

Comparative Anatomical and Histological Studies of the Tongue between the Egyptian Bat *Pipistrillus Kuhli* and the Syrian Bat *Pipistrillus Kuhli*

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(Received 4 / 10 / 2007. Accepted 18/2/2008)

□ ABSTRACT □

The microscopical anatomy of the tongue of the Egyptian *Pipistrillus kuhli* and the Syrian *Pipistrillus kuhli* are similar to that of the other mammals but with some specialized structures .In the first specimens the tongue is characterized by the presence of numerous filiform papillae at its dorsal surface, a moderate number of fungiform papillae and a small number of circumvallate . In the second one the circumvallate papillae absent by using bromophenol blue stain to detect the protein content indicate that the protein content of the papillae of the Egyptian bat give more dense reaction than those of Syrian one .Also the same result observed by using Periodiac acid Schiff reaction to detect with carbohydrate content

Keywords: *Microcheroptera, Vespertolionidae, Pipistrillus kuhli*

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دراسة تشريحية ونسجية مقارنة للسان بين الخفاش المصري *PIPISTRILLUS* *KUHLI* والخفاش السوري *PIPSTRILLUS KUHLI*

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(تاريخ الإيداع 4 / 10 / 2007. قبل للنشر في 2008/2/18)

□ الملخص □

التشريح المجهرى، للسان الخفاش المصري *Pipistrillus kuhli*، والخفاش السوري *Pipistrillus kuhli*، مشابه لألسنة الثدييات الأخرى، ولكن مع بعض البنى المتخصصة. في العينات الأولى تميز اللسان بوجود حليمة خيطية على السطح الظهري، بعدد معتدل منها، وكمية أصغر من الحليمة الكأسية. وفي العينات الأخرى كانت الحليمة الكأسية غائبة. وباستخدام صبغ أزرق البروموفينول تبين أن محتوى البروتين لحليمة الخفاش المصري يعطي تفاعلاً أكثر كثافةً من تلك التي للخفاش السوري. وأيضاً، لوحظت النتيجة نفسها باستخدام تفاعل شيف للحمض البيريودي، لكشف محتوى الهيدروكربونات

كلمات مفتاحية: *Pipistrillus kuhli* ، *Vespertolionidae* ، *Microcheroptera*

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Introduction:

The structure of the tongue of Chiroptera drew the attention of many authors. In *Rhinopoma hardweickei* and *Asellia tridens*, which feed on insects, the structure of the tongue is extremely complex and the epithelium of the anterior half of the tongue is extremely keratinized if compared with the posterior half (Madkour *et al.*, 1988). Greten and Philips (1974) stated that the mucous and serous glands are similar in number and size in the two species of bats *Leptonycteris Sanborni* and *L. nivalis*. Madkour (1977) described the tongue papillae of adult *Rousettus aegyptiacus* studied the anatomy and the histology of the tongue of one-humped camel *s*. Jwaski (1997) studied the morphology of the three types of lingual papillae in the rat and showed that in fetuses at age of 12 days. The rudiments of fungiform papillae could be observed as two rows of bulges that extend bilaterally and parallel to the median of the anterior half of the dorsal surface of the tongue Oakley *et al.* (1998) studied the morphology of the circumvallate epithelium and taste buds and observed that on the seven days post-natal, the papillae of mutant mice are 30% narrower and 35% of the trench walls reduced in area. Fujimoto *et al.* (1993) studied the pre-natal and post-natal development of the rabbit foliate papillae taste buds and serous glands and reported that the epithelium grows at the 22 day of prenatal development. Belecky and Smith (1990) studied the postnatal development of palatal and laryngeal taste buds in the hamster and reported that the taste bud population originates at different times in various mammalian species. Jwasaki (2002) studied the evolution of the structure and function of the vertebrate tongue and showed that the tongue which plays a very important role in food intake exhibits significant morphological variations. Qayyum. *et al.* (1991) *Camelus dromedarius* and showed that the camel has a typical elongated mammalian tongue which tapers to a dorsally flattened surface. Tsunekawa *et al.* (2005) studied the development of spontaneous mouth/ tongue movement in fetal mice. They observed that the movement of the head region was studied by ultrasound-imaging. Kobayashi *et al.* (2005) studied the comparative morphology of the tongue and lingual papillae of the horse. They observed that the lingual papillae are developed on the dorsal surface of the tongue and the foliate papillae are found in the horse but not found in the goat.

