

Comparative Histological Study on Lingual Glands of Some Mammals

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Abstract: Tongue is a mobile muscular organ whose lubrication is maintained by the secretion of salivary glands. Salivary glands located on the posterior pharyngeal part of tongue were described as serous (Von Ebner glands) and mucous (Weber gland) by Triantafillou (2001)¹ (Triantafillou A, Fletcher D and Scott J (2001). Mucins, the main components of mucus, are present in the secretion of mucus gland and it forms the protective layer on oral mucosal surfaces. This mucin is responsible for maintenance of lubrication and hydration of the surfaces (Proctor, 2016)². Proctor GB (2016). In general, salivary glands are adapted to the necessities of each species of the animal kingdom. In view of this context we conducted a comparative study of lingual glands of five different vertebrates- albino rat, guinea pig, rabbit, goat and dog. We collected pieces of tissue from different parts of tongue, prepared histological sections with H & E stain and study under light microscope for its histological details. No anterior lingual gland was found in any animal under study. The serous glands were found in the vallete and foliate papillary region mostly in the intermuscular area in all the animals under study. While posterior a lingual gland of Weber was confined to the pharyngeal part of tongue, mostly in the intermuscular interval in all the animals. The posterior lingual glands were purely mucus in albino rat and guinea pig. The serous gland of von ebner were purely serous in rabbit but seromucus in the rest of animals

Key words – Lingual gland, Tongue, Vallete papilla, Serous Gland, Mucus gland

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I. Introduction

Tongue, playing a key role in speaking, chewing and swallowing food, occupies almost the whole of oral cavity in relaxed stage. Its posterior part is attached to the floor of oral cavity and is called root, while anterior two-thirds, comprising the body is very mobile. On the dorsal surface of the tongue the terminal sulcus and foramen caecum mark the junction of root and the body. Tongue contains skeletal muscles and connective tissues in its core and is covered by mucus membrane all around. Tongue's function in speaking, chewing and swallowing food needs an intricate movement inside the oral cavity, which in turn needs lubrication of lingual mucosa as well as oral cavity. This lubrication is maintained by the secretion of salivary glands present within and around tongue inside mouth cavity.

Many researchers have worked and reported about its location, morphology and histology. Salivary glands located on the posterior pharyngeal part of tongue were described as serous (Von Ebner glands) and mucous (Weber gland) by Triantafillou (2001)¹, Mucus secreted by some salivary glands, is a sticky substance that enables food and other substances bind tightly and makes it to slide easily through the gastrointestinal tract and prevents epithelium damage (Guyton and Hall 2007)³. Mucin are the main components of mucus, a protective layer found on most mucosal surfaces in the body, and salivas containing high amounts of mucin tend to be viscoelastic, an important characteristic for retention of saliva on oral mucosal surfaces and maintenance of lubrication and hydration of the surfaces (Proctor, 2016)² Middle part of tongue possesses 8-13 taste buds bearing vallete papillae in the depth of depression around vallete papilla open the ducts of serous glands of von Ebner. A series of discoveries about the salivary ducts in the 17th century by Niels Stensen (1638–1686), Thomas Wharton (1614–1673), and Caspar Bartholin (1655–1738) established the concept of exocrine secretion as well as salivary glands. The submandibular (Wharton's) duct runs forward along the lingual nerve in the sublingual space to open in the sublingual caruncle with the major sublingual (Bartholin's) duct [Amano O 2011)⁴, (Saracco 1993)⁵, Williams P. L., 1989)⁶. Anterior lingual glands of Blandin or Nuhn have been described only in human tongue. Lingual salivary glands of the mole rat, is very different from that of mammals and other species (Girgin 2010) In general, salivary glands are adapted to the necessities of each species of the animal kingdom. Keeping this fact in mind, we conducted a comparative study of lingual glands of five different

vertebrates to know the differences in their morphological and histological aspect. Our study group included albino rat, guinea pig, rabbit, goat and dog.

