Histological And Histochemical Study Of Laying Female Genital System In Peacock "Pavo Cristatus"

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Abstract

The present study was conducted with focus detailed on the histological and histochemical architecture of the oviduct in laying peahen because such research, yet not to be done. Peahen's oviduct included six regions, each composed histologically of four tunicae and lined by pseudostratified columnar ciliated epithelium. Infundibulum consists of two parts: funnel with wide fimbriae and neck part. Funnel had low primary mucosal folds branched into secondary ones, while neck showed short primary folds branched into secondary and tertiary ones. Magnum characterized by the widest and largest unbranched primary folds with leaf-like appearance. Isthmus' folds weren't broad as the magnum; they're smaller, narrower, branching into primary, secondary and tertiary folds containing lots of deepest invaginations. Uterine folds were the most branching bearing secondary, tertiary and quadruple folds; its wall was thicker than magnum and isthmus because muscularis thicker than them with three layers: inner circular, middle oblique and outer longitudinal. Utero-vaginal junction: appeared as small recess between uterus and the cranial part of vagina and open inside the uterine cavity and slightly elevated than its lumen. This area possessed its own type of folds because it showed abrupt alteration of folds from uterine type into a special vaginal type called utero-vaginal which differs from the both because it's lamina propria contain epithelial crypts which termed sperm storage tubules (SST). Vaginal mucosa possessed folds represent continuation to the junction region at the beginning then become shorter near cloaca.

Keywords: histological, histochemical, oviduct, Laying, peahen

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Introduction

Since thousands of years, peafowl have been admired by human beings and preserved as a pet. Peacocks are large, colorful pheasants known for their iridescent tails. The term "peacock" is commonly used to refer to birds of both sexes, but technically, only males are peacocks and the females are peahens, and together, they are called peafowl. (1) Peafowl are forest birds that nest on the ground, but roost in trees. They are terrestrial feeders. All species of peafowl are believed to be polygamous and generally have two to three breeding peahens in its harem (2). The knowledge of the microscopic structural design of different portions of the oviduct through various physiological stages may show a chief role in the ability of inheriting good reproductive functions as highly production of egg by selective breeding (3). The reproductive system had studied thoroughly in many avian species, especially the commercial level and domestic birds, and because the wild birds' reproductive system is necessary it still needs further study in order to develop their reproduction efficacy and improve the production and keep their species. Hence, this study has been made with focus detailed on the histological and histochemical architecture of oviduct in laying peahen because it's yet not be done to date.

Materials and Methods

Around 36-48 months old, ten laying peahens "Pavo cristatus" of body weight about (3.8-4 kg), were used to achieve our study. Birds gained from the local markets in Diyala and Baghdad Governorates, Iraq (4), and transported into the animal house at College of Veterinary Medicine, Baghdad University for couple days before dissecting to make sure from their safety (5,6) then were sacrificed by halal method. The viscera removed after opening the celomic cavity (7-9) to show the genital system. Oviduct parts were set in containers included 10% neutral buffered formaldehyde for (48 hours) then treated with routine histological methods (10). Prepared paraffin blocks were sectioned at 5-6μm thickness then stained with Harris Hematoxylin and Eosin stain for general histological description of all parts during laying period, Alcian blue stain (AB) pH2.5-: for demonstration of acidic mucin, Combined PAS- AB pH2.5: for differentiation between neutral and acidic mucin and Promo phenol blue: for detection of albumin protein. Stained slides examined under light microscope and photographed by using digital camera. All data were analysed using the GrphPad Prism Software at a significant differences of $P<0.05$ (11).

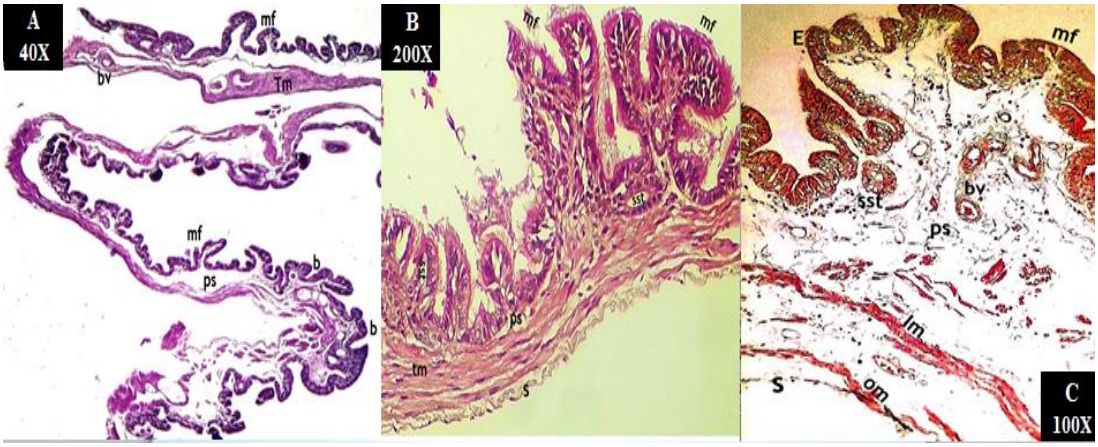
Ethical approval: The research ethical approval was obtained from the (Research Ethics Committee) at University of Baghdad, College of Veterinary Medicine, number (837 / PG).