Material And Methods:

Pipistrillus kuhli which is from the family *Vespertilionidae* from *Microchiroptera*. The research was conducted in the laboratories of Faculty of Science, Tishreen University and Faculty of Science, Tanta University.

The specimens of the adult Egyptian *Pipistrillus kuhli* and the Syrian *Pipistrillus kuhli* were collected alive from Abu-Rawash, Giza government and from Syrian government. After dissecting the animals, the tongues were separated and fixed in 10% formalin, then embedded in paraffin wax and serial sections were cut. The following stains were used to elucidate the different histological and histochemical features. 1- Hematoxylin and Eosin for general structure 2- Bromophenol blue stain for protein content. 3- Periodic Acid Schiff (PAS) for the polysaccharides of the gland and the muscular tissue of the tongue

Results:

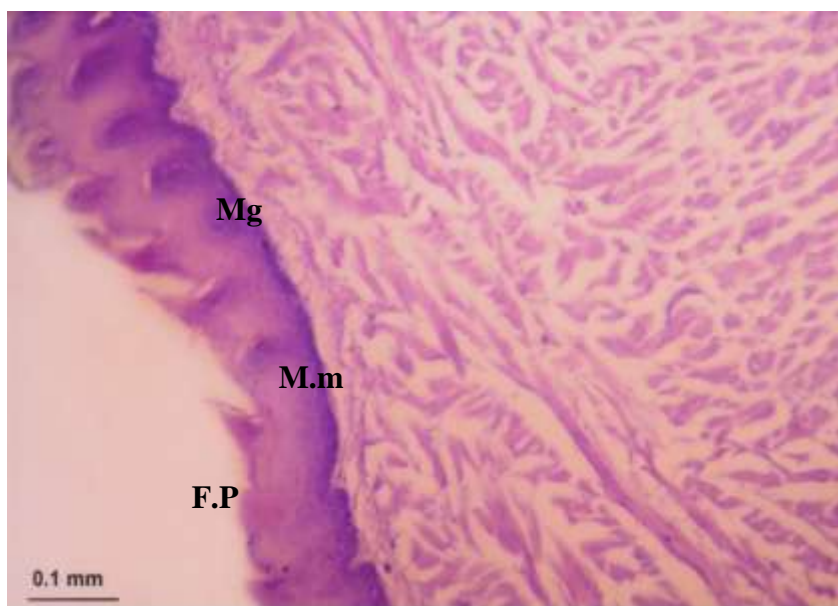
The tongue of the adult Egyptian *Pipistrillus kuhli* :

The tongue lies in the floor of the buccal cavity and is connected posteriorly by means of the frenulum linguae. It is a muscular organ and consists of interlacing bundles of

striated muscles .The muscular mass is at the ventral lower surface of the tongue and is covered by stratified squamous epithelium:

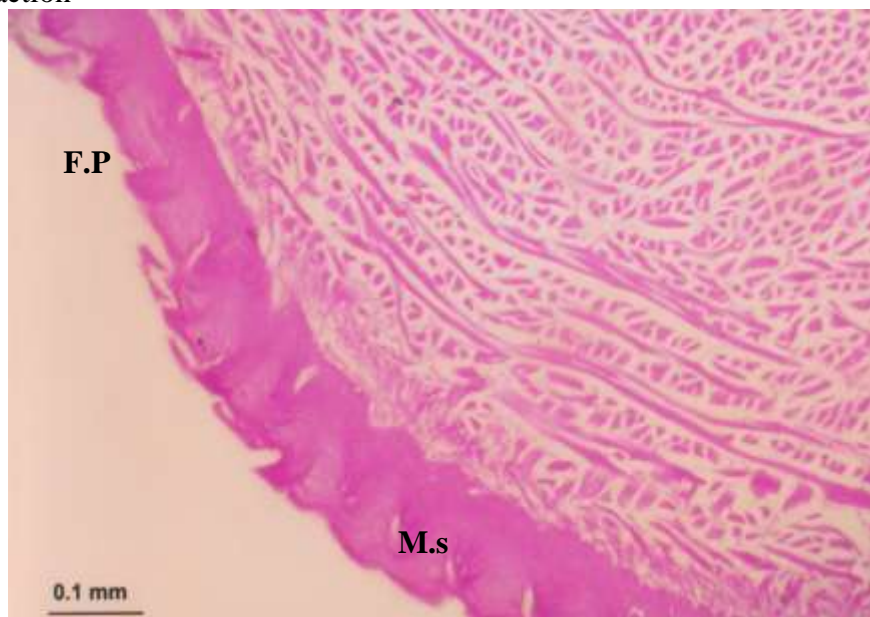
Abbreviations

F. P .	:	Filiform papillae
C. P	:	Circumvallate papillae
Fg. P	:	Fungi form papillae
Ms	:	Mucous substances
M.m	:	Mucous membrane
M.g	:	Mucous gland



