Morphology of the Dorsal Lingual Papillae in the Bush Dog (*Speothos venaticus*)

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Summary: The dorsal lingual surface of a bush dog (*Speothos venaticus*) was examined by scanning electron microscopy (SEM). The tongue was about 7 cm in length. Filiform, fungiform and vallate papillae were found. The filiform papillae were distributed over the entire dorsal surface of the tongue. Each filiform papillae on the apical surface of the tongue had several conical processes, in the midportion were larger than those on the apex in size. In the region of the vallate papillae, the filiform papillae had not the conical processes and more larger than those on the midportion of the tongue. The fungiform papillae were present rounded bodies and more densely distributed on the tip of the lingual apex. There were 5 vallate papillae on both sides. The vallate papillae were located on both sides of the posterior end of the lingual body. Each papilla was surrounded by a groove and a crescent pad. In the dorsal surfaces of the papillae, small conical papillae were observed.

Much work has been published on the three-dimensional structures of the lingual surfaces in various animals. In the order Carnivora, there have been some SEM studies of the tongues of cat (Bosshell *et al.*, 1982; Ojima *et al.*, 1997), dog (Iwasaki and Sakata, 1985), mongoose (Iwasaki *et al.*, 1987) and Japanese weasel (Furubayashi *et al.*, 1989). Furthermore, the tongues of dog (Iwasaki and Miyata, 1989) and mongoose (Iwasaki and Miyata, 1990) have been studied by transmission electron microscopy (TEM). Such studies reveal variations in morphology and distribution of papillae on the dorsal lingual surface among animal species.

However, there is no study on SEM studies of the tongue of the bush dog. The purpose of this study is, therefore, to examine three-dimensionally the dorsal lingual surface of the bush dog, in order to compare the results with those previous reports in other order Carnivora.

Materials and Methods

Tongue of a female bush dog (7-year-old) of the order Carnivora was used in this study. The tongue

was fixed in 10% formalin. Small blocks containing papillae were cut with a razor blade, postfixed with 1% osmium tetroxide for 2 h. Thereafter, the specimens were dehydrated through graded series of acetone, critical-point-dried and plasma-coated with OsO₄ before being examined under SEM (Hitachi S-3500N) at an accelerating voltage of 10 kV.

Results

The tongue is about 7 cm in length. The filiform papillae are distributed over the entire dorsal surface of the tongue. Each filiform papillae on the apical surface of the tongue have several conical processes. (Fig. 1). The filiform papillae in the midportion of the dorsum of the tongue are larger than those on the apex of the tongue in size (Fig. 2). In the region of the vallate papillae, the filiform papillae have not the conical processes and more larger than those on the midportion of the tongue (Fig. 3). The fungiform papillae are present rounded bodies and more densely distributed on the tip of the lingual apex (Figs. 1, 2). There are 5 vallate papillae on both sides. The vallate papillae

are located on both sides of the posterior end of the lingual body. Each papilla is surrounded by a groove and a crescent pad. In the dorsal surfaces of the papillae, small conical papillae are observed (Fig. 3).

Discussion

Boshell *et al.* (1982) reported that the filiform papillae on the tip of the tongue of the cat were short and exhibited several conical processes from the base of each papilla, in the midportion consisted of a large mound with a single sharp spinous process projecting posteriorly and in the region of the vallate papillae were shorter and more conical than those on the midportion. Iwasaki and Sakata (1985) reported that each filiform papilla on the apical surface of the tongue of the dog had a dome-shaped bulge in the baso-frontal areas, some conical twigs were arranged semicircularly from the back of the bulge, on the middle area the bulge of the filiform papillae became gradually smaller and flatter, and only the central twig became gradually larger and the other twigs became smaller. Iwasaki *et al.* (1987) indicated that in the mongoose the form of filiform papillae changed gradually from the lingual apex to the posterior part of the lingual body.

In the present study, each filiform papilla on the apical surface of the tongue had several conical processes, in the midportion were larger than those on the tip in size. In the region of the vallate papillae, the filiform papillae had not the conical processes and more larger. These findings are similar to the observations of the dog (Iwasaki and Sakata, 1985).

Much work has been published on the three-dimensional structure of the vallate papillae in the mammalian tongue. Several studies indicated that the vallate papillae showed a flattened oval shape and the papillae were surrounded by a groove and pad (Krause and Cutts, 1982; Chamorro *et al.*, 1986; Qayyum *et al.*, 1988; Chunhabundit *et al.*, 1992; Agungpriyono *et al.*, 1995; Atoji *et al.*, 1998). The vallate papillae of the cat, dog or flying squirrel were encircled by the filiform papillae in the posterior body (Boshell *et al.*, 1982; Iwasaki and Sakata, 1985; Emura *et al.*, 1999). Equine vallate papillae were composed by a primary papilla which was divided into several secondary papillae by intermediate grooves (Chamorro *et al.*, 1986). Sometimes, in bovine vallate papillae twin papillae were surrounded only by a primary papillary groove (Chamorro *et al.*, 1986).

In this study, the vallate papillae were located on

both sides of the posterior end of the lingual body. Each papilla was surrounded by a groove and crescent pad, and in the dorsal surfaces of the papillae small conical papillae were observed. However, there is no report of the small papillae in the dorsal surface of the vallate papillae.

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Explanation of Figures

Plate I

Fig. 1. Dorsal surface of the lingual apex. The filiform papilla (*) has several conical processes (arrows). Fu=fungiform papillae.

Plate II

Fig. 2. Dorsal surface of the lingual body. The filiform papilla (*) is larger than that on the lingual apex in size. Arrows = conical processes. Fu = fungiform papillae.

Plate III

Fig. 3. Posterior end of the lingual body. Two vallate papillae (V) are surrounded by a groove and crescent pad (P). * = small conical papillae. Fi = filiform papillae.