

## HISTOLOGICAL STUDY OF THE OVARY AND INFUNDIBULUM OF TURKEY HEN *Meleagris Gallopavo*

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### ABSTRACT

The present study showed that the ovary of adult turkey hens *Meleagris Gallopavo* is covered with simple cuboidal epithelium (germinal epithelium). Internally, two distinct regions can be distinguished. The cortex, a peripheral region contains a numerous follicles in different stages of development that are classified as primordial, primary, secondary and tertiary follicles. The primordial follicle appear distributed to the surface of sub capsular cortex surrounded by a single layer of follicular cells contains a small oocyte, showing a cytoplasm of filamentous aspect. The primary follicle appear distributed in the periphery and middle of the ovarian cortex contains and oocyte that shows an homogeneous cytoplasm with fine granules.

### INTRODUCTION

Histologically in the Avian the ovary consists essentially of two regions, the cortex and medulla. The ovarian cortex surrounded the medulla except at the hills where the medulla is in contact with the dorsal body wall .Its contains numerous follicles in different stages of development (1,2). The outer surface of the cortex is lined by superficial epithelium that is classified as cuboidal simple epithelium, sustained by poor cells connective tissue, rich in collagen fibers and scars in elastic and reticular fibers. That layer of connective tissue forms the tunica albuginea. The medulla, more central and made of loose connective tissue intensely vascularized and presenting nervous fibers and some smooth muscle fibers. As follicular maturation starts, the tunica albuginea gets slimmer and almost the cortical medullar regions cannot be distinguished (3,4). the ultra-structure wall of avian follicles has been six layers from inside to outside: The zona radiate and lamina perivitelline; Startum granulosum ; Theca follicular interna ; Theca folliculi externa ; the outer connective tissue and the superficial epithelium(5,6). in birds, the size of infundibulum is proportional to the size of egg. The upper end of the tract is expanded to include long finger-like fimbria, each is covered with a ciliated simple columnar epithelium (7, 8). There were four types of epithelial cells which can be distinguished in the infundibulum of the avian, vis:(9).The cranial part of the infundibulum of the fowl is lined by ciliated columnar cells, while the caudal part showed three types of epithelial cell, alternating ciliated and non-ciliated columnar cells on the tip and sides of the folds, the third type is secretory cell in the pouches or grooves between the bases of the primary and secondary folds.(10)

In the laying hen, the infundibular wall is composed of outer longitudinal and inner circular layers of muscle. The lamina propria contains tubular glands lined by

secretory cells that are most numerous in the posterior segment. Internally, the surface epithelium of the anterior segment of infundibulum (ampulla) is lined by ciliated non-secretory cells with occasional groups of granular cells. The middle and posterior segments of the infundibulum (chalaziferous region) are lined by ciliated non-secretory and non-ciliated granular cells (12).

The fimbriae region (funnel portion) of the infundibulum in the mature laying hen is densely populated with ciliated cells. The ratio of ciliated to non-ciliated secretory cells is greater towards the luminal surface of the folds. Non-ciliated cells predominated in the basal aspects of the folds and are found exclusively in the sub-epithelial tubular glands throughout the oviduct. The loose connective tissue in the lamina propria is populated with lymphocytes, plasma cells, macrophages, fibroblast and mast cells(11).

The tunica mucosa of an infundibulum of the mature hens is thin wall observed by (13), fine folds and cover by ciliary cylindrical epithelium. Epithelial cells of the infundibulum can be divided into two groups: ciliary and mucous (goblet cells).

The epithelium of infundibulum of the turkey hen was variable in upper and lower end. It was simple cuboidal in upper end and ciliated simple columnar in middle and lower end stated by. In pigeon, the epithelium of infundibulum was ciliated simple columnar. The mean length of mucosal folds of infundibulum in pigeon and turkey determined  $500.47 \pm 57.7\text{mm}$  and  $125.25 \pm 28.8\text{mm}$  respectively. Mucosal folds in pigeon were leaf shape with secondary folds. The funnel part of infundibulum had no glands but there were seen serous acinus glands in lamina propria of tubular part of infundibulum. In pigeon cilia were distinct able and tunica muscularis of infundibulum in turkey was thick (14).

