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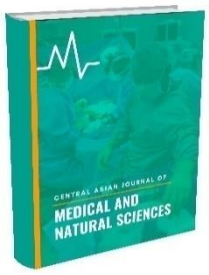

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Anatomical and Histological Study for Nasal Glands in Geese (Anser Anser)

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Abstract: The present investigation aimed to study the anatomical, histological and characterizations of the nasal glands(Nasal glands) of the geese. birds Phoenicopterus ruber roseus. The results of the present investigation shows that the geese(Anser anser) has a well developed bilateral salt glands which consist of an array of secretory lobules surrounded by richly avascularized connective tissue. Each lobe is made of a mass of branched secretory tubules radiate from central canal and enmeshed in one cell layer blood capillaries. The secretory tubule consists of simple cuboidal epithelium surrounding a narrow lumen showing round basal cells at their terminal segments. The secretory tubules and central canals drain in a main duct leads to the anterior of the nasal cavity.

Key words: nasal gland, geese, birds

Introduction

The 278 species of birds which have been recorded in lower Mesopotamia, 134 are species which are to some extent dependent on the wetland habitats and occur in Mesopotamia in significant numbers (9). Marine birds possess salt-secreting nasal glands which produce hypertonic solutions of sodium chloride in response to osmotic loads in case of sea water intake. The presence of this gland considered a necessary adaptive tool in birds which live in an environment high salt concentrations,(22)(23). Nasal glands are together with the kidneys, maintain body fluid homeostasis, despite the excess sodium chloride they ingest, (24).

Anatomy of their nasal glands(Salts Gland), The nasal glands, which constitute from 0.1 to 2% of body mass, are located in depressions usually in or above the orbits (e.g., Schmidt-Nielsen, 1959; Siegel-Causey, 1990;. They are distinct from lachrymal or Harderian glands. The basic structural unit of the nasal gland, the lobe, consists of blind-ended secretory acini (tubules) which drain into central ducts (canals). Toward the blind end of the tubule are small, relatively undifferentiated peripheral cells, whereas most of the length of the secretory tubules is composed of principal secretory cells (11). Capillary blood flow runs counter to flow in the secretory tubules. Each gland contains numerous lobules whose final common ducts drain into the nasal cavity. Nasal gland secretion either drips from or is shaken from the bird's beak. The salt glands in domestic geese were crescent in shape with two pointed anterior and posterior extremities. The dorsal boarder was carved while the ventral boarder which face the eye ball was concaved. The gland was firmlyattached with supra orbital depression, the skin of the head directly covered the gland.

This results were similar with that mentioned in all most all water birds such as duck, geese, common coot, moorhen and flamingo which were studies by Hussein *et al*., (2006); Al-Mansour, (2007); Maysoon, (2012); Reshag *et al*., (2014), Reshag *et al*., (2016) respectively. With some exception, the shape of salt gland in Kentish plovers and love birds were tubular in shape as mentioned by Jarrar and Basher, (2009); Waleed,

(2016) respectively. The color of the gland in control ducks was red,

(Fig. 1). The changes in salt gland color from red color to dark red

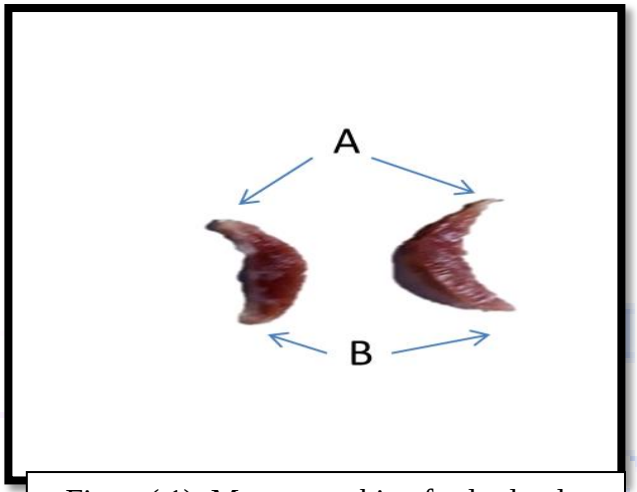
in duck which drink salt loaded water was noticed earlier by El-Gohary *et al*., (2013), they found that the color of salt stressed gland was dark red. The current study suggested that the cause of such alteration in gland color due to the shaft and increase of blood fallow toward the gland when the bird drink salty water. This suggestion depending on the study of Hossler and Olson (1990) they found there was changes in blood flow to the salt gland of duck live in osmotic loading (1%NaCl) food and water, this was adaptation strategy for hyper osmotic environment.

