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Histochemical and Enzymohistochemical Study of the Uropygial gland in *Sturnus Vulgaris* (Starling)

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ABSTRACT

The uropygial gland is an exocrine gland that produces a variety of biochemical and is located above the tail of birds, there has been little empirical research on its histological structure, this study was to investigate the histochemical and histoenzymic features of the uropygial gland in *Sturnus Vulgaris*. Five birds of European starling were obtained from local market in Basrah province, the tissue samples were stained by traditional and special stains Van Gieson, periodic acid-shiff (PAS) and demonstration of alkaline phosphatase (ALP). The histochemical analysis of gland was recorded in vangieson stain positive reaction was observed in the collagen fibers of capsule, with strong intensive to (PAS) in all layers of gland also the strong reaction of (ALP) was revealed in all layers of secretory tubules. The reason for this study was a paucity of knowledge on the histochemical and histoenzymic features of uropygial glands in starling birds via used the special stains.

Introduction

Birds of the European Starling (*Sturnus vulgaris*) are found in southern and western Europe, as well as southwestern Asia. Starlings are distinguished by their black, slender bodies that are glossed purple or green and strewn with white, especially in the winter. Adult male starlings are less likely than adult females to be detected below (Higgins *et al.*, 2006). The birds' uropygial glands, also known as the oil gland, preen gland, or rump gland, are exocrine glands that produce a variety of biochemicals and are located above the tail of birds' last caudal vertebrae (Braun *et al.*, 2016). It's thought to play a role in chemical defense, water resistance, and plumage brightness maintenance (Ushakumary *et al.*, 2011). Although some

empirical evidence supports these not necessarily mutually incompatible roles, there has been little scientific research on the function of waterproofing. Other physiological functions of uropygial gland secretion include pheromone synthesis, plumage hygiene control, thermal insulation, and defense against pathogens and predators. It is the sole structured tegumentary structure of external secretion that is unique to birds; it is always present in embryonic stages but vestigial or lacking in adult stages of some species (Salibian, A., & Montalti, D. 2009). It's a bilobate sebaceous organ with a variety of shapes and sizes (Lacus and Stettenheim, 1972). The uropygial gland varies in size and form depending on the species. On its caudal extremity, which has external ducts, it has two lobes and one papilla with cylindrical, conic,

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or alveolar morphology.

The histochemical and histological properties of the uropygeal gland have been studied in some birds, such as the moorhen (Sawad, A. A. 2006), white stark (Kozlu, T., *et al.* 2011), and guils Zhang, Y.-H., *et al.* (2013) on the other hand, the activity of enzymes and distribution, like acid phosphatase and lactate dehydrogenase, were recorded in fowl Kanasiya *et. al.*, (2017).

The aim of our study is to investigate the histochemical and histoenzymic structure of the uropygial gland in the *Sturnus Vulgaris*; because of the paucity of literature about the gland of the *Sturnus Vulgaris*, this study was prompted.

Materials and methods

Five birds from both sexes were used to determine the histochemical and histoenzymic structures of the uropygeal glands, the gland was removed and immediately fixed with (10%) of formalin for 48 hours. Then specimens were submitted to dehydration in a series of ascending grades

of ethanol (70-96%), cleared in several changes of xylene and embedded in paraffin. The sample were stained by hematoxylin and eosin for general structure and special stain such as Van Gieson, periodic acid Schiff and Gomori's technique based on (Dibal *et al.*, 2022), Vangieson and (PAS) depended on (Suvarna *et al.*, 2018), while the demonstration of ALP was done by Balbaied & Moore's (2019) technique.

Result

The histological examination of the uropygeal gland by light microscope illustrated that the gland is composed of a capsule and four layers: germinative, intermediate, secretory, and degenerative layer (Figures 1 and 2). The capsule is made up of dense connective tissue of collagen fibers without the smooth muscles (Figure 3). On the other hand, the histochemical analysis of the gland was observed to have a strong positive reaction with PAS in all surface of epithelial cells of secretory tubules (Figure 4), depending on the activity of ALK a strong reaction was observed in all parts of the gland (Figures 5 and 6).



Figure 1: Microscopically section in Uropygial gland show A. capsule B. secretory tubule (H&E 10x)

