MORPHOGENESIS OF THE VOMERONASAL ORGAN (JACOBSON'S ORGAN) IN BUFFALOES (BOS-BUBALIS)

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ABSTRACT

The present study was done on 16 heads of buffalo foetuses (12-104 cm CVL. & 83-308 days-old). The specimens were prepared as usual for the descriptive dissection and the light microscopic studies. The result revealed that Grossly, the vomeronasal organ was bilateral formation located alongside the ventral border of the nasal septum and invested by its own cartilage underneath the nasal mucosa. It had an average length of about 8 cm long, it was communicated rostrally with the incisive duct and ended caudally by blind end 2 - 2.5 cm cranial to the first premolar tooth. Its lumen mostly was crescentic in shape. Microscopically, the developmental changes could be chronologically followed in three stages. In the first stage (83-155 days-old), the primitive vomeronasal organ of 83 days-old foetuses was formed of a primitive vomeronasal duct lined by stratified epithelium rested on loose propria-submucosa and it was surrounded by a sheet of primitive chondrogenic tissue. In foetuses of 110-128 days-old, the lining epithelium of the duct showed more differentiation into lateral thin and medial thick layers and rested on a loose vascular propria-submucosa. In 155 days-old foetuses the lining epithelium was differentiated into lateral respiratory and medial olfactory epithelia, the propria-submucosa was thickened and showed blood sinuses deep to the respiratory epithelium. In stage II (182-227 days-old), the glandular buds of the vomeronasal glands appeared were firstly differentiated along the main part of the duct in foetuses of 182-191 days-old and later on at its cranial part in foetuses of 227 days-old. The propria-submucosa deep to the respiratory epithelium revealed many glandular buds and many large venous sinuses. Meanwhile, deep to the olfactory epithelium it had scattered nerve fasciculi but neither glands nor sinuses. In stage III (254-308 days- old), the propria-submucosa became more thicker in foetuses of 254 days old and revealed abundant glands and large venous sinuses and projected to inside the lumen of the duct deep to the respiratory epithelium but revealed many nerve bundles deep to the olfactory epithelium. In foetuses of 308 days-old the lumen became narrowed and the propria was endowed with the glandular acini and the venous

sinuses deep to the respiratory epithelium and by many nerve bundles deep to the olfactory one. The vomeronasal cartilage encircled the vomeronasal duct all over its long axis. The most rostral end of duct was lined with stratified squamous epithelium. The vomeronasal glands were PAS positive and - Ab negative.

INTRODUCTION

It has been suggested that, the vomeronasal organ is intimately associated with the olfactory sense and detection of the phermone material and it was involved in mediation of the reproductive behavioral responses among the mammals (10, 22, 31, 15 and 32). In spite of the many available literature concerning the basic anatomical structure of the vomeronasal organ among the adult domestic animals (13, 11, 16, 24, 12, 1, 8, 23 and 18) and the laboratory animals (29, 26, 27, 19 and 25) the available data concerning the development of such organ were meager (30, 28, 2 and 3). The occurrence of the Flehmen displays was linked to vomeronasal function (15). The buffaloes are best known to exhibit a good Flehmen reproductive behavior, thus the present study was intended to describe the morphogenesis of this organ in the buffaloes and to document its developmental status during prenatal life .

MATERIAL AND METHODS

The present work was carried out on 16 heads of buffalo foetuses (Bos-bubalis L.) of both sexes, ranging in CVR. length from 12-104 cm long in corresponding to 83-308 days-old. The foetuses were collected from Mansoura abattoir and animal's farms during the abortion, premature birth and dystocia. The heads of the aged foetuses were dissected, the nasal cavity was separated and the nasal region including the nasal septum and the vomeronasal organs were isolated. The specimens were fixed in Bouin s fluid and /or 10% buffered neutral formalin solution and the aged specimens were decalcified in 5% EDTA solution. Two formalin-fixed heads of full term foetuses were dissected and utilized for the macromorphological studies. The selected specimens including the cranial, middle and caudal parts of the vomeronasal organ from all specimens were treated with the normal histologoical techniques and sectioned at 5m thickness. The sections were stained with haematoxylin and eosin, alcian blue /periodic acid Schiff's and Crossmon s trichrome stains adopted by (7). The nomenclature used was that adopted by (21). The age of each foetus was estimated according to (4) and postulated in table (1).