Results

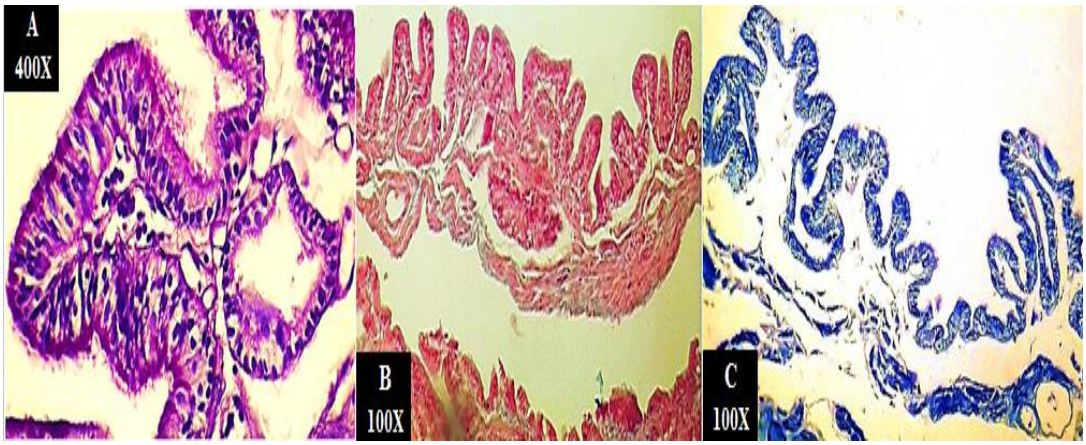
Oviduct: the histological observations of oviduct in laying peahen showed that its wall consists of four tunicae: mucosa, submucosa, muscularis and serosa, with a noticeable increased in their thickness except the serosa.

Infundibulum of laying peahen consists of two parts: cranial thin walled funnel region with long finger-like projections represented the fimbria and the second caudal part was the neck. The mucosa of funnel had low primary mucosal folds branched into secondary ones, lined by pseudostratified columnar ciliated epithelium with the presence of some epithelial crypts lined by simple columnar epithelium. The lamina propria consisted of cellular connective tissue that extended into the core of the mucosal folds and was devoid of glands. Submucosa was vascular loose connective separated from propria by interrupted layer of muscularis mucosa. The muscularis was composed of inner and outer longitudinal smooth muscles separated by loose connective tissue (Fig.1). Histochemical results of the funnel epithelium showed a positive reaction for PAS stain, but give a negative reaction for Alcian blue and Bromophenol blue stains (Fig.2). The second caudal part termed the **neck** which was a short tube that slightly thicker and narrower in comparison to the funnel. Its mucosa showed short longitudinal primary folds branched into

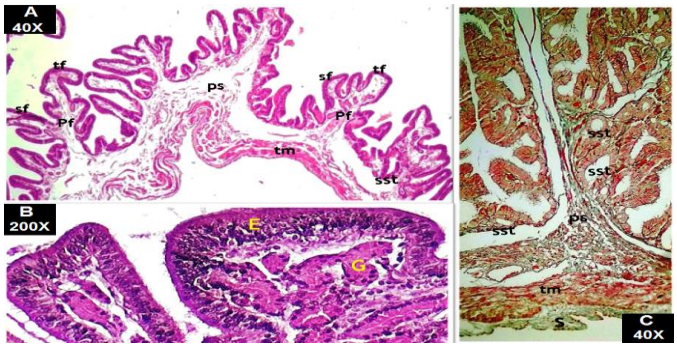
secondary and tertiary ones, each lined by pseudostratified columnar ciliated epithelium and showed discrete tubular structures called sperm-storage tubules (SST) or which are epithelial invaginations play as spermatozoa storage sites that were lined by simple columnar epithelium (mucous secreting). The propria-submucosa was loose connective tissue contained many tubular and acinar glands lined by cuboidal cells. The muscularis consisted of one layer of smooth muscle fibers and covered by serosa on the outside (Fig.3). The histochemical results of the neck gave weak positive reaction for PAS and negative reaction for Alcian blue and Bromophenol blue stains (Fig.4).



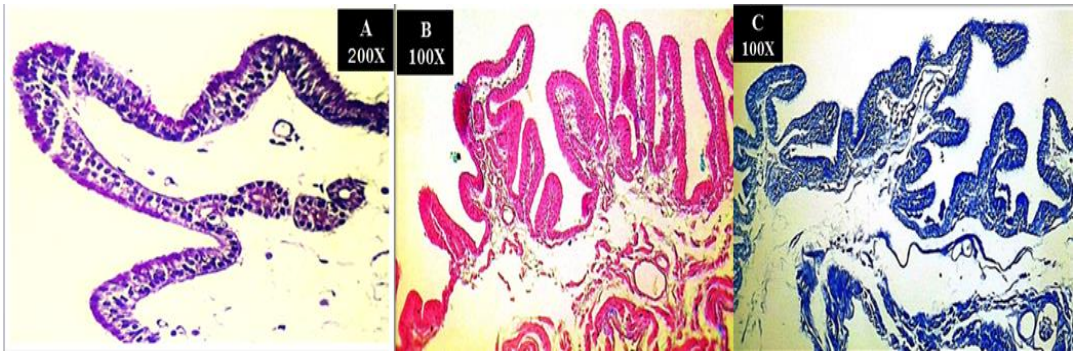
(Fig.1): Histological section of funnel in laying peahen showed: Mucosal folds (mf), branched folds (b), epithelial crypts (ec), propria-submucosa (ps), muscularis (tm), Inner longtudinal m. (Im), Outer longitudinal m. (om), blood vessels (bv) Serosa (s). (A&B- H&E stain, C-Masson's trichrome).