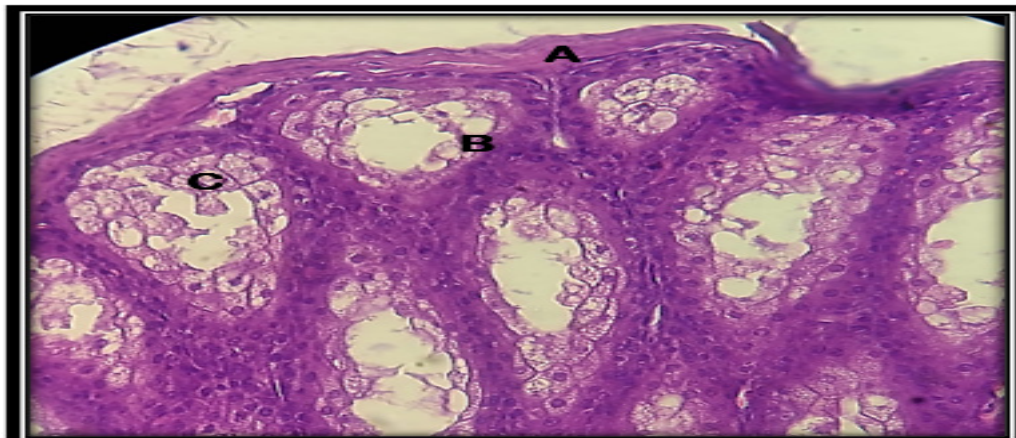


Figure 2: Microscopically section illustrates the capsule of uropygial gland : A. capsule B. secretory tubules C. epithelial layers. (H&E, 400x).

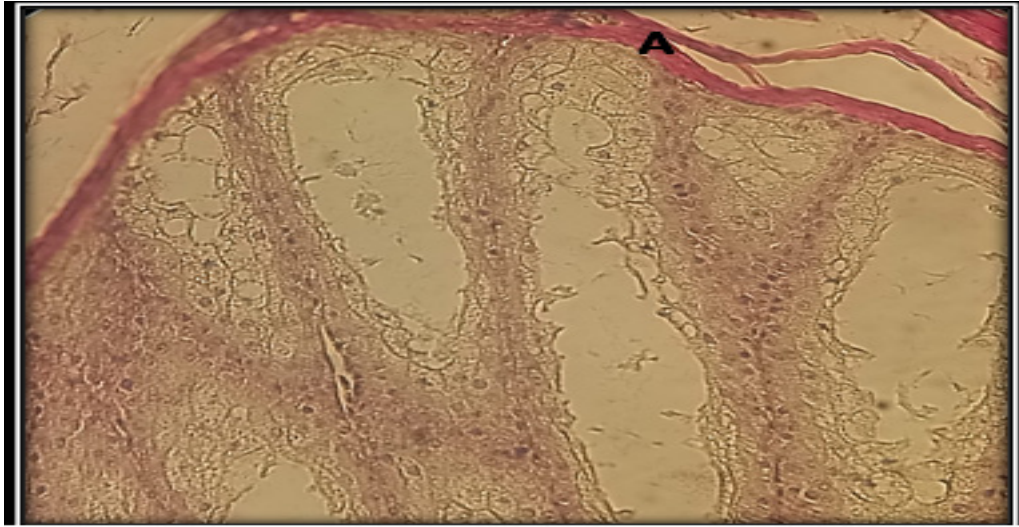


Figure 3: Microscopically section show the A collagen fibers (vangieson stain, 400x).

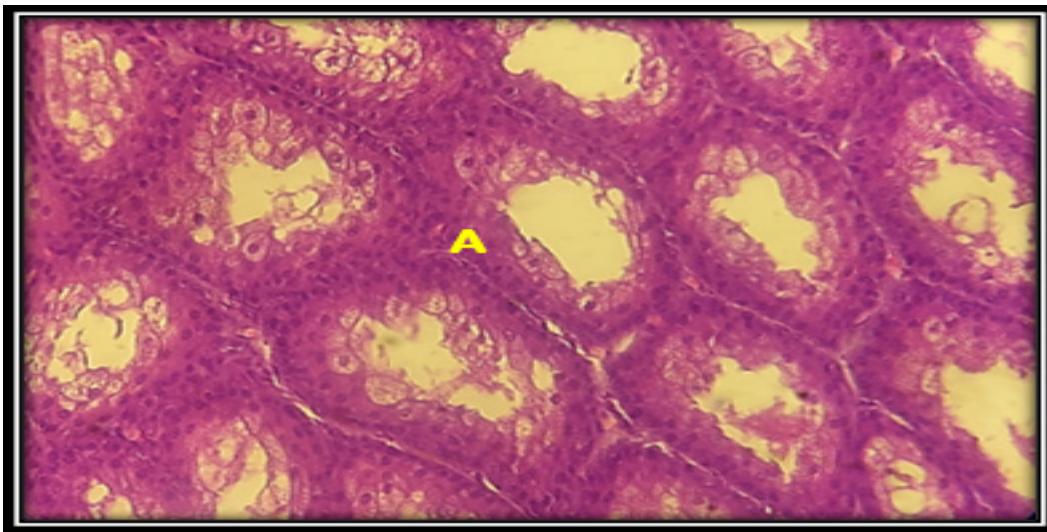


Figure 4: Microscopically section of uropygial gland show strongly positive reaction in epithelial layers (A), (PAS 400x).