II. Material and Methods

Study was conducted in department of anatomy in Rajendra Institute of Medical Sciences, Ranchi. Samples of lingual glands were obtained from tongues of five vertebrate animals. The animals selected were - albino rat (*Rattus norvegicus*) and guinea pig (*Cavia cobaya*) from Order rodentia, rabbit (*Lepus ruficaudatus*) from Order lagomorpha, goat (*Capra indica*) from Order artiodactyls, and dog (*Canis familiaris*) from Order carnivore. Sample from goat was procured from butcher's shop. The other four animals were anesthetized in the laboratory under closed chloroform anesthesia and whole of tongue was dissected out. Pieces of tissue taken out from posterior pharyngeal part of tongue and from vallate papillary region and put in fixative kept separately for each sample. Following fixation with 10% neutral formalin, the specimen was cut into several pieces, and routine paraffin sections in sagittal and cross directions were made. The sections were stained with hematoxylin and eosin (HE) stain and examined under light microscope for its histological details. Microphotographs were taken for specimen from each animal under study and observations were noted down on paper.

Inclusion criteria: Animals selected were all Adult male

Exclusion criteria: Animals with any obvious disease were excluded.

III. Observation and Result

In our study tongue of all five animals including Guinea pig (fig 1) and Rabbit (fig2.) Showed presence of serous and mucus glands at junction of oral and pharyngeal part. But pharyngeal part of Tongue in Rabbit (fig 3.) Showed only mucus glands in intermuscular connective tissue. In the tongue of Goat (fig 4.) also only mucus gland was found in intermuscular connective tissue of pharyngeal part though Demilunes were seen at places. Tongue of Dog (fig.5.) Was found showing serous glands in intermuscular connective tissue of vallate papillary region. The posterior lingual glands of Tongue in Albino rat (fig.6) showed only mucus alveoli with faint staining of cytoplasm.

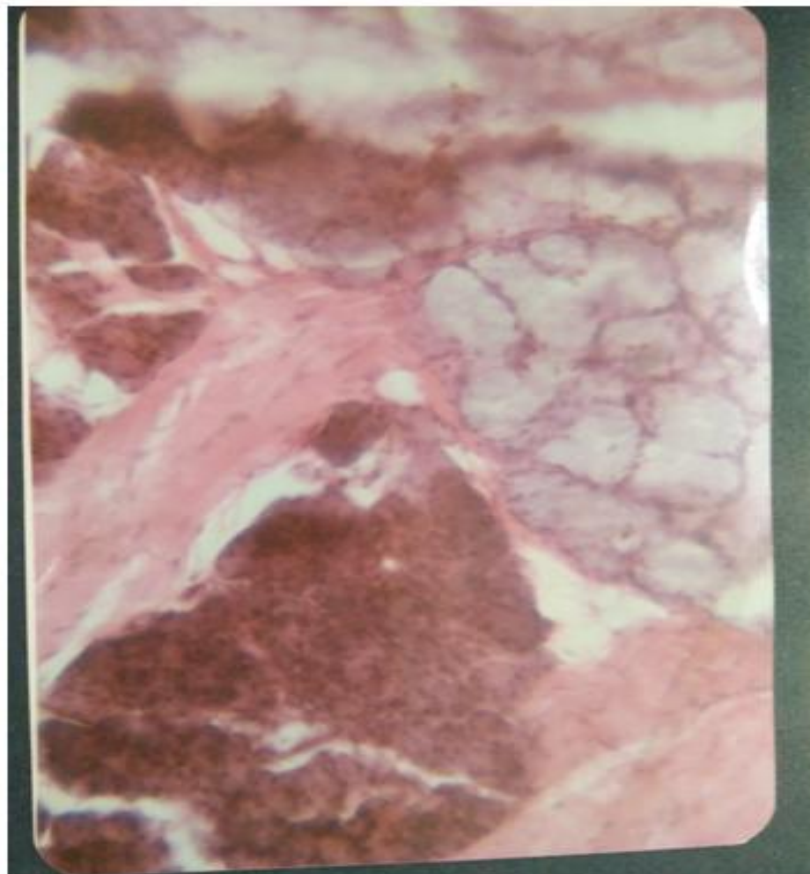


Fig.1. Guinea pig: Tongue showing serous and mucus glands at junction of oral and pharyngeal part (H&E stain 125x)