RESULTS

A: Macromorphology :

The vomeronasal organ of the full term buffalo foetus was a bilateral formation located alongside the ventral border of the nasal septum underneath the nasal mucosa and in direct relation to the vomer bone, the palatine processes of both maxillary and premaxillary bones. It started cranially just caudal to the incisive papilla and ended caudally by 2-2.5 cm cranial to the level of the first premolar tooth and measured an average length of about 8 cm long. The rostral part of the organ proceeded craniventrally through the palatine fissure from the nasal to the oral cavity where it communicated with the incisive duct caudal to its oral orifice. The organ was communicated with the oral and nasal cavities by means of the oral and nasal orifices of the incisive duct. The organ was almost completely enclosed by the vomeronasal cartilage along its axis. The internal contour of the organ was varied along its axis and it was mostly appeared crescentic in its shape. The long axis of the crescentic lumen was oriented vertically with lateral convex and medial concave mucosal walls .

B: Microscopical study:

The developmental changes met with during the organization of the vomeronasal organ of the buffalo could be divided into three distinct stages according to its chronological events. Stage I (83-155 days-old): At the earliest age of the study (83 days-old), the presumptive vomeronasal organ was composed of two primitive vomero-nasal ducts coursed alongside the ventral border of the prospective nasal septum. Each duct was uniformly lined along its length by stratified epithelium having mostly spherical nuclei, it was formed of a single basal cell layer of darkly stained cells and many superficial cell layers of lightly stained or vacuolated cells. The lining epithelium was more thicker at both ventral and medial aspects of the duct than elsewhere. The duct was surrounded by propria-submucosa of loose connective tissue rich with scattered connective tissue cells. The propria submucosa was bordered along the ventral and medial aspects of the duct by a perichondrogenic curved plate that was formed of fibroblastic condensation and primitive chondrogenic cells and surrounded by dense perichondral layer (Fig. 1 & 2).

In foetuses of 110 days-old, the lining epithelium of the duct showed more differentiation into lateral thin epithelial one that having numerous cellular vacuolations and medial thick epithelial layer having more stratification and less cellular vacuola-tions. The superficial cells of the lateral epithelium revealed partially spherical and partially elongated nuclei while, those of the medial one mostly revealed vertical oval nuclei with apparent few cilia. The propria-submucosa was continued with that of the septal nasal mucosa and it was still formed of loose connective tissue containing many small and few large blood vessels. These vessels were mostly engorged with the

blood and appeared invaded from the nasal mucosa. The lumenal configuration of the duct was varied from a upright elongated to ovoid in its shape passing in a craniocaudal direction. The prechondral sheet of the prospective vomeronasal cartilage was J-shaped and showed more distinguished chondrogenic tissue with widely spaced chondroblasts and covered with well-recognized perichondral layer (Fig. 3&4).

In foetuses of 128 days-old, the most distinct developmental features were the differentiation of the primitive J-shaped prechondral plate along the main part of the duct into closed quadrilateral tube enclosing the vomeronasal duct and its associated soft tissues. The medial layer of the lining epithelium of vomeronasal duct showed more stratification and revealed uniformly concave lumenal surface while, the lateral one showed only moderate reduction in the number of the vacuolated cells and revealed more or less straight lumenal surface. The lumen of the duct appeared more or less ovoid in outline. The propria-submucosa was formed of loose connective tissue rich in scattered small blood vessels but it was mostly thicker deep to the lateral epithelium and revealed few large blood vessels or sinuses (Fig. 5).

In foetuses of 155 days-old, the vomeronasal organ and its associated soft tissue showed a great diversity in their structures. It was possible to distinguished to two types of lining epithelium; thin respiratory and thick olfactory types. The former lined the lateral and dorsolateral aspects of the duct while the later one lined the medial and ventral aspects of the duct. The respiratory epithelium was thinner and formed of pseudostratified columnar ciliated epithelium with scarcely scattered goblet-like cells. The olfactory epithelium was much thicker and built-up of basal, bipolar and sustentacu-lar cells and having many surface cilia. The propria submucosa was greatly thickned deep to the respiratory epithelium and contained many large blood sinuses. Meanwhile, it was thin deep to the olfactory epithelium and revealed many nerve fasciculi especially at the dorsomedial aspect of the duct indicating the tracing course of the vomeronasal nerve. The lumenal surface of the olfactory epithelium was concave, while that of the respiratory one was convex and the lumen was crescentic in its shape. The configuration of vomeronasal cartilage was varied along the axis of the duct and revealed many differentiated chondroblasts and chondrocytes as well as developed chondrogenic perichondral layers (Fig. 6 & 7). Caudal to the closed caudal end of the duct, the blood vessels and the nerve fasciculi of the vomeronasal nerve were proceeded caudally through the septal-submucosa and guarded by prolonged L-shaped plate of the vomeronasal cartilage (Fig. 8).

