

The tongue in three species of lemurs: Flower and nectar feeding adaptations

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Abstract

The mobility of the primate tongue allows for the manipulation of food, but, in addition, houses both general sensory afferents and special sensory end organs. Taste buds can be found across the tongue, but the ones found within the fungiform papillae on the anterior two thirds of the tongue are the first gustatory structures to come into contact with food, and are critical in making food ingestion decisions. Comparative studies of both the macro and micro anatomy in primates are sparse and incomplete, yet there is evidence that gustatory adaptation exists in several primate taxa. One is the distally feathered tongues observed in non-destructive nectar feeders, such as *Eulemur rubriventer*. We compare both the macro and micro anatomy of three lemurid species who died of natural causes in captivity. We included the following two non-destructive nectar feeders: *Varecia variegata* and *Eulemur macaco*, and the following destructive flower feeder: *Lemur catta*. Strepsirrhines and tarsiers are unique among primates, because they possess a sublingua, which is an anatomical structure that is located below the tongue. We include a microanatomical description of both the tongue and sublingua, which were accomplished using hematoxylin–eosin and Masson trichrome stains, and scanning electron microscopy. We found differences in the size, shape, and distribution of fungiform papillae, and differences in the morphology of conical papillae surrounding the circumvallate ones in all three species. Most notably, large distinct papillae were present at the tip of the tongue in nectar-feeding species. In addition, histological images of the ventro-apical portion of the tongue displayed that it houses an encapsulated structure, but only in *Lemur catta* case such structure presents cartilage inside. The presence of an encapsulated structure, coupled with the shared morphological traits associated with the sublingua and the tongue tip in *Varecia variegata* and *Eulemur macaco*, point to possible feeding adaptations that facilitate non-destructive flower feeding in these two lemurids. © 2021 by the authors. Licensee MDPI, Basel, Switzerland.

Author keywords

Chievitz; Coevolution; Ecology; *Eulemur macaco*; *Lemur catta*; Madagascar; Papillae; Sublingua; *Varecia variegata*