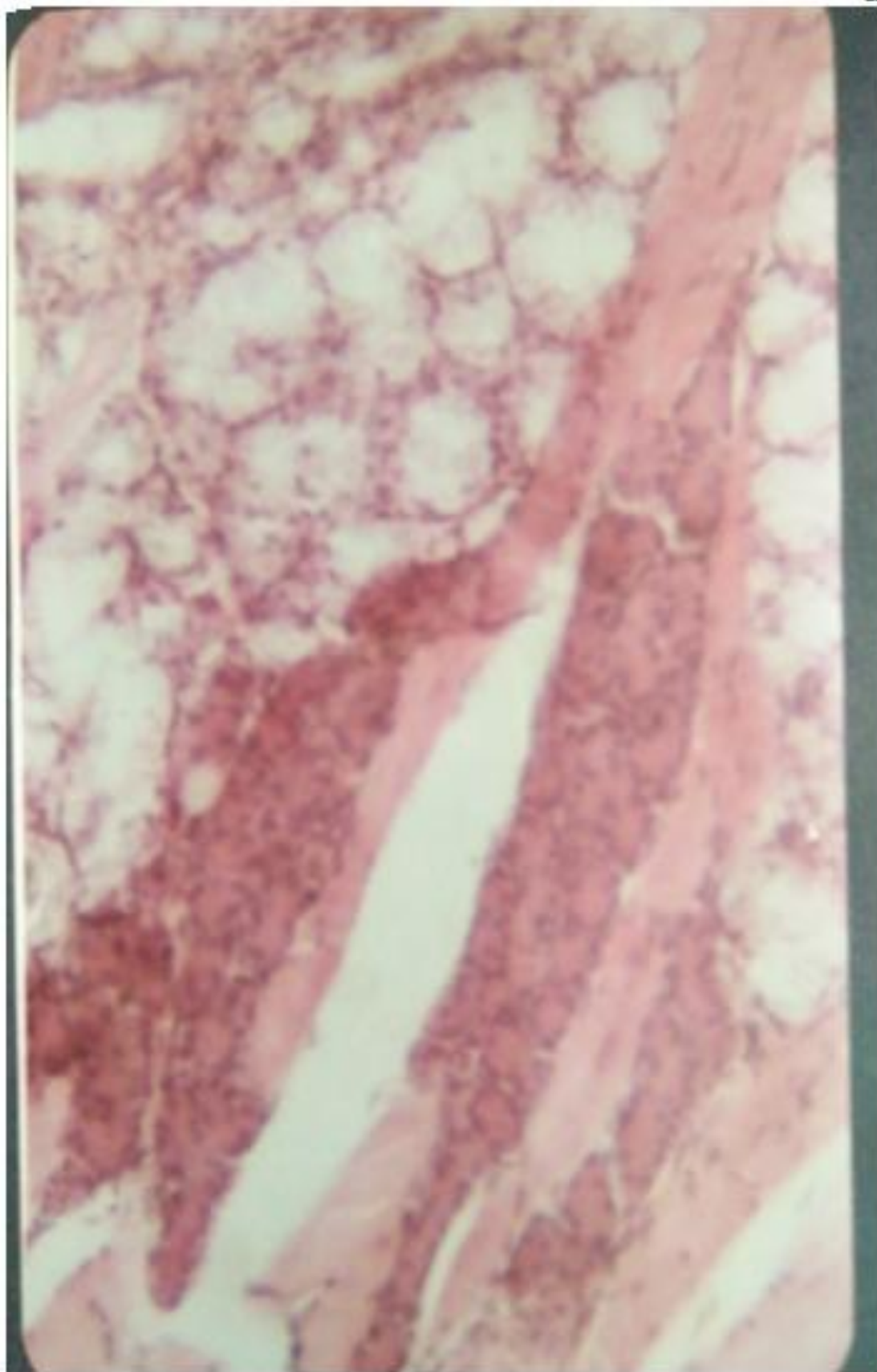


fig.2 - Rabbit : Tongue showing serous and mucus glands in intermuscular connective tissue at junction of oral and pharyngeal part(H&E stain 125x)