Stage II : (182-227 days old). In foetuses of 182 days—old, the general appearance of the lining epithelium of vomeronasal duct had not changed substantially with respect to the previous age where it was formed of a lateral thin respiratory epithelium and medial thick olfactory one. But the latter showed further dorsal and ventral expansions to line the dorsal and ventral curvatures

of the lumen rather than the medial aspect and showed further cellular differentiation. The configuration of the lumen was varied from upright straight to slightly curved to crescentic cavity passing in a craniocaudal direction along the axis of the duct (Fig. 9 & 10). On the other hand, the lateral respiratory epithelium showed dorsolateral and ventrolateral outward invagination in the underlying propria-submucosa. The most distinct developmental features were the differentiated glandular buds of the future vomeronasal glands from the dorsal crypt of the lateral respiratory epithelium. The appearance of these glandular buds were mostly limited to the middle and caudal parts of the organ as they were not yet observed cranially. The propria-submucosa showed widely distributed small blood vessels deep to both respiratory and olfactory epithelium as well as many intermingled large thin walled blood sinuses or small arteries deep to the respiratory epithelium.

In foetuses of 191 days-old, the constructive pattern of the vomeronasal organ was closely similar to that of the previous age except that, the previously differentiated glandular buds were increased in the number and became canalized. Also, the ventral crypt of the respiratory epithelium showed early differentiated glandular buds (Fig. 11).

In foetuses of 227 days-old, the vomeronasal cartilage was being to be formed of mature hyaline cartilage that was contained mature chondrocytes and cartilaginous matrix and invested with clear fibrous perichondral layer. The enclosed tubular configuration of the vomeronasal cartilage along the main part of the duct was represented cranially by strongly curved J-shaped plate around the cranial part of the vomeronasal duct. Also, the general configuration of the lumen was varied from upright elongated straight to slightly curved to crescentic-like in its outline passing in a craniocaudal direction along the length of the duct. The lining epithelium of the vomeronasal duct had no further changes in its structure and appearance unless, it was relatively thin at the cranial part of the duct. The respiratory epithelium showed more or less corrugated lumenal surface. The propria-submucosa along the middle and caudal parts of the duct became more vascularized and revealed more differentiated glandular buds and canalized acini deep to the respiratory epithelium but many scattered nerve fasciculi and bundles deep to the olfactory epithelium. In this respect, the cranial part of the duct showed peculiar features where the glandular buds were delayed in its differentiation and being to be developed from both medial and lateral respiratory lining epithelium. As well, both buds and the blood vessels showed peculiar distribution all over the contour of the lumen and even more medially than laterally in contrast to the usual pattern which could be maintained in the middle and caudal part of the duct. The nerve fasciculi were being to be absent at the cranial part of the organ the orifices of the glandular duct system were observed at the ventral and lateral commissures of the wall and occasionally at the lateral wall (Fig. 12 & 13).

Stage III: (254-803 days-olds): In foetuses of 254 days old, the general construction of vomeronasal organ along its length had little further developmental changes that were concerted mainly to the propria-submucosa of the middle and caudal parts of the organ where it was formed of interwoven dense collagen fibers and little ground substance. It showed many distributed small blood vessels underneath the lining epithelium all over the contour of the lumen. Furthermore, it was much thicker deep to the respiratory epithelium where it contained many large blood sinuses and great patches of aggregated glandular acini as well as few nerve fasciculi. The propria-submucosa together with the overlain respiratory epithelium were clearly bulged to the lumen. As a result, the lateral lumenal surface of the duct became strongly convex and the lumen was displaced medially. The respiratory epithelium revealed clearly corrugated lumenal surface. On the other hand, the propria-submucosa underneath the olfactory epithelium had neither glands nor blood sinuses but had many nerve fascicull and revealed a uniform lumenal concave surface (Fig. 14 &15).