(Fig.2): Histochemical sections of funnel: Epithelial cells gave positive reaction for PAS stain and negative for both Alcian blue and Bromophenol blue stains. (PAS, AB, Bromophenol blue stains).

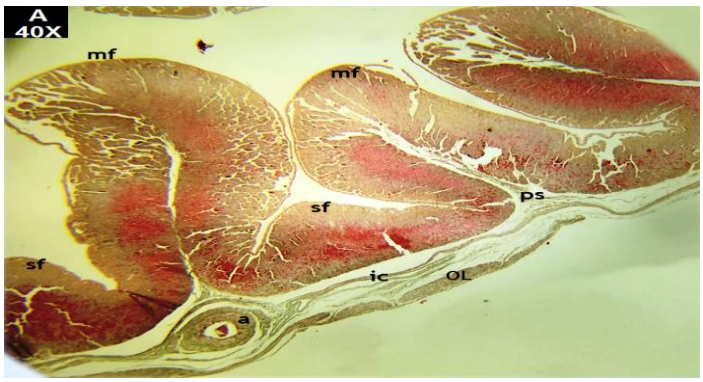


(Fig.3): Histological section of the neck: Primary fold (Pf), Secondary (Sf), Tertiary (Tf), Epithelium (E), Propria-submucosa (Ps), Sperm storage tubule (sst), Acinar and Tubular glands (G), muscularis (tm), serosa (s) (A,B H&E stain, 40X,200X) (C-Masson's Trichrome, 40X).

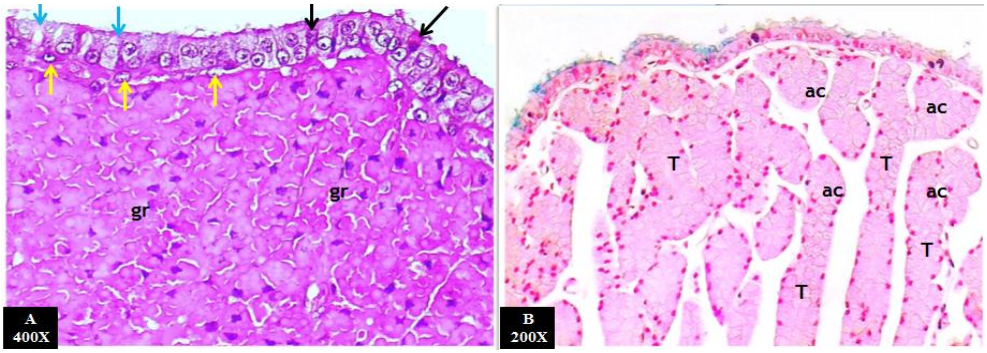


(Fig.4): Histochemical sections of Neck: Epithelial cells gave positive reaction for a-PAS stain and negative for b-both Alcian blue and c-Bromophenol blue stains.

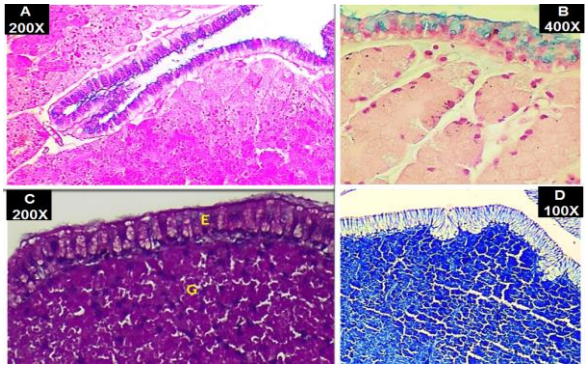
Magnum was the longest part of the oviduct, its mucosa was characterized by the presence of the widest and the largest unbranched primary longitudinally oriented folds take the leaf-like appearance with small simple folds between them (Fig.5a,b). Each lined by pseudostratified columnar epithelium that composed of ciliated and non- ciliated secreting cells (goblet cells). The ciliated cells showed darkly stained cytoplasm and oval nuclei occupied the apical region of the cell while the non-ciliated secretory cells contained basal rounded nuclei. The lamina propria was loose connective tissue, occupied by huge number of simple branched tubulo-acinar proprial glands which were highly developed extended into the core of the mucosal folds and open to the epithelial surface by epithelial infoldings, they were densely packed and lined by cuboidal cells with spherical basally situated nuclei. (Fig.6a,b). The submucosa was loose connective tissue extended into the lamina propria of mucosal folds without distinct separation. The muscularis was inner circular layer and outer longitudinal layer separated by vascular loose connective tissue. The tunica serosa composed of collagenous connective tissue and covered by the mesothelium (Fig.5b). Histochemical results showed strong positive reaction of the epithelial cells and proprial glands of magnum for PAS, Alcian blue and combined (PAS-AB), with positive reaction with Bromophenol stain (Fig.7).



(Fig.5): Histological section of the magnum: mucosal folds (mf), short folds (sf), propria submucosa (ps), Tunica muscularis inner circular m. (ic), outer longitudinal m. (OL), blood vessel (bv), collagen (arrows) serosa (S), (Masson's trichrome, stain, 40X).



(Fig.6): Magnum epithelium: ciliated cells (black arrows), non-ciliated cells (Blue arrows), basal nucleus (yellow arrows), and secretory granules (gr). (a- H&E, 400X, b-AB stain, 200X).

