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The Morphology of Salivary Glands in Water Monitor (*Varanus salvator*)

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INTRODUCTION

Salivary gland is one of the accessory organs of the digestive system that produces saliva. The saliva helps to moisten and soften the dry food, as media to divide food, maintaining the pH balance in the oral cavity, carbohydrates break down and as an antibacterial agent [1]. The morphological data of the salivary glands of water monitor (*V. salvator*) has not been reported yet. Therefore, this study aimed to determine the morphology of the salivary glands in water monitor.

MATERIALS AND METHODS

Macroscopic observation was done directly to study location to collect data of morphology and morphometric of all salivary glands include shape, length, and weight of those glands. For microscopic examination, samples of salivary glands that consist of lingual, sublingual, and mandibular glands were processed routinely for embedding in paraffin and subsequently stained with haematoxylin-eosine (HE).

RESULTS

The lingual gland was unseen macroscopically because this gland located beneath the epithelial layer of tongue. A pair of sublingual glands were found the ventrolateral part of tongue while the mandibular glands located at ventral part of the sublingual glands, between a pair of mandible bone dexter and sinister. The salivary glands composed of several lobes and in lobe that consist of lobules which separed by the connective tissue (Table 1).

Table 1. Location and morphometric of the salivary glands of *V. salvator*

Salivary glands	Location	Shape	Length (cm)	Weight (g)
Lingual	Beneath the epithelial layer of tongue	n/a	n/a	n/a
Sublingual	Ventrolateral tongue	Globular	4	0,51
Mandibular	Right and left mandible bone	Globular	4	0,83

n/a : not observed macroscopically

Based on microscopic observation, all of the salivary glands belongs to complex tubuloasinar glands that characterized by the form of tubes or tubular glands. Lingual and sublingual glands were seromucous cell, whereas the mandibular gland was serous cells (Figure 2). Mucous cells are basophilic type cells that have a nucleus with ovoid shape and located in the basal of the cytoplasm whereas the serous cells are acidophilic cells with round nucleus that located slightly to the basal and cytoplasm.

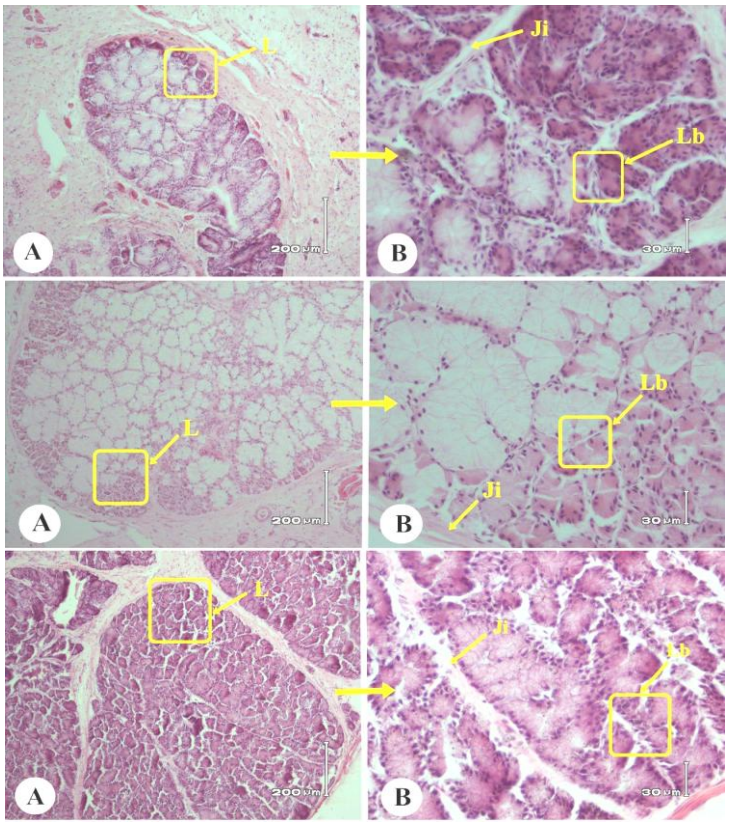

Figure 2. Microanatomy of the salivary glands in *V. salvator*. The lingual gland (A1, B1), sublingual gland (A2, B2), and mandibular gland (A3, B3). HE Staining.

DISCUSSION AND CONCLUSION

This is early information of the macroanatomy and microanatomy of the salivary glands in water monitor. The study still important to carried out especially about the distribution of the carbohydrates in three types of those glands. The secretion of the salivary glands contain water, electrolytes, protein complex, and carbohydrates. Besides as ingredients in secreta cells, carbohydrates also play an important role in the process of metabolism, immune response, differentiation, migration, maturation, and the cells interaction [2]. Additionally, the salivary glands have a biological role that related to digestive process by producing a molecule or compound that plays a role in a variety of growth factors, affect the environment of the mouth and stomach as well as respond to physiological conditions involving the balance of water and ions [3]. From this study, we concluded that the water monitor (*V. salvator*) has lingual gland, sublingual gland, and mandibular gland that consist of tubuloacinar complex glands.

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