## **MATERIALS AND METHODS**

In the current study, total of (10) indigenous adult turkey hens (*Meleagris gallopavo*) aged about (45-55) weeks, these birds purchased from local supplier in Diala city, Iraq, were used birds were kept under normal conditions (outdoor) and allowed to access feed and water ad-lib given feed for two weeks to eliminate those have the signs of illness. the euthanasia done by overdose of ketamine (25mg/Kg. B.W) and xylazin (10mg/Kg. B.W), intramuscular injection. Abdominal laparotomy was performed; the ovary and immediately removed from the abdominal cavity. Then specimens were washed with 0.9% normal saline and fixation with 10% formalin solution. The period of fixation in 10% formalin solution (48) hours. After that the specimens washed with running tap water for (4-6) hours, the specimens were proceed with Histological technique as the following steps (15).

Dehydration: in order to remove all extractable water from them.

**Clearing by xylene.**

**Infiltration:** The specimens of ovary and oviduct were transported to a melted paraffin in two steps each step rest for two hours by using oven at (58°C).

**Embedding (Blocking):** The specimens were blocked with paraffin wax then sectioned using standard histological techniques.

**Sectioning:** Standard histological techniques was applied using rotary microtome, exactly 5-6µm thick were prepared from the center and margin of each specimens.

**Mounting:** The section were carried out from bath and fixed on a slide contained mayors albumin (mixture of egg albumin with glycerin) slides were dried an oven with (40°C) for (24) hours (15,16).

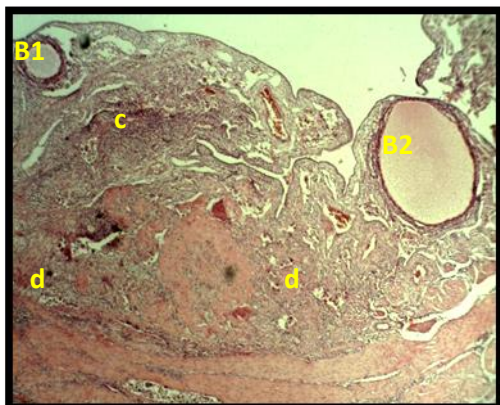
**Staining:**

**Harris hematoxylin and Eosin stain:** For appearance of the general structure of tissue.(15)

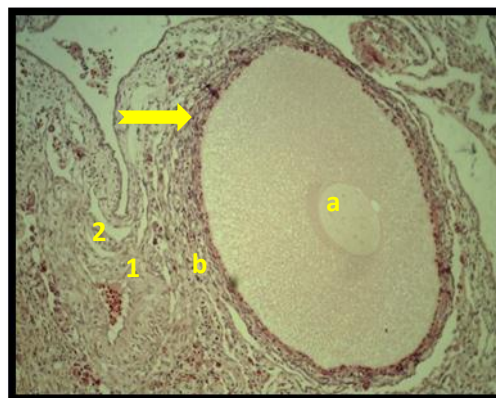
## **RESULTS AND DISCUSSION**

The present study showed that the ovary is covered with simple cuboidal epithelium (germinal epithelium). Internally, two distinct regions can be noticed. The cortex, a peripheral region contains a numerous follicles in different stages of development that are classified as primordial, primary, secondary and tertiary follicles. The primordial follicle appear distributed to the surface of sub capsular cortex surrounded by a single layer of follicular cells contains a small oocyte, showing a cytoplasm of filamentous aspect. The primary follicle appear distributed in the periphery and middle of the ovarian cortex contains oocyte that shows an homogeneous cytoplasm with fine granules. The volume of primary follicle is large than the primordial follicle. The secondary follicle located in the middle cortex. At this stage the follicle is bigger which contains well developed oocyte with the cytoplasm showing a clear with fine granules. The nucleus is placed in central or a slightly eccentric position. The medulla, a more central region, which composed of loose connective tissue, rich in blood vessels and smooth muscle fibers as shown in (Figure 1,2). This result also reported in the domestic fowl by (3). The funnel shaped region of the Infundibulum was expanded and has long finger-like projection which represents the fimbria. Each is lined with simple low columnar epithelium. The lamina propria of fimbria was loose and highly vascularized connective tissue occupied by bundles of smooth muscle fibers and tubular glands were absent in this part as shown in (Figure 4,5,). This result is compatible with results by (1,2) in birds. At the neck region, the mucosa of infundibulum is thrown into long, branched into primary and secondary mucosal folds lined by simple columnar epithelium (Figure5). This result also as in avian (9) and in the laying hen (12). But this result incompatible with result reported by (14) in turkey hen who demonstrated that the epithelium of infundibulum was

variable in upper and lower end represent by simple cuboidal in upper end and ciliated simple columnar in middle and lower end. The lamina propria-sub mucosa was cellular loose connective tissue and highly vascularized contains few of lymphocytes in the sub epithelial tissue as given in (fig.6). The muscularis of this part consists of thick inner circular and outer longitudinal smooth muscle layers as given in (Figure 7). This result as reported in the laying hen by (12).