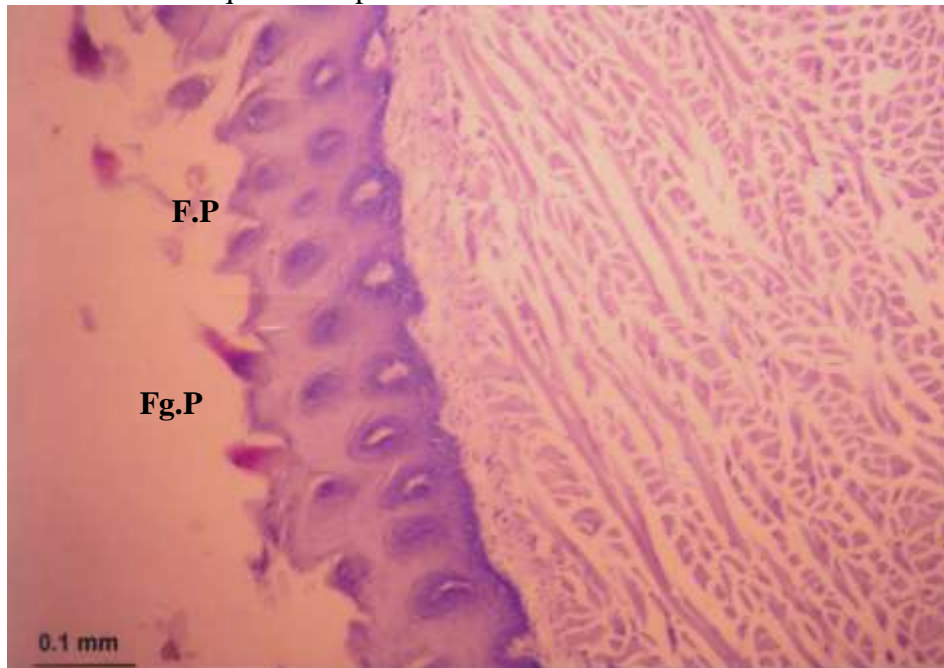
(Fig.1) Cross section in the tongue of the Egyptian bat

which is loosely cornified and their cells contain mucous substances that take PAS positive reaction



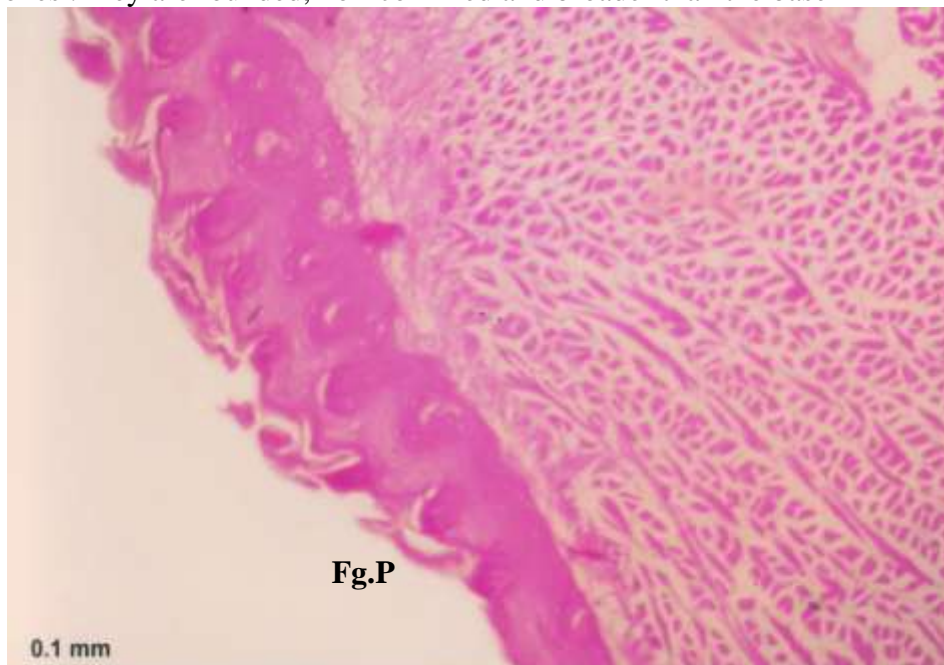
(Fig. 2): which is loosely cornified and their cells contain mucous substances that take PAS positive reaction