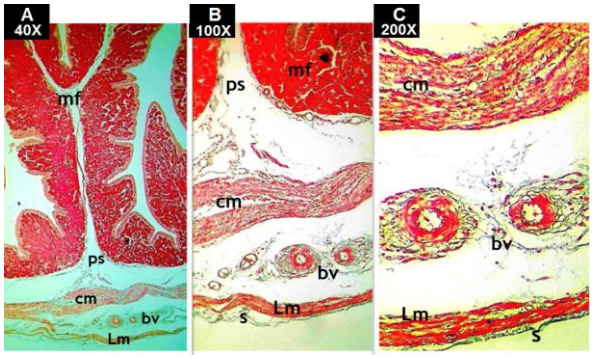


(Fig.7): Histochemical of Magnum: epithelium showed A- strong positive for (combined PAS-AB stain, 200X) B- strong positive for (AB stain, 400X) C- strong positive (PAS stain, 200X) D- positive reaction for (Bromophenol blue stain, 100X).

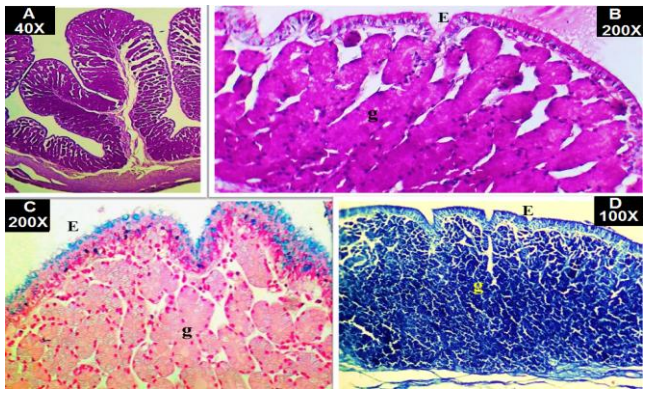
Isthmus: the major mucosal folds in isthmus were not as broad as those of the magnum; they were smaller, narrower, elongated with deepest invaginations. They were branching into primary, secondary and tertiary folds with few short folds between them containing lots of epithelial invaginations with surface opening (Fig.8a). Each lined by pseudo stratified columnar epithelium consisted of ciliated and non-ciliated (goblet cells) and basal cells (fig.8b). The propria- sub mucosa was similar to that of magnum contained densely packed tubulo-acinar glands which were cuboidal with round nucleus and their secretory granules were seen above these glands. The muscularis was inner circular and outer longitudinal smooth muscle with a layer of collagen and blood vessels in between them and the serosa was comprising of loose connective tissue covered by mesothelium (Fig.9). The histochemical study showed that isthmus epithelium gave positive reaction with combined PAS-AB stain while proprial glands showed a positive reaction with AB only. The tubuloacinar glands gave a positive reaction with Bromophenol blue stain (Fig.10).

(Fig.8): Histological section of Isthmus: Primary (Pf), Secondary (Sf), Tertiary (Tf), Short folds (Shf), Invaginations (Green arrows), ciliated cells (Black arrow), non-ciliated (Blue arrows), basal

cells (Red arrows), blood vessels (bv) Propria-submucosa (Ps), Tunica muscularis (tm). (H&E, 40X,400X).

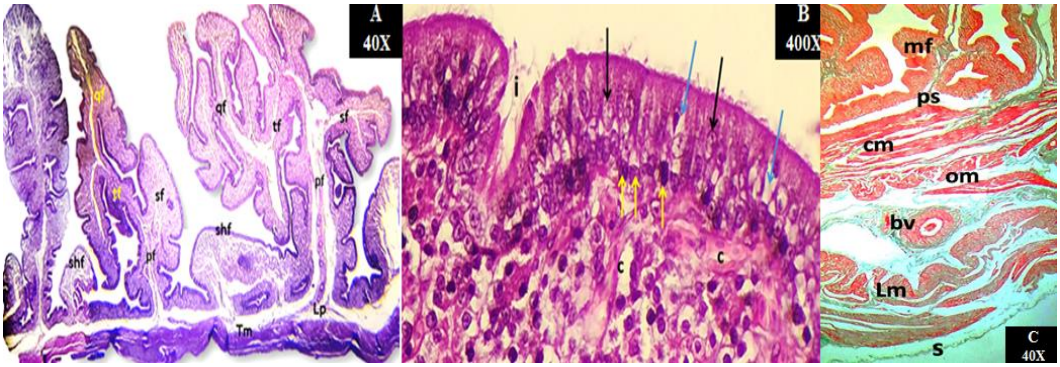


(Fig.9): Isthmus wall: A- Mucosal fold (Mf), propria submucosa (ps), muscularis (M), blood vessel (bv), circular m. (cm), longitudinal m. (Lm), serosa (S). (Masson's trichrome stain, 40X,100X,200X).

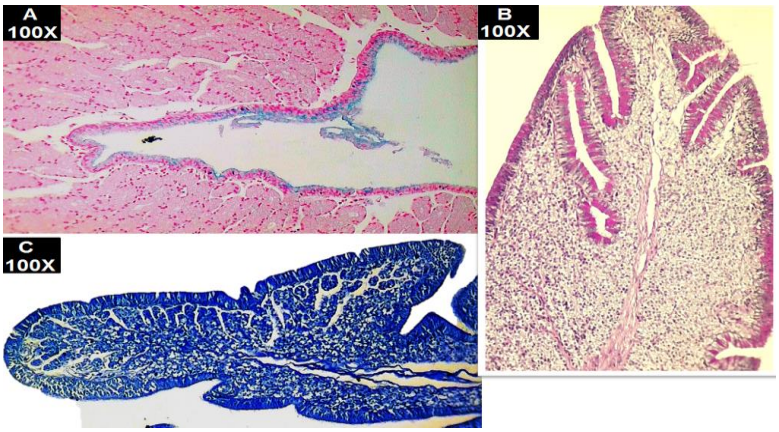


(Fig.10): Histochemical of Isthmus: A&B- strong positive for (PAS stain 40x, 200x). C-Positive reaction for (AB stain, 200x), D-positive reaction for (Bromophenol stain, 100X).

