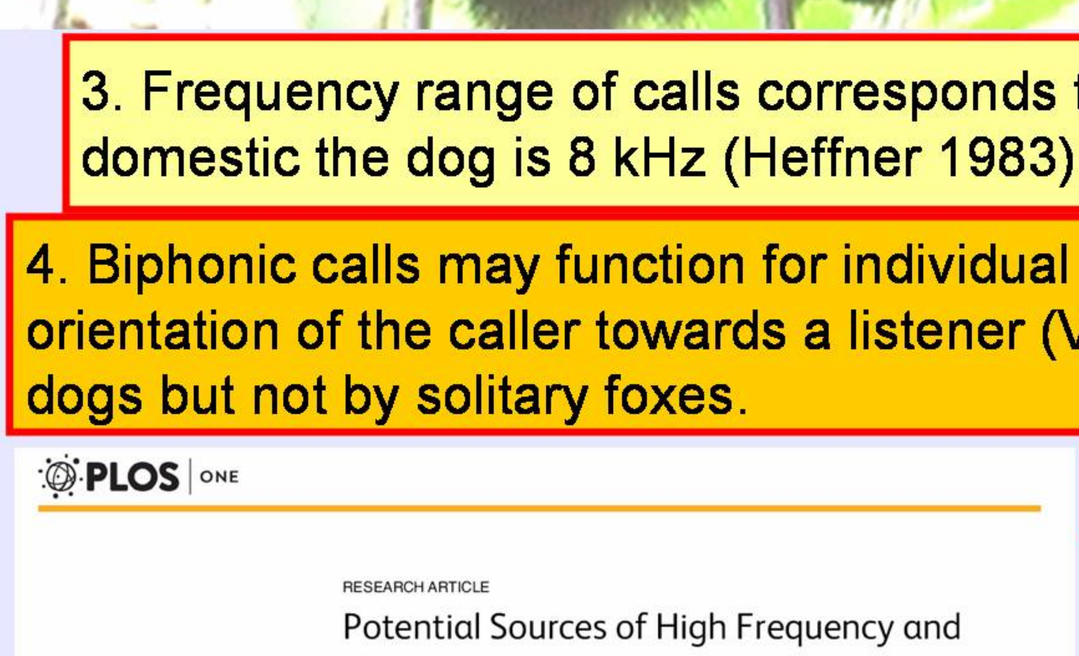

PLOS ONE

RESEARCH ARTICLE

Potential Sources of High Frequency and Biphonic Vocalization in the Dhole (*Cuon alpinus*)

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SHORT COMMUNICATION

Effects of selection for behavior, human approach mode and sex on vocalization in silver fox

Svetlana S. Gogoleva · Ilya A. Volodin · Elena V. Volodina · Anastasia V. Kharlamova · Lyudmila N. Trut