Histology of their Nasal Gland

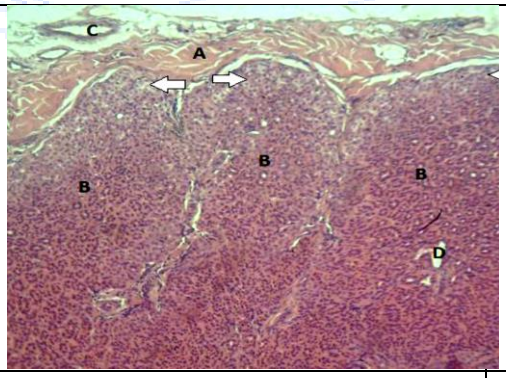
The nasal glands were consists of two longitudinal lobes. Each lobe is divided into polygonal lobules(Fig.2,5)., and each lobule was composed of secretary tubules, that peripheral cells located at the blind ends of the secretory tubules(Fig.3,4)., comparable finding with Maysoon (2012) in marine birds; Hussein *et al*. (2006) in moor hen, they mention the salt gland consisted of many concentric polygonal lobules arranged in rows and each lobule separated by interlobular connective tissue and branched into secretary tubule. Histological investigation of nasal gland was consisted of many

polygonal lobules surrounded together by connective tissue capsule. This histological observation of the nasal glands are in agreement with the results of many workers whom studied the histological structures of salt gland in many water birds species such as Hussein *et al*. (2006) in Moor Hen; Jarrar and Basher (2009) in Kentish Plovers; Maysoon (2012) in wild water birds and domestic water birds; Reshag *et al*. (2016) in greater flamingo and Waleed (2016) in love birds. They showed that the salt gland in different avian species is consists of several longitudinal lobules composed of secretory tubules radiating from central canals. The secretary tubules lined by principle and peripheral (basal) cells. In histological section each lobule appeared as honey comps or

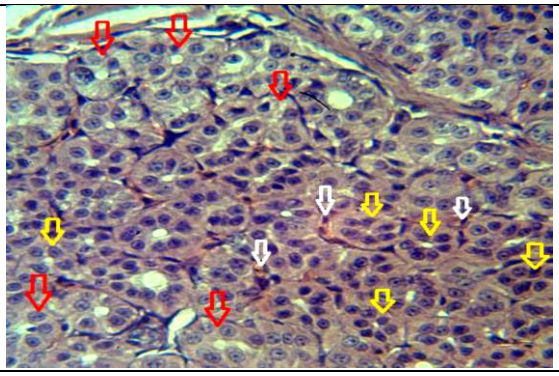
polygonal Structures, each of them surrounded by connective tissue blood capillaries were present within the connective tissue. Inside lobule numerous branched tubules runs in radical direction from the center to the margined. The center of this lobule were occupied by center canal (Fig.6). The secretary tubes were branched with two ending the inner end center canal, the other end was blind forming the peripheral region opened directly in the of the secretary tube (Fig.4,6). The lining cells of secretary tubules were of two types, peripheral cells which located at the peripheral end of the secretary tubules. This cells was small and rounded in shape with esonophilic cytoplasm. The second type was the principle. cells which were cuboidal in shape with rounded nucleus and stain cytoplasm(Fig.7). The principle cells occupied the majority of secretary tubules (Fig.4,6).



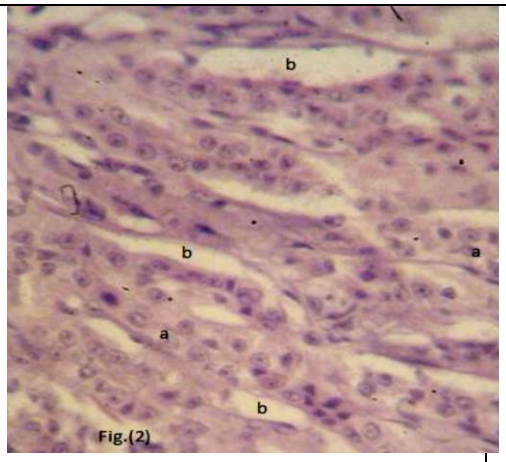
Figure(1): Macro graphic of salt glands shows: A-Anterior part, B-Posterior part.