Uterus mucosal folds characterized by the presence of the most branching primary folds that bearing secondary, tertiary and quadruple folds with simple short folds in between them. They begin from the end of isthmus and increased in thickness toward the uterus center, then decrease again to be terminated at the junction between the uterus and vagina with thick and short cilia on the top of its cells (Fig.11a,b). Each fold was lined by pseudostratified columnar epithelium composed of three cells types: ciliated, non-ciliated and basal cells. Blood capillaries from the sub-epithelial connective tissue appeared in contacting to the basement membrane of the lining epithelium. The proprial uterine glands were crowded and difficult to distinguish their type, but it can be described as simple branched tubular glands lined by cuboidal epithelium contained secretory granules (Fig.11b). Uterus wall was thicker than that of the magnum and isthmus because its muscularis was thicker than both of them with three layers of smooth muscle: inner circular, middle oblique and outer longitudinal separated by well-vascularized collagenous connective tissue (Fig.11). The histochemical results showed that non-ciliated cells reacted strong positively to PAS stain while the ciliated cells showed slight to moderate acid mucopolysaccharide activity for Alcian blue stain, While the proprial glands showed positive reaction for Bromophenol blue stain (Fig.12).



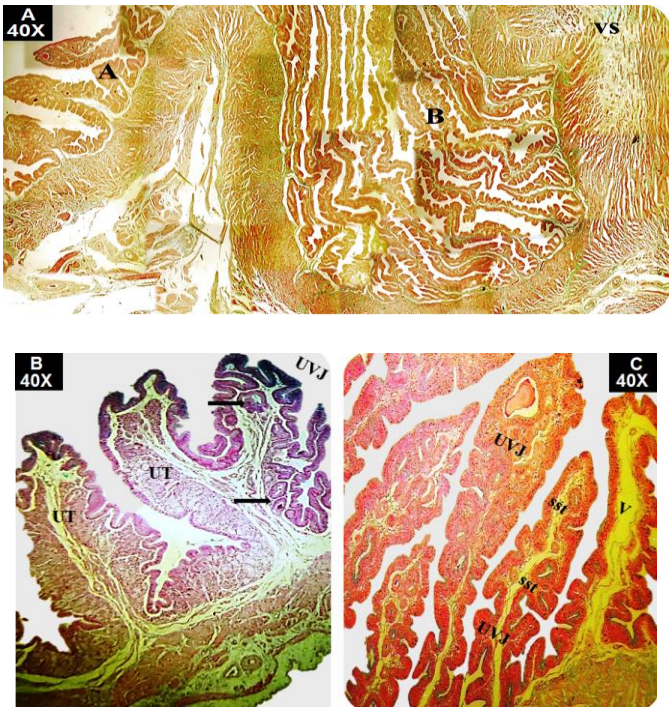
(Fig.11): Histological section of Uterus: primary (Pf), Secondary (Sf), Tertiary (tf), quadruple folds (qf), Short folds (Shf), infolding (i), ciliated cells (Black arrow), non-ciliated (Blue arrow), basal cells (yellow arrows), capillaries (c), propria-submucosa (ps) muscularis (Tm): inner circular (cm), oblique m. (Om), outer longitudinal (a,b- H&E stain. 40X, 400X, c-Masson's trichrome stain, 40X).



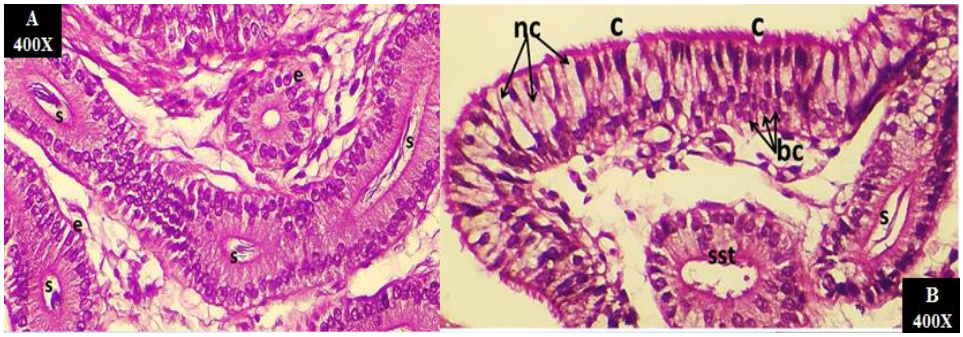
(Fig.12): Histochemical of Uterus: A- positive AB stain (AB stain 100X). B- Strong positive PAS stain (PAS stain, 100X) C- Positive reaction to (Bromophenol blue stain, 100X).