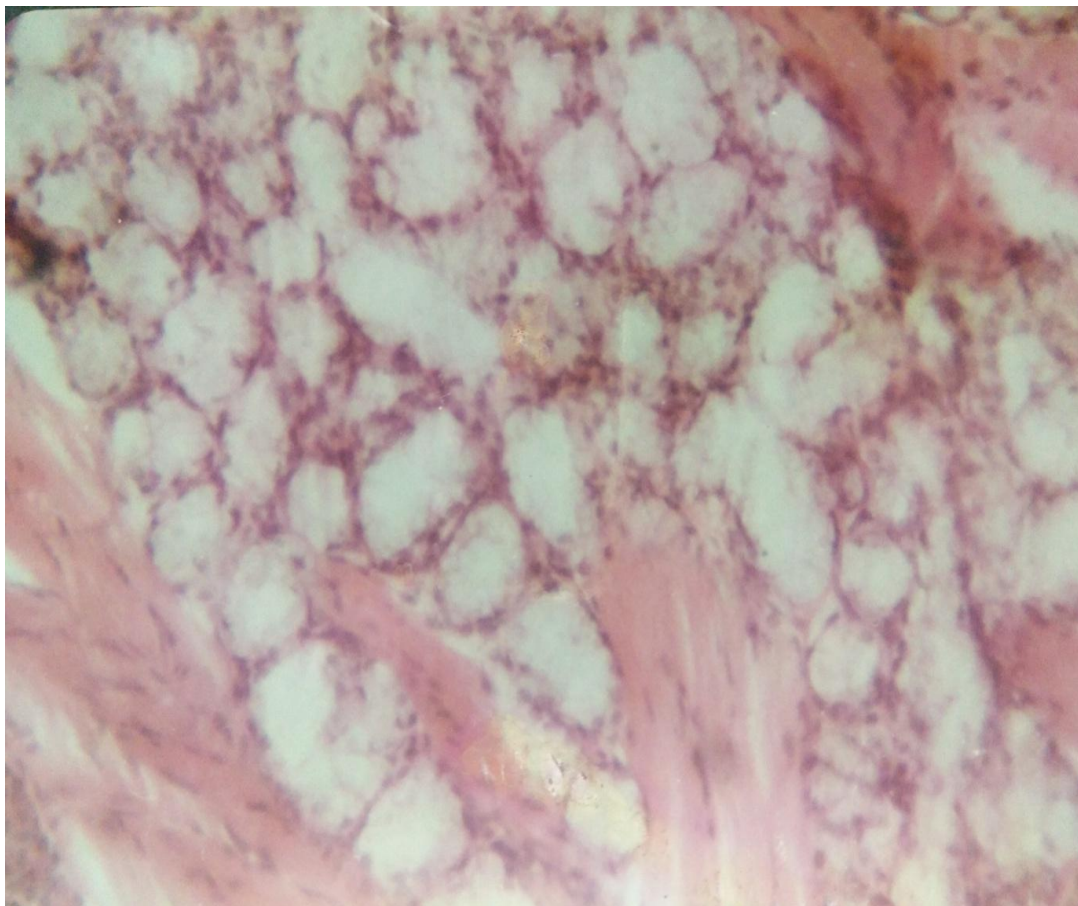


Fig.3: Tongue of Rabbit showing mucus glands in pharyngeal part in intermuscular connective tissue (H&E stain

