

# Vocal behaviour of rutting male goitred gazelles (*Gazella subgutturosa*) reveals mate quality

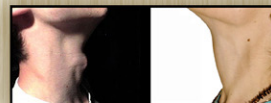
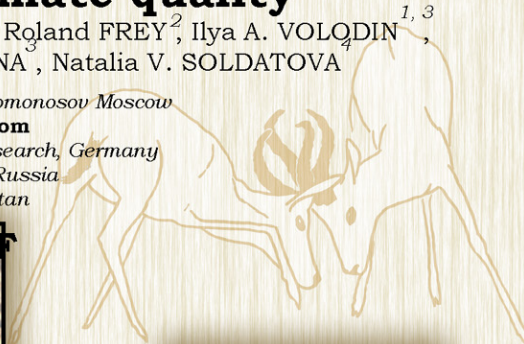
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A nonhuman mammal with sexual dimorphism  
of enlarged and descended larynx

## MAIN IDEA:

**Descended and retractable larynx**

**Enlarged larynx**

**Elongated vocal tract**

**Enlarged vocal folds**

**Low call formants**

**Low call fundamental frequency**

## METHODS

Free-ranging goitred gazelles, Ecocenter

"Djeiran", Bukhara, Uzbekistan

During the rut, 17.10 – 11.11.2009

### AUDIO

124 rutting calls: roars, growls and grunts

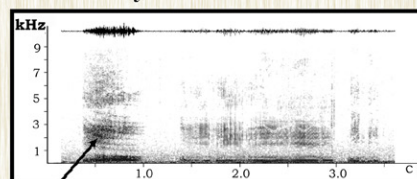
Measured parameters:  
Fundamental frequency  
Formants  
Duration

### ANATOMY

2 adult male specimens were dissected  
Morphological reconstruction was done

### VIDEO

Vocal tract length estimation using a new T-line-based frame-by-frame analysis



Formants decrease for the duration of the call, following retraction of the larynx  
Maximal vocal tract length calculated from formant frequencies in roars – 450 mm

Dynamic vocal tract elongation during

## RESULTS

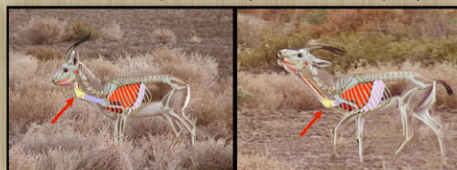
50% enlargement of the larynx during the rut  
The external larynx high in live captive animals:

4-years-old male "Galamus":

**75 mm** (non rut) - **120 mm** (rut)

2-years-old "Bambi":

**70 mm** (non rut) - **100 mm** (rut)



295±25,3 mm

434±33,6 mm

Three rutting call types: roars, growls, grunts, produces at chasing females or rival males

**! CALLS ARE VERY SOFT !**

Audible at close distance, of 10-15 m

## MALE QUALITY ATTRIBUTES

**Descended larynx** –  
apparent body size exaggeration

**Enlarged larynx** –  
Indicates testosterone status

Goitred gazelles – **NO**  
Calls are short-distant, so both females and rivals can see real body size of the caller

Goitred gazelles – **YES**  
Calls are soft, so this is visual rather than vocal key to male quality

Humans – **YES**

Humans – **YES** (Vocal key)

Frey, R., Volodin, I., Volodina, E., Soldatova, N.V. & Juldachev, E.T. 2011:  
Descended and mobile larynx, vocal tract elongation and rutting roars in male  
goitred gazelles (*Gazella subgutturosa* Guldénstaedt, 1780). J. Anat. 218, accept-

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