The Utero-vaginal junction: is a region between uterus and vagina appeared as small recess at the cranial part of vagina and open inside the cavity of uterus and slightly elevated than its lumen, may be to allow the stored spermatozoa to descend toward the infundibulum the secondary storage site for fertilization and they prevented from return caudally to the lumen of the vagina due to the presence of a muscular elevation of a ridge shaped called the vaginal sphincter between the uterus and vagina (Fig.13a). This area possessed its own type of folds because it showed abrupt alteration of the mucosal folds from the uterine type into a special vaginal type called the utero-vaginal which differs from the both because it's lamina propria contain epithelial crypts which were the sperm storage tubules SST (Fig.13a,b,c). The folds of this region branched into mainly primary and sometimes secondary ones, and arranged in two regions: anterior and posterior; the former had short and wide simple mucosal folds while the latter had the tallest and the thinnest mucosal folds which is continuation to the beginning of vagina (Fig.13b,c) the both were devoid of proprial glands and lined by pseudo stratified columnar epithelium containing of three types of cells (ciliated columnar cells with apical nuclei and non-ciliated secretary with basal nuclei, that have arranged into three rows and basal cells) (Fig.14a). The lamina propria was loose connective tissue showed no glands and filled with SST that lined by a single layer of columnar epithelium with basal nuclei, the microscopic examination demonstrated the presence of many spermatozoa observed inside their lumen (Fig.14b). The muscularis was inner circular smooth muscle intermingled with collagen bundles and thin outer longitudinal smooth muscle (Fig.15a,b). Histochemical results of UVJ revealed that epithelial cells and SST were positive to PAS and combined AB/PAS while displaying

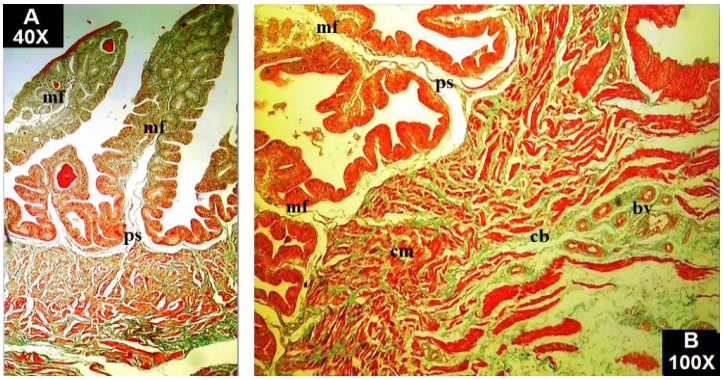
moderate reaction for Bromophenol blue stains (Fig.16).



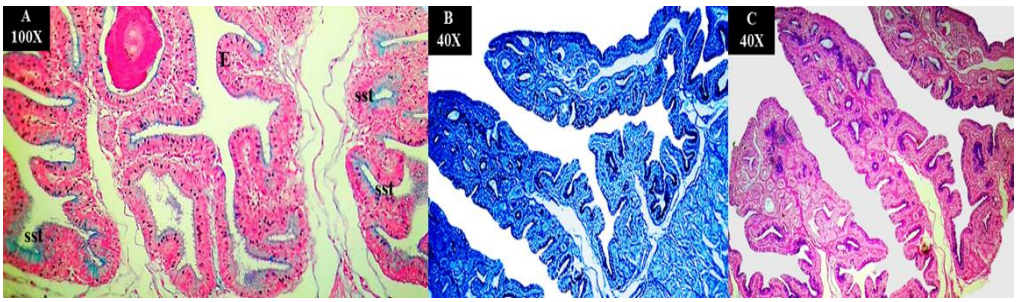
(Fig.13): Utero-vaginal junction: anterior part (A), posterior part (B), vaginal sphincter (vs), uterine type folds (UT), Utero-vaginal type folds (UVJ), vaginal type folds (V) sperm storage tubules (SST) (arrows), (A&B-Masson's trichrome stain 40x) (C- AB stain 40x).



(Fig.14): Epithelium of UVJ containing: ciliated cells (c), non-ciliated-secretory (goblet) (nc), basal cells (bc) sperm storage tubules (SST) and spermatozoa (s) inside it (H&E stain, 400X).

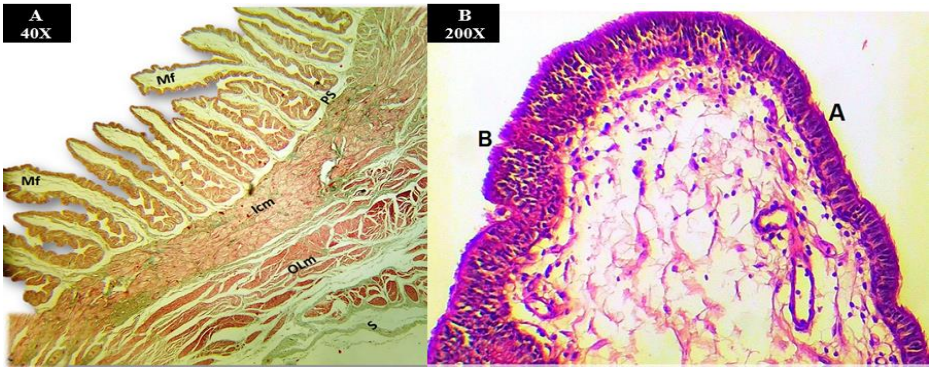


(Fig.15): UVJ wall: Mucosal folds (mf), propria submucosa (ps), circular smooth m. (cm) intermingled with collagen bundles (cb), blood vessels (bv). (Masson's trichrome stain, 100x,400x).