In foetuse of 308 days old, the basic constructive and functional components of the vomeronasal organ were clearly attained and the organ became well-established. The vomeronasal cartilage was clearly formed of mature hyaline cartilage that contained mature chondrocytes and surrounded by a clear fibrous perichondrial layer. It completely encircled vomeronasal duct and its associated soft tissue all over its whole length except cranially it where deficient laterally and replaced by J-shaped lamina. The lining epithelium allover the length of the vomeronasal duct was formed of lateral thin respiratory epithelium and medial thick olfactory one but the relative thick-ness of these layers were reduced cranially and caudally to some extent. The propria-submucosa all around the contour of the duct became highly endowed with the associated special structure of the vomeronasal organ. It showed many large blood sinuses deep to the respiratory epithelium rather than the widely distributed small blood vessels. As well, it revealed lot of the well-developed glandular acini all around the contour of duct except medially where they were absent. These glands were branched tubuloacinar of strongly PAS positive and AB negative indicating neutral mucopolysaccharides nature. Moreover, these glands showed few excretory duct system but had very clear periglandular lymph spaces. Furthermore, the propria-submucosa revealed many nerve bundles deep to olfactory epithelium at the medial and ventral aspect of the duct. The lumen of the duct was greatly narrowed especially at the caudal end of the duct (Fig. 16 & 17). On the other hand, the most extreme cranial end of the vomeronasal duct pursued a craniventral direction and traverse the palatine fissure where, it was communicated with the incisive duct. It was lined by stratified squamous non keratinzed epithelium continued with that of the incisive duct and it was supported by comma-shaped cartilaginous plate (Fig. 18). As well, the vomeronasal cartilage was continued caudal beyond termination of the or-

gan to some extent to guard the blood vessels and sinuses and bundles of the vomeronasal nerve (Fig. 19) .

Table (1): Material available for study:

No. of foetuses	CVRL (cm)	Estimated age (days)
2	12	83
3	18	110
2	24	128
1	36	155
2	48	182
2	52	191
1	68	227
1	80	254
2	104	308 (At birth)

Fig. (1) : A photomicrograph of cross section at the middle part of the nasal cavity of 83 days-old buffalo foetus showing. the relative position of the primitive vomeronasal (o) and the nasal septum (s) H&E stain X 40.

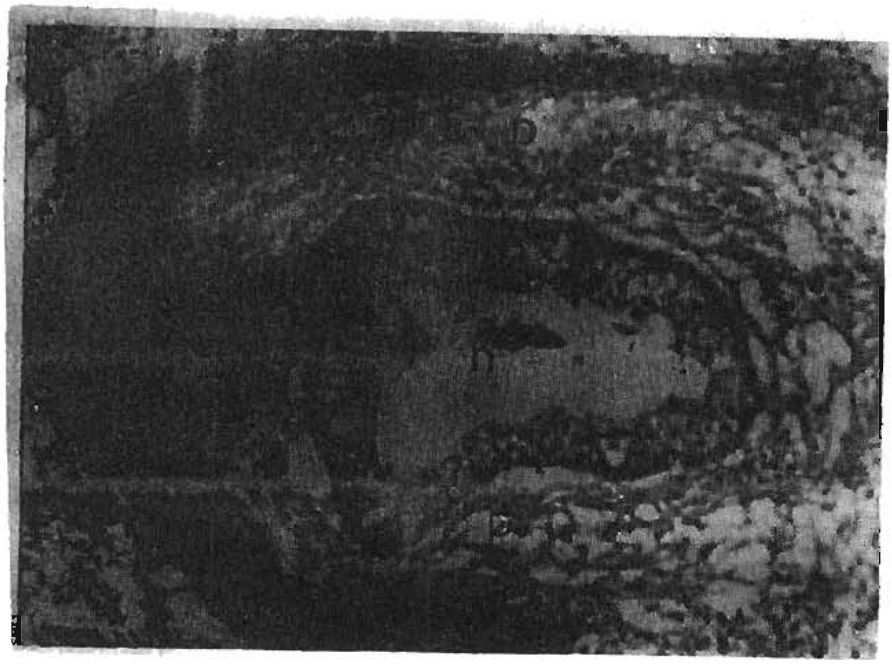

Fig. (2) : High magnification of Fig. (1) showing the lumen (n), thin (l) and thick (m) epithelium of the primitive vomeronasal duct, propria-submucosa (b) and primitive vomeronasal cartilage (c) H&E stain X 200.