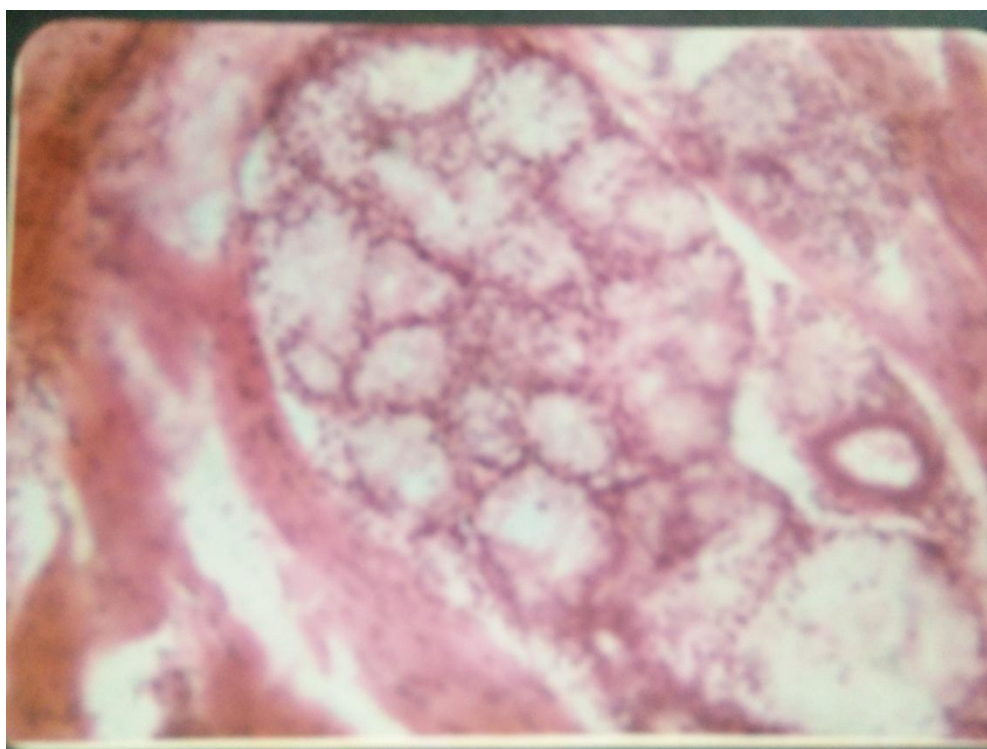


Fig.4 : Tongue of Goat showing mucus glands in pharyngeal part in intermuscular connective tissue. Demilunes are seen at places(H&E stain 125x)