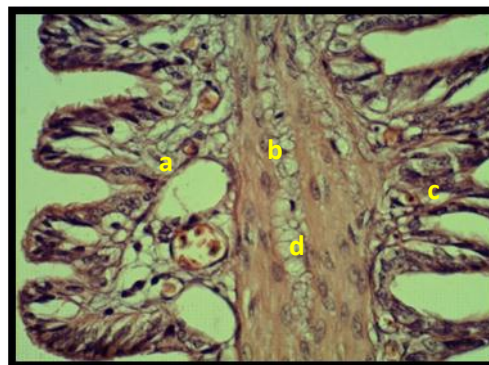
**Figure(1):**Histological Section of the Ovary Showed: a- Germinal epithelium b-Follicles in different stage of development: 1-primordiol follicle 2-primary follicle c-Cortex d- Medulla (H&E stain x10)



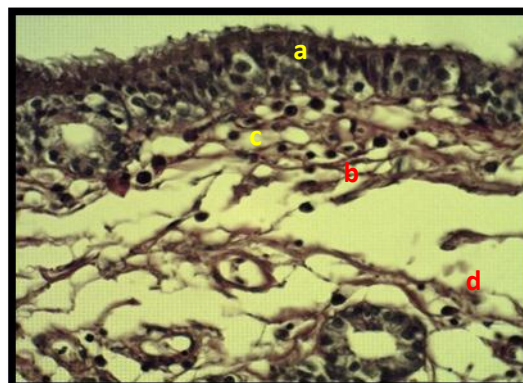
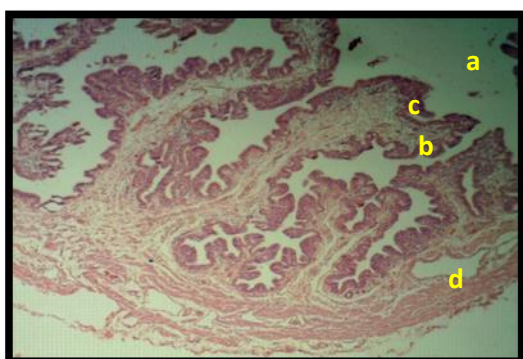
**Figure (2):** Histological Section of Secondary follicles (arrow) showed: a- Nucleus of oocyte b- Ovarian struma contain 1- Bundles of smooth muscle 2- Blood vessels (H & E stain x40)



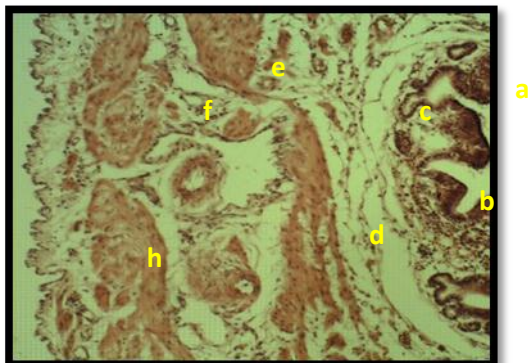
**Figure (3) :** Histological Section of Fimbria Showed: a- Folded mucosa b- Lamina propria c-Muscularis mucosa (H&E stain x40)



**Figure (4):** Histological Section of Fimbria Showed: a- Ciliated pseudo stratified columnar epithelium b- Lamina propria c.Muscularis mucosa d- Arterioles (H&E stain x100).