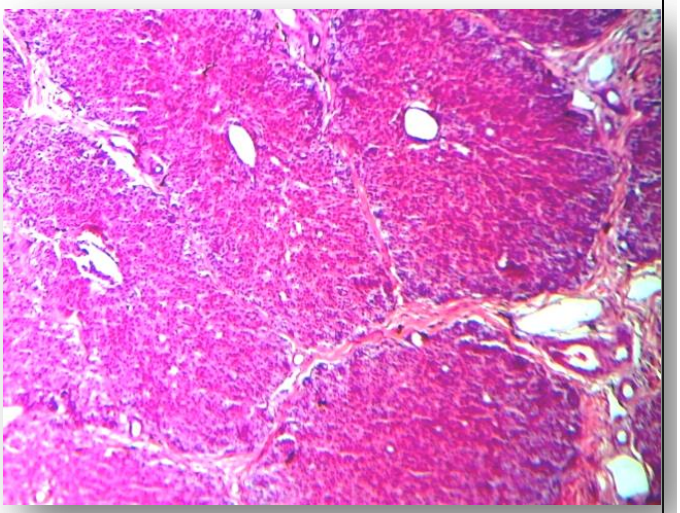
Figure(2)Histological section of nasal gland shows:A. Collagenous capsule.B. Glandular lobules.C. Artery.D. Central main duct.(White arrows show zone of hypertrophied secretory units). H&E stain. 200 x.(25)



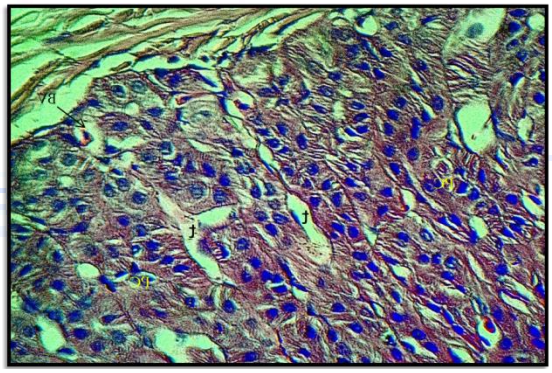
Figure(3)Histological section of nasal gland shows: Red arrows: hypertrophied secretory units which lined with simple cuboidal cells of large rounded nuclei.White arrows: capillaries,Yellow arrows: normal sized secretory units.H&E stain 400x (25)



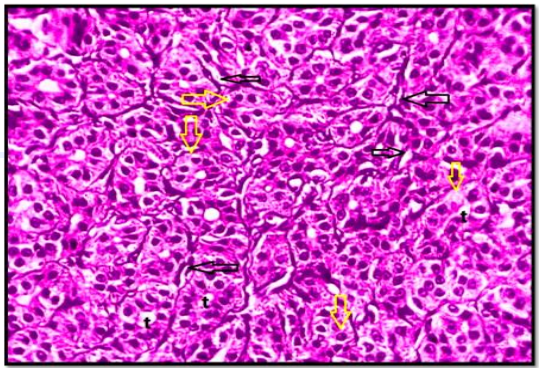
Figure(4)Histological section of nasal gland (domestic Geese) showing branched secretory tubules : (a) Simple cuboidal cell. (b) Lumen. (H&E) stain 400x.



Figure(5)Histological section of nasal gland(domestic geese) showing: Central canal., polygonal lobule., interlobular connective tissue (H&E) stain 200x.



Figure(6)Histological section of salt gland (Control) shows: t-Secretary tubules, PC-Principle cells, BV-Blood capillaries. (H&E stain X400)



Figure(7))Histological section of salt gland shows::t-Secretary tubules, Principle cells (yellow arrow), Blood capillaries (black arrow)(H&E stain X400).

Conclusions

The presence of this gland considered a necessary adaptive tool in birds which live in an environment high salt concentrations. Nasal glands are together with the kidneys, maintain body fluid homeostasis, despite the excess sodium chloride they ingest.

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