The ontogeny of the vocal apparatus in male and female goitred gazelle (Gazella subgutturosa)

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IDEA: A descended larynx occurs in several species of mammals, including humans. Sexual dimorphism of larynx size and position is more pronounced in adult goitred gazelles than in human adults, whereas the vocal organs are isomorphic in male and female neonates. This study quantitatively documents the vocal ontogeny of goitred gazelle from neonates, via adolescents to adults.

METHODS: We examined the vocal anatomy of 19 (11 male, 8 female) naturally died goitred gazelle specimens across age-classes from neonates via sub-adults to adults.

Larynx and pharynx

Resilience of pharynx and thyrohyoid ligament involved in larynx retraction.

Vocal folds and vocal pads

Long and thick vocal folds with large vocal pads produce fundamental frequencies comparable to those in elephant rumbles.

Hyoid apparatus and thyrohyoid ligament

The hyoid apparatus gets sexually dimorphic towards adulthood. The larger, strongly descended, highly mobile larynx of males requires longer thyrohyoids.

Muscles retracting the larynx and the trachea, nerves

The larynx is mobile in both sexes but particularly so in adult males during rutting call production, when sternohyoid and sternothyroid muscles strongly contract to effect larynx retraction. Nerves cannot be extended, so they are strongly elongated and course in dense loops that straighten during laryngeal descent.

CONCLUSION: Both sexes share the same traits of vocal morphology yet differences in size and proportions emerge along vocal ontogeny. The hyoid apparatus, resilient pharyngeal structures and highly contractile muscles evidently play a decisive role in the mobility of the larynx in both sexes but more so in males.

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