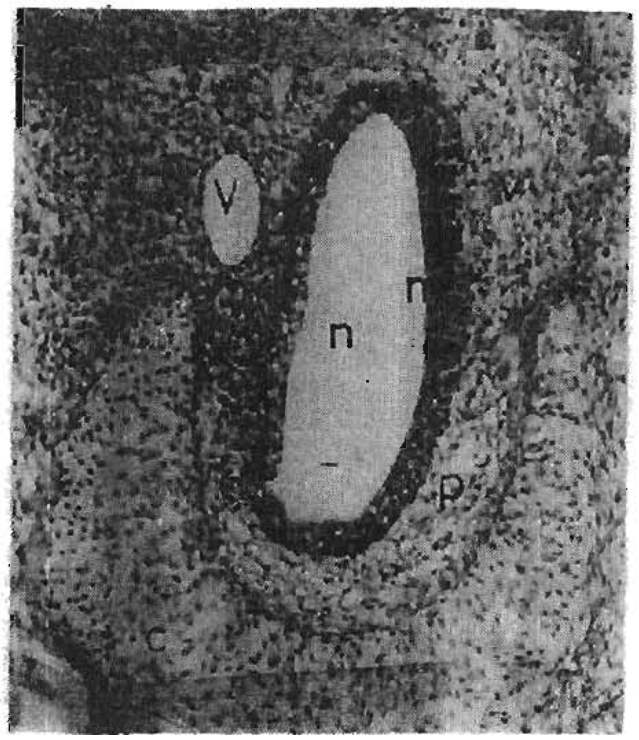

Fig. (3): A photomicrograph of cross section at the cranial part of the vomeronasal organ of 110 days-old buffalo foetus showing thick lateral (l) and thin medial (m) layer of the lining epithelium, propria-submu-cosa (p), small blood vessels (v), large blood sinuses (V), elongated lumen (n) and prospective cartilage (c) H&E stain X 100.

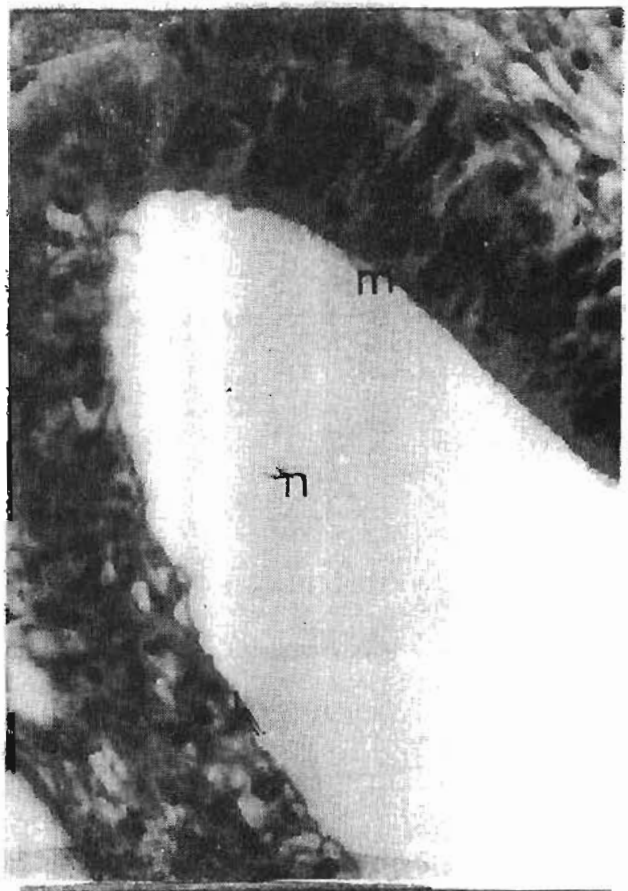

Fig. (4): High magnification of Fig. (3) showing, thick medial (m) and thick lateral (l) layers of the lining epithelium and the lumen (n) H&E stain X 400.