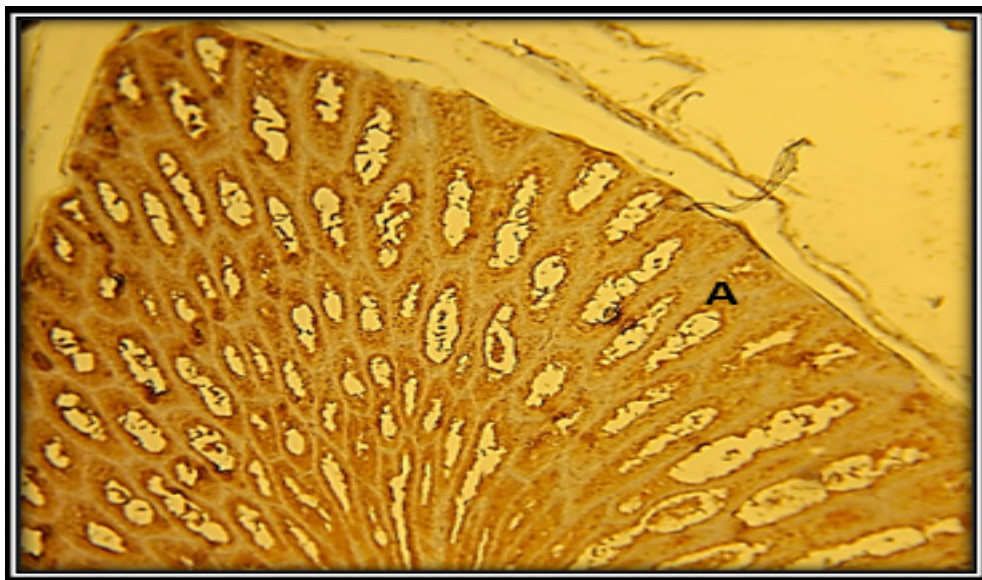


Figure 5: Microscopically section show the localization of alkaline phosphatase in secretory tubule (A) (Gomoris method 100x).

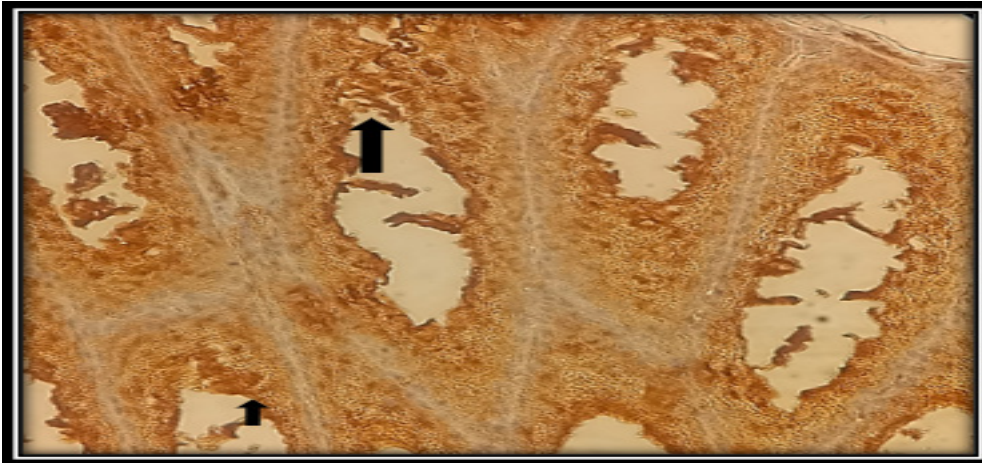


Figure 6: Microscopically section show the localization of alkaline phosphatase in all layers of secretory tubule (Gomoris method 400x).

Discussion

The present study identified that the gland consisted of stroma and parenchyma, including the capsule and secretory tubules; this result agrees with Sadoon (2011). Histochemically, the uropygeal gland showed that PAS activity of glycogen was strong in all layers of the gland. This result disagrees with Shafian and Mobini (2014) in geese. On the other hand, the light examination revealed that the capsule was made up of collagen fibers. This result disagrees with Sunada et al. (2001), who recorded that the capsule is composed of reticular, elastic, and collagen fibers in domestic ducks, and disagrees with Kanasiya *et al* (2017), who noticed that the capsule was composed of elastic, reticular, and collagen fibers. Depending on the activity of ALP in the uropygeal gland, it was a positive reaction in all layers of the gland. This result disagrees with Jawad et al. (2016), who noticed a negative reaction of ALP in the the uropyial gland in fowls, and disagrees with Mohamed (2019), who recorded that the activity of ALK was predominantly seen in the tubular trabecular of the capsule. The fluctuation of distribution of ALK is due to the differences of metabolic activity of secretion compound from the esters compound at alkaline phosphatase (Jawad, et al., 2016)

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