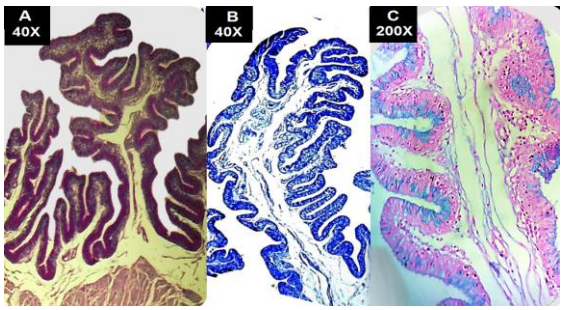


(Fig.16): Histochemical of UJV: a- positive AB stain, 100X, b- Moderate reaction for Bromophenol blue stain, 40X. c- Moderate reaction for Combined PAS-AB stains, 40X.

The vagina: was the caudal most section of the oviduct. Peahen's vaginal mucosa in laying birds possessed long primary folds as a continuation to that in the junction region at the beginning of vagina but it become shorter near the cloaca, the folds were mostly primary and sometimes bearing secondary and tertiary ones, each lined by pseudostratified columnar epithelium consists of three types of cells: ciliated cells, non-ciliated secretory goblet cells and basal cells (Fig.17a). Near the cloacal region, the pseudo-stratified epithelium changing into stratified squamous keratinized epithelium (Fig.17b). The propria-sub mucosa characterized by the lack of any tubular glands and SST and consists of dense irregular collagenous connective tissue. The muscularis was well developed particularly the inner circular layer which represented the thickest part of the vaginal wall forming the vaginal sphincter, as well as the outer longitudinal smooth muscle fibers. Serosa made of loose connective tissue (Fig.17a). Histochemical results of vagina revealed that the epithelial cells showed positive reaction for both PAS and AB stains and showed moderate reaction for Bromophenol blue stain (Fig.18).



(Fig.17): Vaginal wall: a- folds (mf), propria submucosa (ps), inner circular (ICM), outer longtudinal (OLM), serosa (S). Near the cloacal region, the ps. st. epithelium (A) that covering vaginal folds changing into stratified squamous epithelium (B) (Masson's trichrome stain 40x, H&E stain 200x).



(Fig.18): Histochemical of Vagina: epithelial cells showed positive reaction for: A- (PAS, 40X) B- (Bromophenol blue stain, 40X) C- (Alcian blue stain, 200X).

Histological Measurements: the number, height, and thickness of the mucosal folds as well as the epithelial height, thickness of lamina propria-submucosa and thickness of tunica muscularis of each region of the oviduct in laying peahen mentioned in Table (1).

Table 1: Shows number, height and thickness of the mucosal folds as well as the epithelial height, thickness of lamina propria-submucosa and thickness of tunica muscularis of each region of the oviduct in laying peahen.

Parameters / Regions	Numbers of folds µm	Height of folds µm	Thickness of folds µm	Height of epithelium µm	Thickness of lamina propria and submucosa µm	Thickness of T. muscularis µm
Funnel	16.16±0.28	196.56±3.67	63.01±3.146	28.003±0.82	76.49±1.11	69.51±1.36
Neck	26.73±0.22	168.79±7.33	61.29±3.44	27.24±0.94	50.05±1.01	72.71±1.12
Magnum	5±0.14	396.87±1.66	195.36±1.159	60.62±0.99	402.55±4.46	62.22±1.117
Isthmus	6±0.197	342.88±2.022	203.16±1.37	46.172±0.82	492.44±2.92	70.76±1.26
Uterus	6.3±0.180	303.69±3.098	131.56±4.21	46.77±0.81	410.45±2.25	518.19±2.95
Junction region	5±0.17	343.10±3.966	206.99±3.127	42.81±0.59	333.63±2.97	128.85±1.86
Vagina	7.0666±0.19	469.52±8.32	117.70±2.817	62.003±0.81	211.21±3.08	717.14±5.18

Discussion

The histological observations on the oviduct of laying peahen showed that its wall consists of four tunicae: similar to findings of (12) in laying hen, and (13) in mature geese.

The infundibulum was consists of two parts: cranial funnel and caudal neck part. The **funnel** mucosa, epithelium and folds appearance was agree with findings of (14) in ostrich, (15) in geese and guinea fowl, but disagree with results of (16) in ostrich who described the epithelium of infundibulum as simple columnar ciliated epithelium. The propria-submucosa was loose connective tissue and devoid from glands these findings emphasizes that this part deals with the reception of the egg only, and were similar to (17) in laying geese but differ with (18) in duck, who found that it contained tubular glands in both the funnel and neck. The muscularis results in funnel were dissimilar to that of (19) in duck who noticed that muscularis of infundibulum was single circular layer. Histochemical results of the funnel epithelium was similar to (20) in emu but different with (16) in ostrich. The second caudal part was the **neck**, its mucosa, epithelium and folds appearance were parallel with (21), (14) in ostrich, (13) in geese. The propria-submucosa was loose connective tissue contain many tubular and acinar glands similar to that of (22) in chicken and (23) in hens. In contrast (24) in duck observed that the infundibulum was devoid of such glands. The muscularis results of neck were similar to (19) in Duck and (15) in geese and guinea fowl; but differs from (13) in geese and (21) in ostrich who recorded the presence of different directions of smooth muscle. The histochemical results of the neck were agreed with (25) in rhea bird who found that neck epithelia had mucous secreting cells which give PAS positive reaction granules only. Besides, these results confirm with results of (22) in mature hen and (18) in duck who noted that the presence of glands distributed within lamina propria of infundibulum. Whereas (19) in immature kuttanad duck revealed that glands were absent in the infundibulum.