.The dorsal surface is covered with filiform , fungiform, cornified filiform papillae.
The filiform papillae are most numerous and distributed over the dorsal anterior portion of the tongue and consists of a slender vascular core of connective tissue covered with cornified stratified squamous epithelium

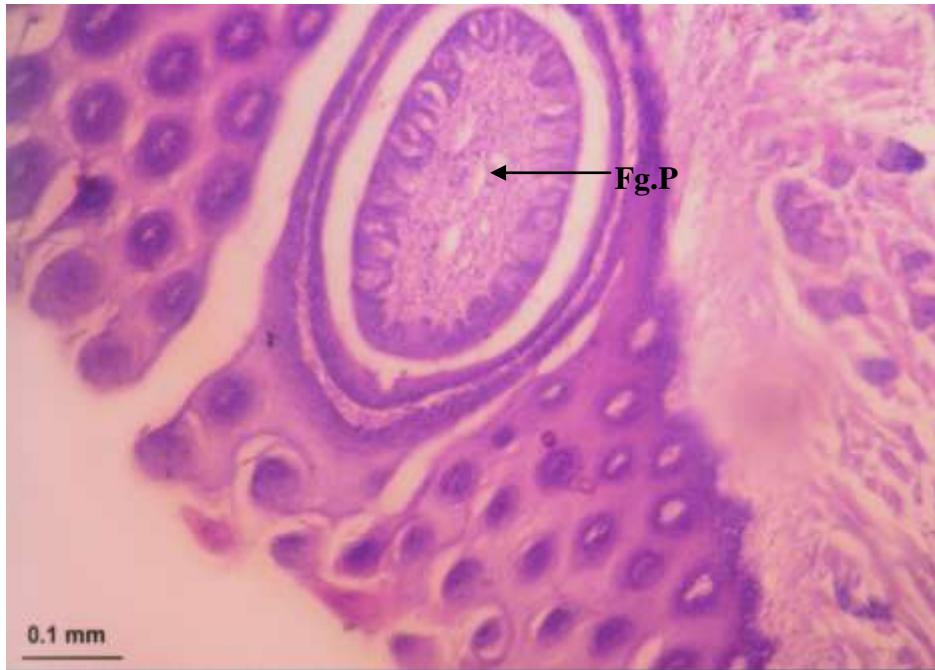


(Fig. 3): The dorsal anterior portion of the tongue of the Egyptian bat

.The fungiform papillae are relatively few in number and are interspersed among the filiform ones .They are rounded, non-cornified and broader than the base