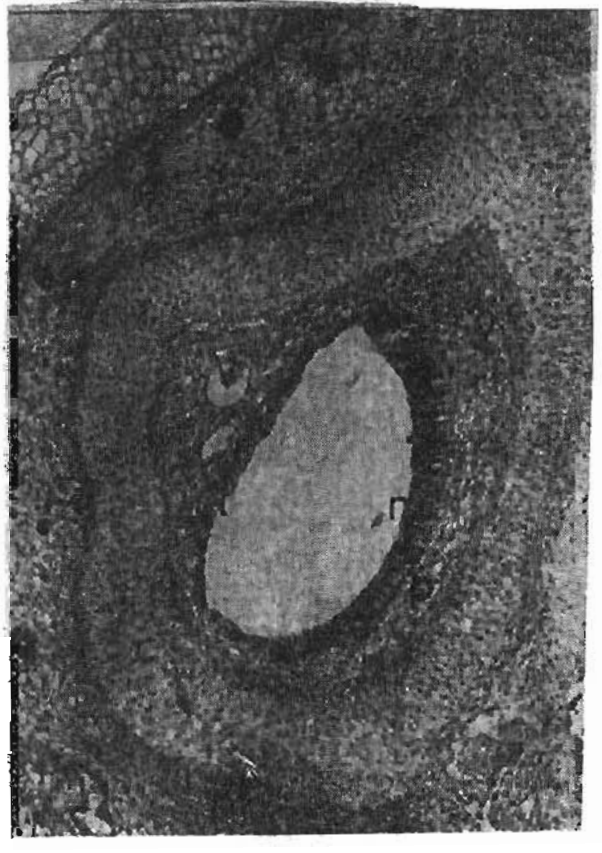

Fig. (5) : A photomicrograph of cross section at the middle part of the vomeronasal organ of 128 days-old buffalo foetus showing, closed tubular vemeromasal cartilage (c), propria submucos (p) small blood vessels (v) blood sinuses (V), thick medial (n) and thin lateral (m) epithe-lial layers H&E stain X 100.

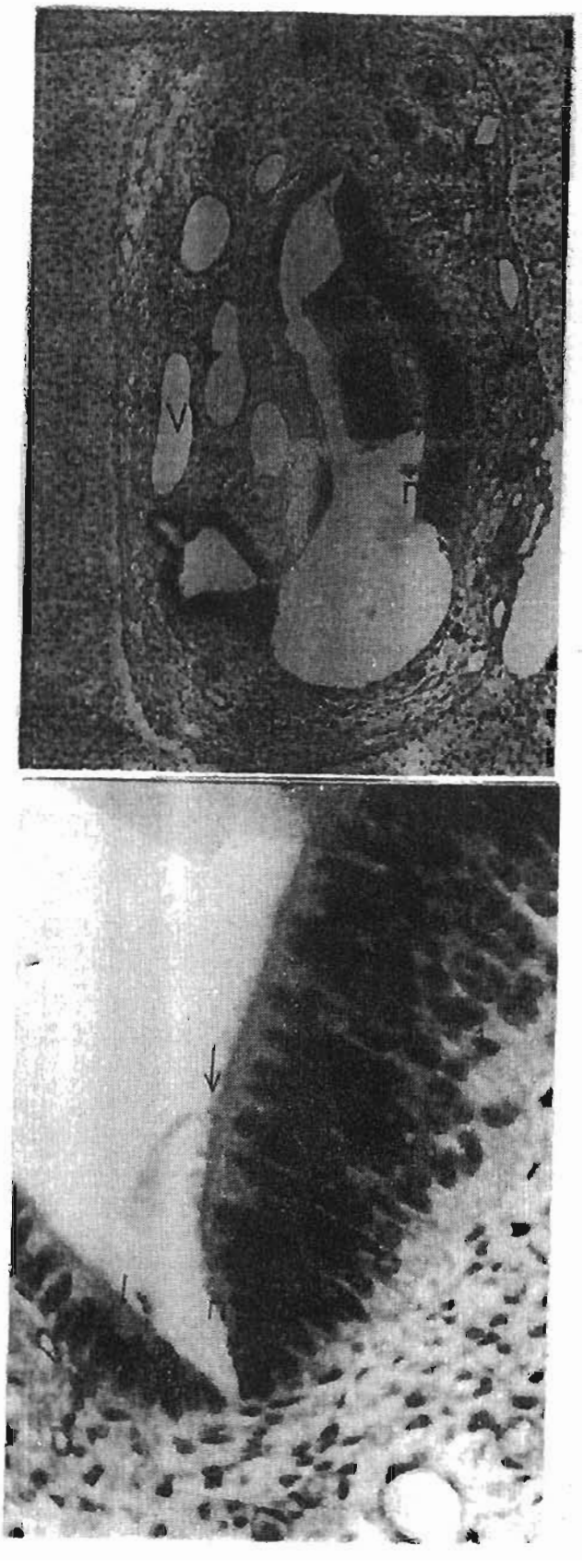

Fig. (6): A photomicrograph of cross section at the caudal part of the vomerona-sal organ of 155 days-old buf-falo foetus show-ing, vomerona-sal carti-lage (c), propria submucosa (p), small blood vessels (v), blood sinuses (V) nerve fasicu-li (e), medial thick (m) and lateral thin (l) epithelium, cres-centic lumen (n) H&E stain X 40.

Fig. (7): High of Fig. (6) showing lateral thin respiratory (l), medial thick olfactroy (m) epithelia, basal (1), receptor (2) and sustanticular (3) cells and cilia (arrow) H&E stain X 400.

