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Sound production of Asian elephant high-frequency vocalisations

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Abstract

Anatomical and cognitive adaptations to overcome morph-mechanical constraints of the vocal folds increase vocal diversity across taxa. The Asian elephants' vocal repertoire ranges from infrasonic rumbles (F_0 20 Hz) to higher pitched trumpets (F_0 340-540 Hz) and species-specific squeaks (F_0 300-2300 Hz). While rumbles are congruent with vocal fold vibration in large sized mammals, trumpets and squeaks were hypothesised to be emitted by the trunk without current knowledge of the sound source. We use an acoustic camera to visualise nasal trumpet but oral squeak emission and an event of simultaneous oral and nasal emission (biphonation) in a captive group of female Asian elephants. By combining these findings with acoustic, behavioural and morphological data we suggest that trumpets are produced by vibration of nasal cartilages, but squeaks by vibration of the tensely closed lips. Our data further suggests that context or vocal production learning might be involved in squeak sound production