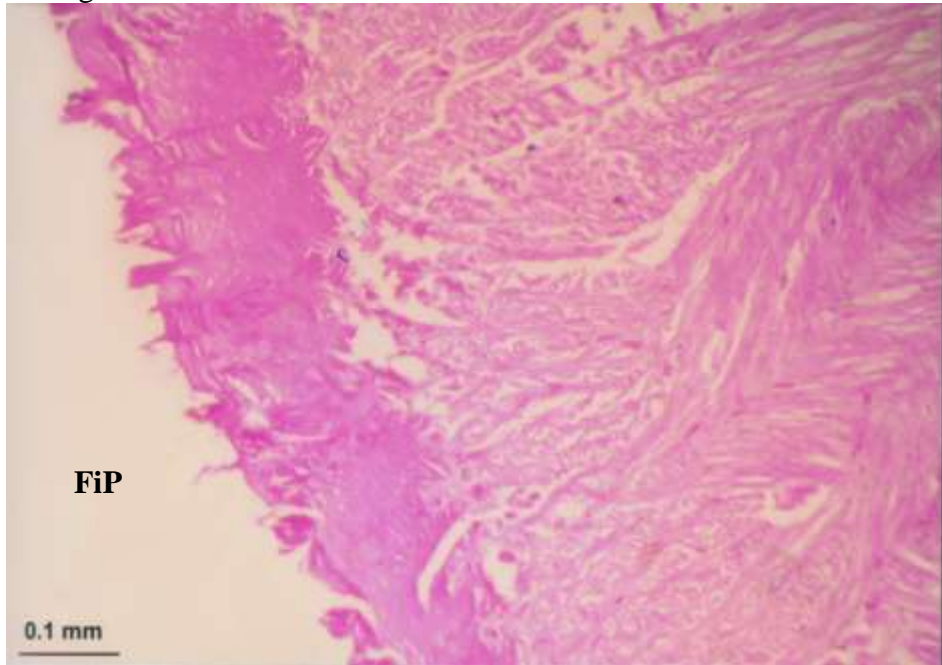


a- Cross section shows fungiform papillae



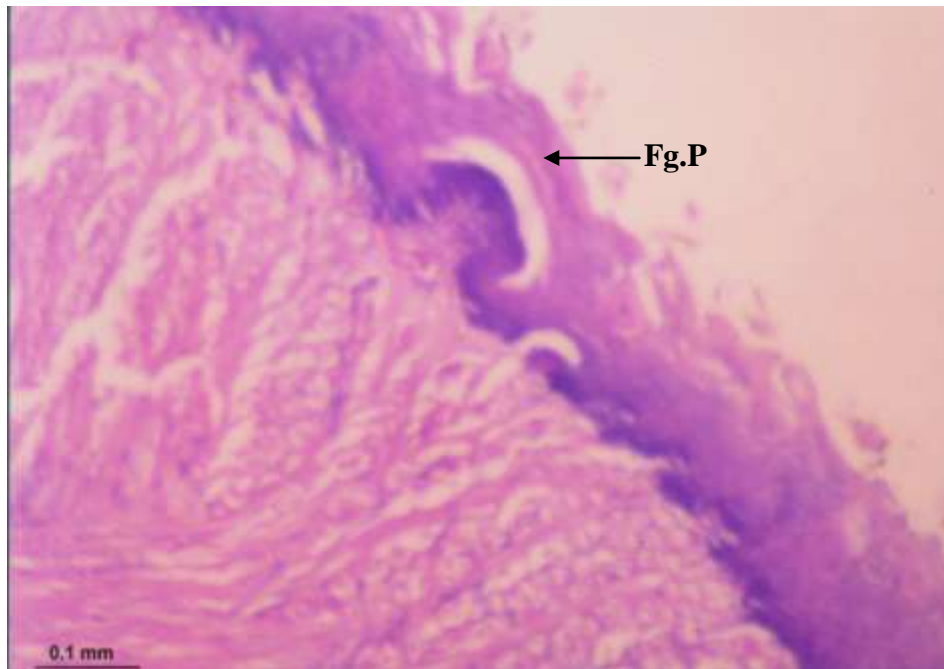
b- Papillae are rounded, non-cornified and broader than the base (Fig.4)

The tongue of the Syrian *Pipistrillus kuhli* : The structure of this tongue is different from that of the Egyptian in which the filiform papillae are present scattered among the fungiform ones

