

Topographical and Histological Study of the Salt Gland of the Moorhen (*Gallinula c. choropus*).

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Abstract

The moorhen (*Gallinula c. chloropus*) ,Because of their diet and environment, need to be able to rid their bodies of excess salt or face dehydration, For this region ,Moorhen possess a pair of glands located just above their eyes in the low groove of the eye orbit attached to the frontal bone of the skull .Salt gland was also called supraorbital or nasal gland and their function to secrete ahyperosmotic NACL or KCL solution an important osmoregulatory organ.

Salt glands in the Moorhen have a micro-structure similar to kidney and use a system of counter current blood flow to remove and concentrate salt ions from the blood stream, The paired ,crescent –shaped glands each contain several longitudinal lobes , each lobe contains central duct from which radiate thousands of tubules enmeshed in blood capillaries. These tiny capillaries carry blood along the tubules of the gland, which have walls just one cell thick ,The Moorhen salt gland was vascularized by several arterial branches such as the supraorbital Facial and internal ophthalmic arteries

The glands are surrounded by a capsule of connective tissue in addition some smooth muscle cells, The secretory units consists of secretory tubules and ducts that lined by one layer of simple cuboidal epithelium that rests at basement membrane, while the ducts have many mayo epithelial cells in their walls.

1-Introduction

The moorhen *Gallinula C.chloropus* was a marine bird descended from the family *Rallidae*. They visit Iraq in winter in the southern marshes. The body was covered by black-brown feathers with a white tail (Allous, 1961).

Salt glands of juvenile herring lie at a shallow supraorbital fossa as a paired dark longitudinal mass of secretory gland on each side of the head (Schmidt-Nelson 1978). Marine birds possess a pair of glands located just above their eyes and they are found in all birds except Passerine birds, and well developed in birds such as Cormorants, Herring-gull, Gannets, Pelicans, Albatrosses and Penguins (Chapman 1978).

The salt glands are vascularized by the internal ophthalmic artery and innervated by large branches from the ophthalmic ethmoidal ganglion with the facial nerve (Gills, 1995).

The salt gland composed of many lobes as a circular canal possess a central canal with blind ends, many lobules extend along the lobes to form the secretory lobules (Acool 2004). The secretory lobules that branch from the central canal surrounded by a thin layer of connective tissue and lined by a single layer of simple cuboidal epithelial cells or low simple columnar epithelial cells (Cool and Gangnon 2000). Due to the lack of information that describes the structures of the salt gland in moorhen and in order to understand the function of these glands, this investigation was designed.

2- Materials and Methods

Twenty Moorhens with average body weight of 750 grams were purchased from the local market of Basrah city, Iraq. They received an appropriate dose of anesthesia and then sacrificed. The gross anatomical features of salt glands of the birds were prepared for latex injection into route of left and right common carotid arteries for the purpose of nutrient blood supply study (Goshal and Getty 1970). The salt glands of the other ten moorhen were removed and placed in 10% formaline solution. Each gland was cut sagittally into six equal parts, sequentially numbered and post fixed for 24 hours in 10% formaline. Fixed tissue were washed in current water, dehydrated in a graded alcohol, cleared in xylol and embedded in paraffin wax. Serial sections of five micrometers thick were made. Mounted on slides and stained with haematoxylin and eosin (Luna 1961).

3- Results and Discussion

The salt gland of the moorhen possessed a pair of glands located at a shallow depression on the lateral supraorbital of the head, they are pink elongated crescent shaped structures (Fig 1,2). Similar findings were reported by (Darin and Maryanne 2003).

The average diameter of the gland about 5 mm and the average length was 12.6 mm, while the average weight about 1.3 grams and their size 9 mm, in contrast to the salt gland of domestic duck it has 2.6 cm in length, 0.3 cm width and one gram in weight with 1.2 cm in their size (Acol, 2004)

The salt gland of Moorhen vascularized via three arterial branches, supraorbital artery which branches from the external ophthalmic artery, the internal ophthalmic artery and facial artery that branches from external carotid artery, thus confirming the observation on the blood supply of the salt gland in marine birds (Sturkie, 1990; Schmidt-Nielsen et al 1958).

Histologically the salt gland of the Moorhen was covered by a relatively thin irregular connective tissue capsule rich in collagen and reticular fibers, the connective tissue of capsule consists of small bundles of smooth muscle fibers and fibroblasts (Fig 3). The structure of salt gland capsule had been also reported by (Lowy, 1989; Donna, 2002).

The lobes of the salt gland in Moorhen composed of branched secretory tubules which opens at a central canal (Fig 4) lined by a single row of simple high cuboidal epithelial cells

rests at basement membrane, while their ducts have many myoepithelial cells in their wall (Fig 5). Thus confirming the observations in the Mallard (Acool, 2004).

The epithelial cells that lined the secretory tubules are in three types, the peripheral cells which lie at the basement membrane, the partially specialized secretory cells that extend into the tubules lumen, and specialized secretory cells that consider as active cells in primary and secondary stages and rest at the basement membrane (Fig 6). This is in agreement with (Graige, 2004), while (Gill, 1995) reports that there are one type of secretory cells lies on the basement membrane.