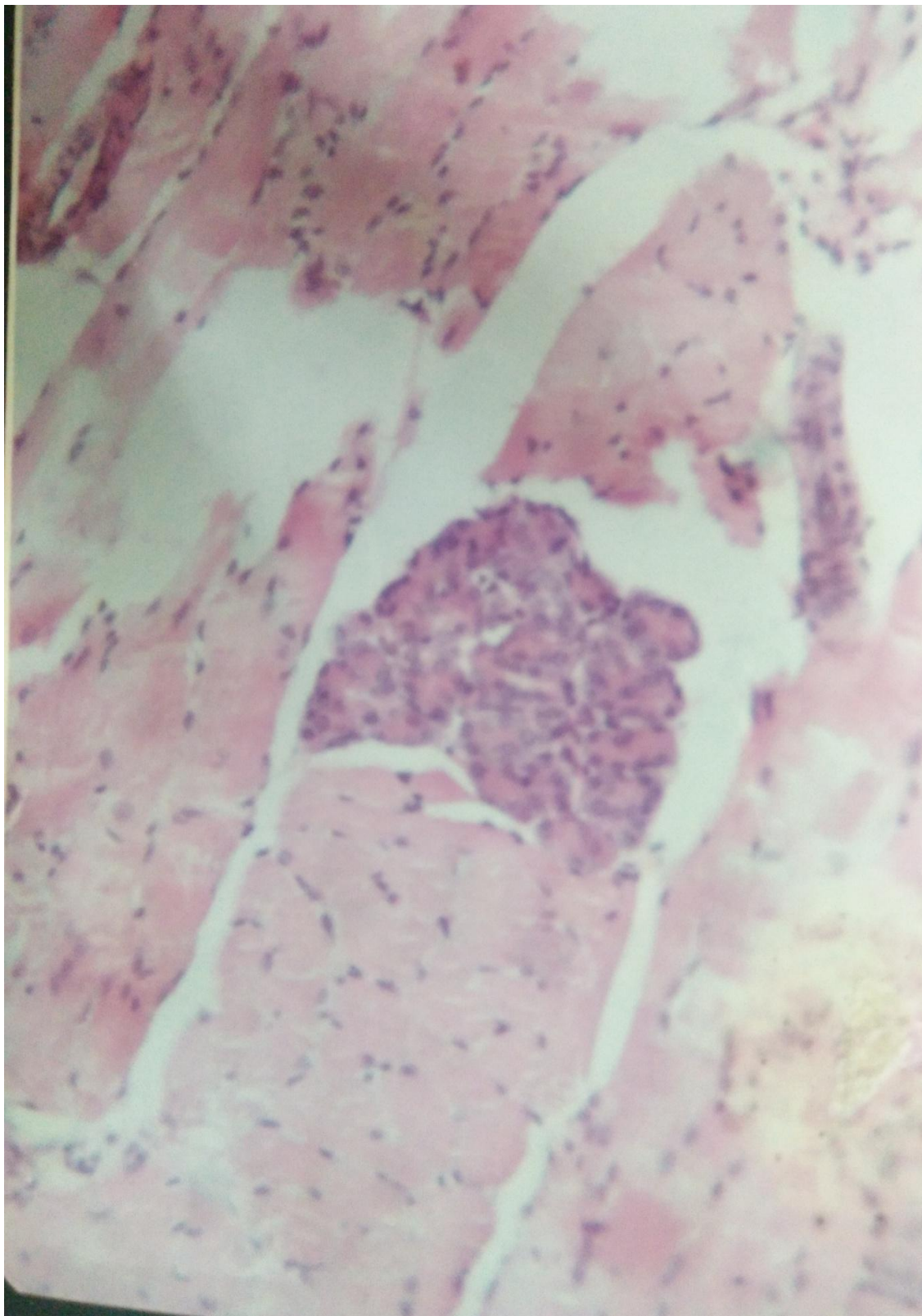


Fig.5 : Tongue of Dog showing serous glands vallate papillary region in intermuscular connective tissue (H&E stain)