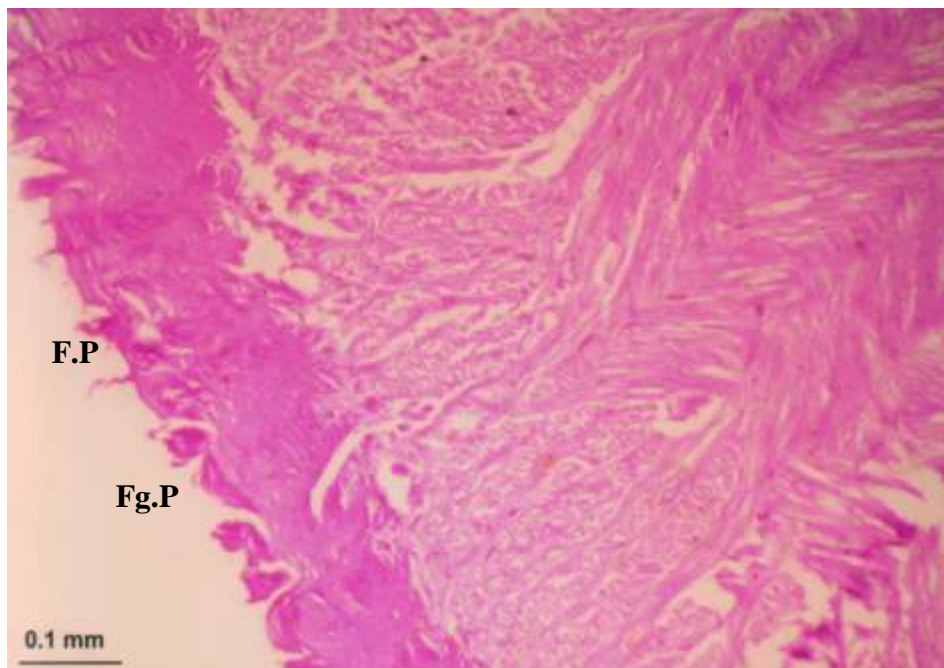


(Fig 5) The filiform papillae scattered among the fungiform one

The fungiform papillae have broad rounded surface and a short slightly constricted stalk ; also the cornification process is not clear. and give weak reaction with PAS stain



(Figs.6). The cross section shows fungiform papillae have broad rounded surface and a short slightly constricted stalk



(Figs.7). the cornification process is not clear. and give weak reaction with PAS stain

Discussion:

The musculature of the tongue is extremely complex; this is not surprising because these animals feed almost exclusively by using of their tongues (Greten and Phillips, 1974). adult Egyptian *Pipistrillus kuhli* and the Syrian *Pipistrillus* In *Rhinopoma hardwickei* and *Ascidia tridens*, which are insectivores, the epithelium of the anterior half is more extensively keratinized than that of the posterior ones which provide the tongue

with greater rigidity to be efficient for feeding (Selim,1988). In the present adult Egyptian *Pipistrillus kuhli* and the Syrian **Pipistrillus**, the keratin is less in the anterior half ; this may be due to the difference of feeding form insectivore to frugivore .In the pre- or post-natal development, the keratin is less prominent ; this may be due to feeding on milk. Abel-El naeim *et al.* (2002) studied the morphology of the tongue and its papillae in the donkey *Equus asinus* and observed that the spatula-shaped tongues measure about 28cm in length, 4.5 cm in breadth and 3.5 cm in thickness.. The filiform papillae are distributed mainly on the dorsum of the tongue being thin and relatively thick at the apex while the fungiform papillae appear scattered mainly on the lateral surface and are mostly rounded. This is similar to the adult Egyptian *Pipistrillus kuhli* and the Syrian *Pipistrillus* but differs in the case of *Oryctolagus cuniculus* in which the filiform papillae are long and gathered in large groups . It also differs in the case of *Rattus rattus* where the filiform papillae have a pointed needle shape. In the human tongue, Cheng and Robinson (1991) reported that the number of fungiform papillae ranged from 171 to 253 and these are located predominantly at the top, but in the present animals the number of the fungiform papillae is very few .

In the common European bat *Pipistrellus pipistrellus* Pastor *et al.* (1993) observed that there are many accounts of the tongues of mammals but apparently only one article about the tongues of the Chiroptera. The tongue is covered with three types of papillae. (filiform, conical and crown-like) similar to the present frugivorous bats, which may be due to their habit of retaining captured food during flight., but absent from *Oryctolagus cuniculus* and *Rattus rattus*. In primates Kobayashi, *et al.* (2005) found that there are some slender protrusions arising from the top of the filiform papillae in all five types of primates . The filiform connective tissue cores (CTC) also had columnar base. This is absent in the present animals. Iwasaki, *et al.* (1996) studied the morphogenesis of three types of lingual papilla in the mouse by scanning electron microscope after collecting different stages of specimens , from fetuses of mice on the 15th day of gestation (E15), from newborns (P0), from juveniles on the 7th day (P7) and on the 14th day (P14) after birth and observed that , in the fetuses at E15, rudiments of fungiform papillae with a relatively regular, lattice-like pattern were visible on the anterior half of the dorsal surface of the tongue. The outline of the rudiment of a circumvallate papilla could be recognized on the median line between the lingual body and the lingual radix. In the pre-natal and post-natal development the filiform and the fungiform papillae can also be observed but the mucous glands cannot complete their development .

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