Magnums' epithelium and folds appearance were similar to (24) in mallard duck (3) in Laying hens, but differ with findings of (26) in Japanese quail who found the magnum epithelium was simple columnar. The lamina propria was loose connective tissue contained huge number of simple branched tubulo-acinar glands parallel to (13; 21) in duck and geese and differ with (27) in turkey who found the magnal proprial glands were simple branched tubular. The submucosa, muscularis and serosa results were parallel with (28) in laying turkey. Histochemical results of magnum confirm with that of (16) in ostrich and (20), (15) in geese and guinea fowl. Both Epithelium and glandular acini give positive

reaction to Bromophenol blue stain Similar to findings of (17) in laying geese.

The isthmus epithelium, structure and folds were similar to findings recorded by (29) in ostrich, (12) in hen and duck; while the epithelium was ciliated simple columnar and non- ciliated mucus secreting cells as reported by (27) and (28) in turkey. The propria- sub mucosa results were agree with (25) in rhea, (30) in pekin duck and (31) in ISA brown chickens; (20) in emu. But they're differing with (18) in balady duck and (32) in pekin duck who found that glands were simple and coiled. The muscularis findings were in accordance with (28) in laying turkey but opposing with finding of (33) in Marreca who described the tunica muscularis composed of three layers. The histochemical results of isthmus were parallel to that of (34) in Kashmer chicken.

The uterus mucosal folds and structure findings were parallel with (24) in duck, but were disagreement with that recorded by (13), in geese, (21, 29) in ostrich; (20) in emu who observed that uterine folds branched into primary and secondary folds only, each fold was lined by pseudostratified columnar epithelium composed of three cells this result agree with (35) in chicken, while disagreement with other authors like (26) in Japanese quail, (29) in ostrich, who showed that the epithelium was ciliated and non-ciliated simple columnar epithelium. The proprial uterine glands findings were Similar to that mentioned by (18) in Balady Duck, (34) in Kashmir chicken and (17) in laying geese. The uterus wall findings were parallel to that detected by (24) in duck and (15) in geese and guinea fowl, in compared with two layers of smooth muscle bundles in the uterus of avian as stated by (21) in ostrich, (36), (3) in laying hen. The histochemical results of uterus were similar to findings stated by (25) in Rhea birds, (13) in mature geese, (29,21) in ostrich. While the proprial glands showed positive reaction for Bromophenol blue stain, this result indicated that albumin was produced of some glandular cells in the uterus, similar result stated by (17) in laying geese.

The Utero-vaginal junction shape and structure of folds were parallel to (37), (38) in quail, (36) in turkey hen who found that the SST either primary or secondary, the primary is UVJ and the chalaziferous region at distal infundibulum is the secondary one, but disagree with (32) who referred to the absence of (SST) in the in turkey and Pekin duck. The folds of this region mainly primary and sometimes secondary with anterior and posterior regions these findings were parallel to (36) in turkey hen. The lamina propria of UVJ resembled to those of (24) in Mallard duck and (15) in geese and guinea fowl, although (38) in quail described this region as rich with glands. Sperm-storage tubules (SST) were observed in the lamina propria of UVJ by many authors as (36) in turkey, (37) in quail, (24) in duck. The muscularis of UVJ was two layers, although others mentioned that the tunica muscularis of the junction region was continuation to that of the uterus and composed of three layers. The histochemical results of UVJ were similar to the findings of (25) in Rhea.

The vaginal epithelium and folds appearance findings were similar to that of (30), (18) in duck, (28); (34) in Kashmir chicken, while unparalleled to those documented by (31) in mature chicken who stated that the vaginal folds were mostly of simple type. Near the cloaca, the pseudo-stratified epithelium changing into stratified squamous epithelium parallel to findings of (21) in ostrich, (39) in barn owl. The propria-sub mucosa characterized by the lack of any tubular glands and sperm storage tubules SST Similar to the findings described by (32) in mature ducks, (29) in ostrich and (40) in geese. The tunica muscularis was well developed particularly the inner circular layer, these finding supported by findings of (12) in hen and duck, (18) in duck and (20) in laying and non-laying emu birds, but differ with the results of (29) in ostrich, (15) in geese and guinea fowl who stated that vaginal muscularis composed from three layers. Histochemical results of vagina were analogous with (24) in mallard duck, while dissimilar to the findings of (30) in duck who

found weak to moderate reaction to combined PAS-AB stain.

Conclusions:

The lack of secretory glands in the propria of funnel and its negative reaction for special stain may be mean that its function is to receive egg only while the presence of SST in neck propria confirm that it's a region of fertilization. Magnum's length and its widest folds lead to large secretory surface that gave strong histochemical reaction which referred that proteins and albumin were formed in the magnal glands. Uterine length, size and further branching of its folds helped in the enlargement of the secretory surface for shell formation. Vaginal wall showed the lack of any glands and SST, this may be explained that it's only a passage area.

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Conflict of interest

There is no conflict of interest as declared by the authors.

Article Highlights

Peahen's oviduct included six regions, each composed histologically of four tunicae. Magnum showed the widest and largest unbranched primary folds. The folds of anterior part of UVJ showed sudden change from uterine type into the UVJ type that devoid of glands and include SST while the folds of the posterior part showed sudden change from the UVJ type into vaginal type that devoid of both glands and (SST).

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