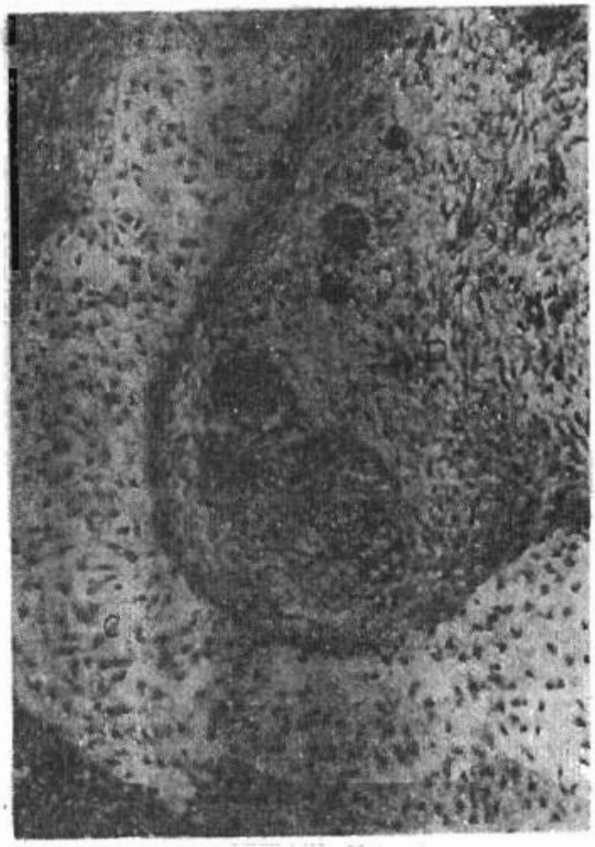

Fig. (8): A photomicrograph of cross section of the vomeronasal cartilage caudal to closed end of the duct in 155 days-old buffalo foetus showing, the caudal continuation of the fas-ciuli (e) and large blood vessels (V) of the organ, L-shaped cartilginous lamina (c) and septal submucosa (b) H&E stain X 100.

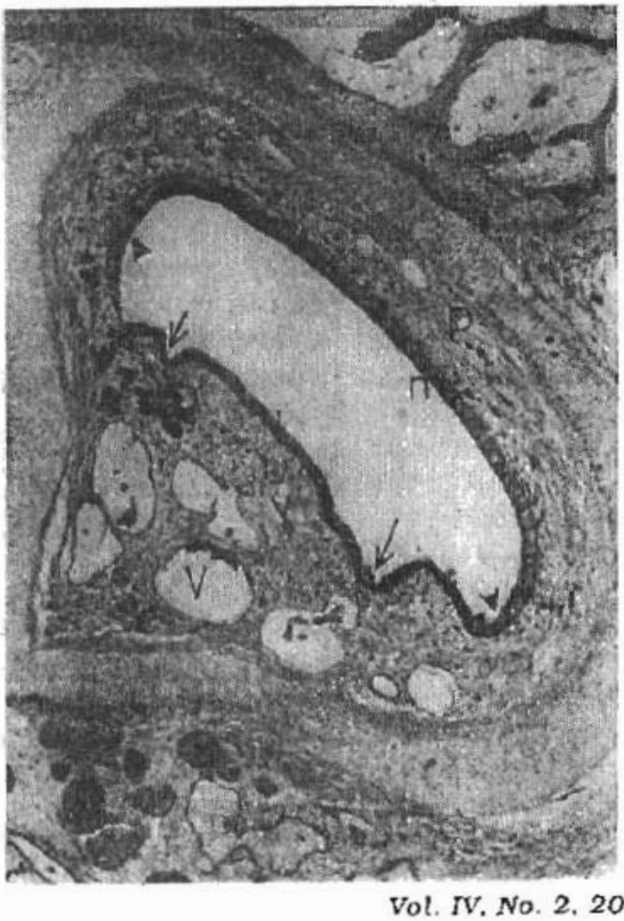

Fig. (9): A photomicrograph of cross section at the middle part of the vomeronasal organ in 182 days-old buffalo foetus showing, the dorsal and ventral expansion (arrow heads) of olfactory epithelium (m), dorsal and ventral crypts (arrow) of respiratory epithelium ( ), glandular buds (b), propria-submucosa (p), small blood vessels (v) large blood sinuses (V), arteries (a) and nerve fasciculi (e). H&E stain X 40.