Fig 1; Showing the species Moorhen (Gallinula c choropus)



Fig 2 ; The lobes of salt glands in the Moorhen

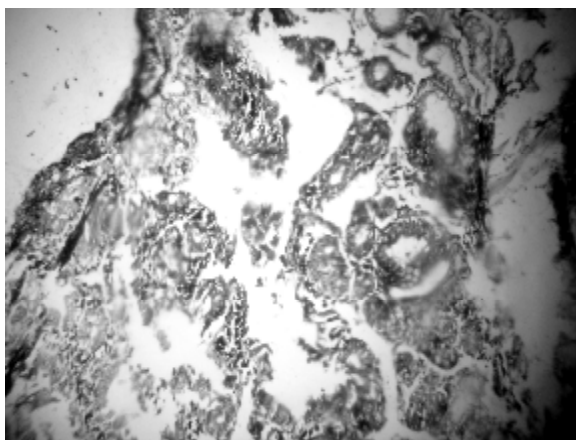


Fig 3;Moorhen salt gland A- The capsule B- Secretory tubules C-Central canal

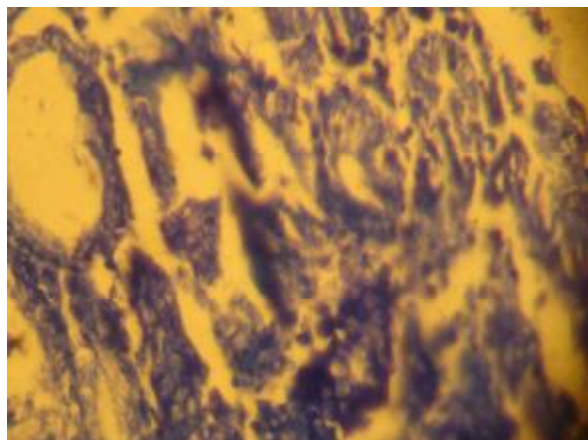


Fig 4: Secretory tubules in moorhen salt gland A-Central canal B-epithelial cells

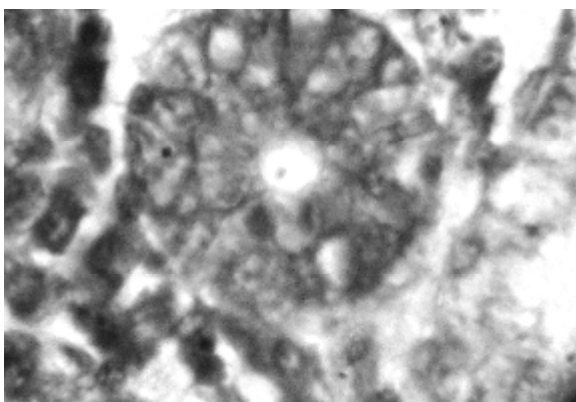


Fig 5:Secretory unit in moorhen salt gland A-Epithelial cell B-Basement membrane C-Mayoepithelial cell

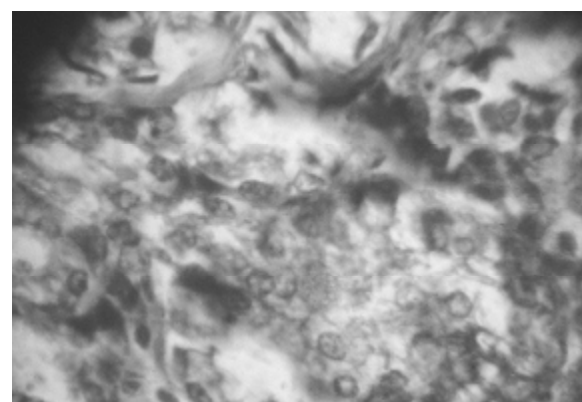


Fig 6: Secretory cells in moorhen salt gland A-Peripheral cell B-Partially specialized secretory cell C-specialized cell

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دراسة طبغرافية ونسجية للغدة الملحية في دجاج الماء

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الملخص

نتيجة لظروف الغذاء والبيئة وحاجة الجسم للتخلص من الاملاح الزائدة, يمتلك دجاج الماء زوج من الغدد تقع فوق العيون في النخض التابع لمحجر العين وتلتصق بالعظم الجبهي للجمجمة, تسمى الغدة الملحية ايضا بالغدة فوق الحجاجية او الغدة الانفية والتي تعتبر احد الاعضاء المهمة المسؤولة عن عملية تنظيم الضغط التناظفي وافراز السوائل عالية التناضح مثل كلوريد الصوديوم والبوتاسيوم. تكون الغدة الملحية نسيجيا مشابهة لتركييب الكلية وتعتمد نظام التدفق الدموي العكسي لازالة وتركيز ايونات الاملاح في مجرى الدم. تتكون الغدة من عدة فصوص طولية هلالية الشكل ويمتلك كل فص قناة مركزية تتصل بالالف النبيبات الدقيقة الغنية بالشعيرات الدموية. تحمل الشعيرات الدموية الرقيقة الدم بامتداد نبيبات الغدة والتي تكون جدرانها بسمك خلية واحدة. تجهز الغدة الملحية بقرعات من الشرايين فوق الحجاجي, الوجهي والشريان العيني الداخلي. تغلف الغدة بمحفظة من النسيج الضام تتخللها بعض الخلايا العضلية, تحوي الوحدة الافرازية على نبيبات افرازية وقنوات مبطنة بطبقة واحدة من النسيج الظهاري البسيط المكعب والذي يستند على غشاء قاعدي رقيق, تتخلل جدران القنوات الافرازية خلايا عضلية ظهارية.