**Figure (5): Histological Section of Infundibulum Showed: a- Primary fold b- Secondary fold c- Lamina propria d- Tunica muscularis e.Tunica serosa ( H&E**



**Figure (6): Histological Section of Infundibulum (neck region) Showed: a- Ciliated pseudo stratified columnar epithelium b- Lamina propria c- Lymphocyte d- Glandular acinar (PAS**

**Figure (7): Histological Section of Infundibulum Showed: a- Tunica mucosa b-- Lamina propria c- Submucosa d- Inner circular layer e- Arterioles f- Outer longitudinal layer h- Tunica serosa (H&E stain x100).**

## دراسة نسجية لمبيض وقمع الديك الرومي

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### الخلاصة

الدراسة بينت ان مبيض انثى الديك الرومي يغطي بنسيج طلاني مكعب بسيط(الطلانية المولدة).تم تمييز منطقتين هي القشرة واللب. و القشرة وهي المنطقة المحيطة والتي تحتوي على جريبات بمراحل تطورية مختلفة تصنف الى جريبات اساسية واولية وثانوية وثلاثية فالاساسية تظهر منتشرة على سطح المبيض تحت محفظة القشرة محاطة بطبقة احادية لخلايا الجريبات تحتوي على بيضة صغيرة يظهر فيها خيوط سايتوبلازمية والخلايا الاولية تظهر موزعه في محيط ووسط القشرة المبيضية وتحتوي على بيوض داخل سايتوبلازم متجانس مع وجود حبيبات.

### REFERENCES

1. Bradley, O. C.(1960). The structure of the fowl. ( Revised by T. Grahame.) 4<sup>th</sup> ed. Edinburgh, Oliver & Boyd, Ltd.
2. Gilbert, A. B.(1968). Observation on the ultrastructure of the post-ovulatory follicle of the domestic hen. VIth Cong. Intern. Reprod. Anim. Insem. Artif., Paris, 2:1629-1631

3. Ribeiro, M. D.; Teles, M. E. O. and Maruch, S. M. G.(1995). Morphological aspects of the ovary of *Columba livia* (*Columbidae-columbiformes*). *Revta bras. Zool.*,12(1):151-157.
4. Bhavna, B. and Geeta, P.(2010). Histological and histomorphometric study of gametogenesis in breeder and helpers of sub-tropical, co-operative breeder jungle babbler, *Turdoides striatus*. *Journal of Cell and Animal Biology.*, 4(5):81-90
5. Roth well, B. and Solomon, S. E.(1977). The ultra-structure of the follicle wall of domestic fowl during the phase of rapid growth. *British Poultry Science.*, 18:605-610.
6. Chapeau, C.; Engelhardt, H.; King, G. J. and Etches, R. J.(1996). Alkaline phosphatase activity in the theca of ovarian follicles of the hen throughout follicular development. *Poultry science.*, 75(12):1536-1545
- Ogwuegbu, S. O. and Air, T. A.(1990). Ultrastructure studies of the magnum and isthmus of the active oviduct of the indigenous helmeted guinea fowl (*Numidia meleagris gelato, paellas*). *Veterinary Archive.* 60:101-108.
7. Auger. E. and Frye, F. L. (2001). *Comparative veterinary histology with clinical correlates.* Manson Publishing.
8. Aitken, R. N. C. And Johnston, H. S.(1963). Observations on the fine structure of the infundibulum of the avian oviduct. *J. Anat.*, 97:87-99.
9. Fouad, S. M.(1970). Histological studies of the female genital system of the Fayoumi Fowl, broiler, and adult. Ph.D. Thesis, Faculty of Veterinary Medicine, Cairo University
10. Fujii, S.(1963). Histological and histochemical studies on the oviduct of the domestic fowl with special reference to the region of uterovaginal juncture. *Arch. Histology. Jap.* 23:447-459.
11. Bakst, M. R.(1998). Structure of the Avian Oviduct With Emphasis on Sperm Storage in Poultry. *J. Experimental Zoology.*, 282:618-626.
12. Chousalkar, K. K. and Roberts, J. R.(2008). Ultra structural changes in the oviduct of the laying hen during the laying cycle. *Cell Tissue Res.*, 332:349-358.
13. Chekhov, R. Y.(2008). Morphology of an Infundibulum of the Oviduct of the Sexually Mature Hens. *Int. J. Morphology.*, 26(4):883-886.
14. Mohammad pour, A. A. and Keshtmandi, M.(2008). Histomorphometrical Study of Infundibulum and Magnum in Turkey and Pigeon. *World Journal of Zoology.*, 3(2):47-50.
15. Luna, L. G. (1968). " Manual of Histological Staining Methods the Armed Forced Institute of Pathology " 3<sup>rd</sup> Ed. American Registry of Pathology. New York. Pp:76-98.
16. Bancroft, J. D. and Stevens, A.(1982). " Theory and Practice of Histological Techniqes ". 2<sup>nd</sup> Ed. Churchill Livingstone. Edinburgh. London. Melbourne and New York.