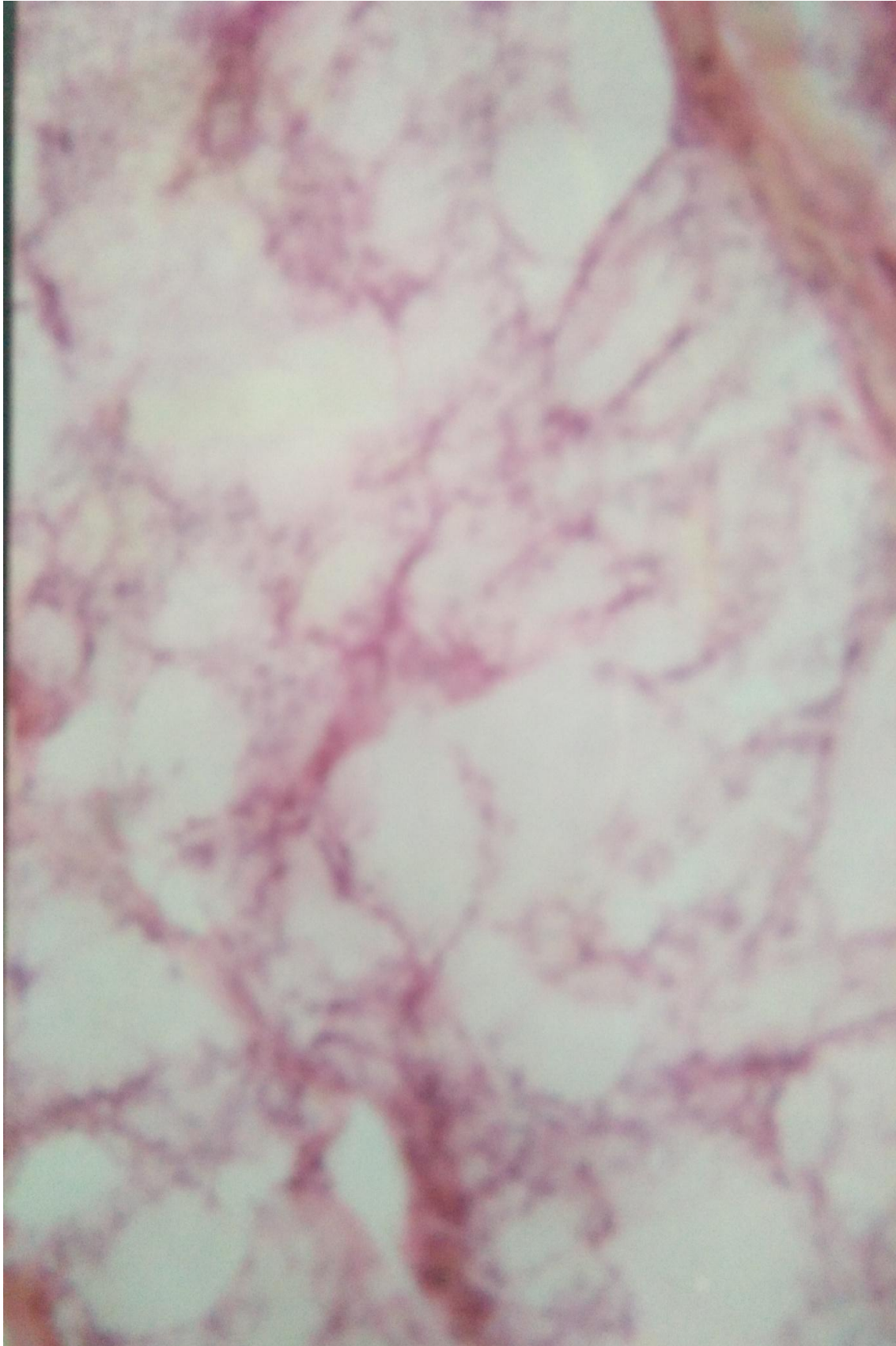


Fig.6: Tongue of Albino rat showing mucus alveoli of posterior lingual gland with faint staining of cytoplasm (H&E stain 500x)

IV. Discussion

In the present study, no lingual gland was found in the anterior part of tongue in any of the five animals which is in accordance with the observations found by Flower (1872)⁸ Sontag (1924) and labh & mitra (1964) have emphatically stated that sub lingual gland is absent in the tongue of rat, guinea pig & rabbit, as well as in goat and dog. The serous gland was mostly situated in the posterior portion of oral part of tongue in the region of vallete & foliates papillae in between muscle bundles. It is significant to note that no gland could be demonstrated in the sub epithelial lamina propria as well.

In tongue of dog large no, of glands were present in lamina propria in foliate papillary region as compared to other animals. All the serous glands were compact and almost obliterating the lumen. The mucous gland was situated in the pharyngeal part of tongue & started showing their presence just behind the circum vallete papillae. Except in goat no gland had been demonstrated in lamina propria. The mucous gland of rabbit, goat & dog's tongue were different from other animals of this series in the sense that serous demilunes were present, whereas in case of albino rat & guinea pig no serous demilunes were seen. The duct of serous gland opened in the depth of trench in vallete papillae except in goat, where some were opening on the outer wall of trench as well. The duct of mucous gland opened on general surface of tongue in the pharyngeal part. The ducts were lined by stratified squamous non keratinized epithelium near their termination; elsewhere they were lined by double layer of cubical cells.

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