Fig.(10): High magnification of Fig. (9) showing, basal (1), receptor (2) and sustanticular (3) cells and cilia (arrow) of well differentiated olfactory epithe-lium . H & E stain X 400.

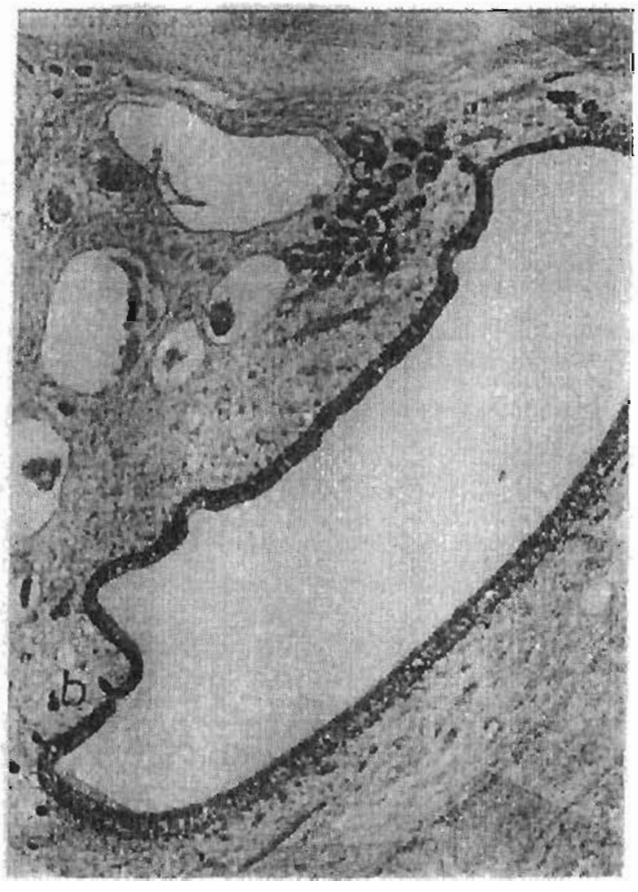

Fig. (11): A photomicrograph of cross section at the middle part of the vomeronasal organ in 191 days-old buffalo foetus showing, dorsolateral glandular acini (d) and ventrolateral glandular buds (b) H&E stain X 40.

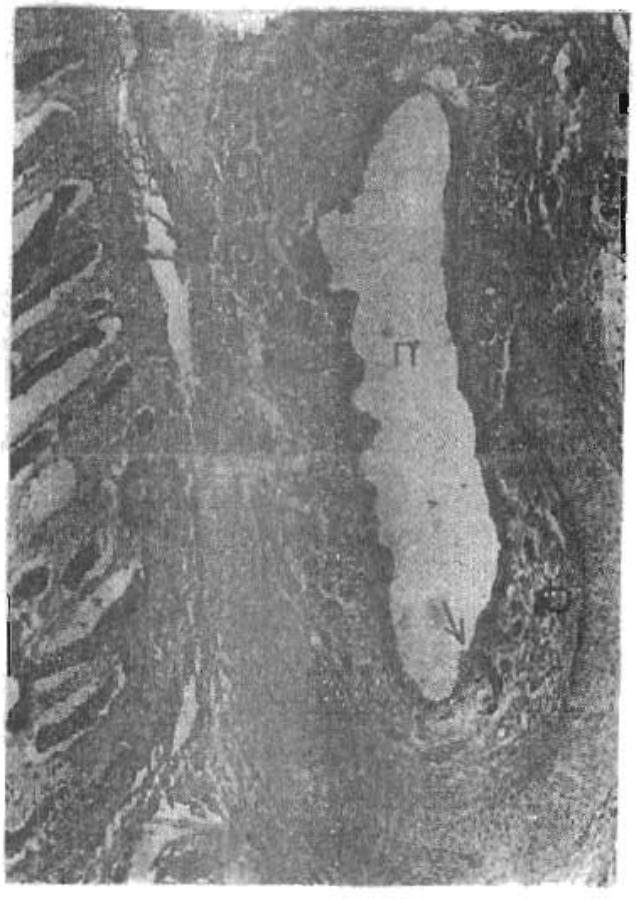

Fig. (12): A photomicrograph of cross section at the cranial part of the vomeronasal organ in 227 days-old buffalo foetus showing the distribution of the glandular buds (b), small (v) and large (V) blood vessels all around the lumen (n) . glandular orifices (arrow) H&E stain X 40.

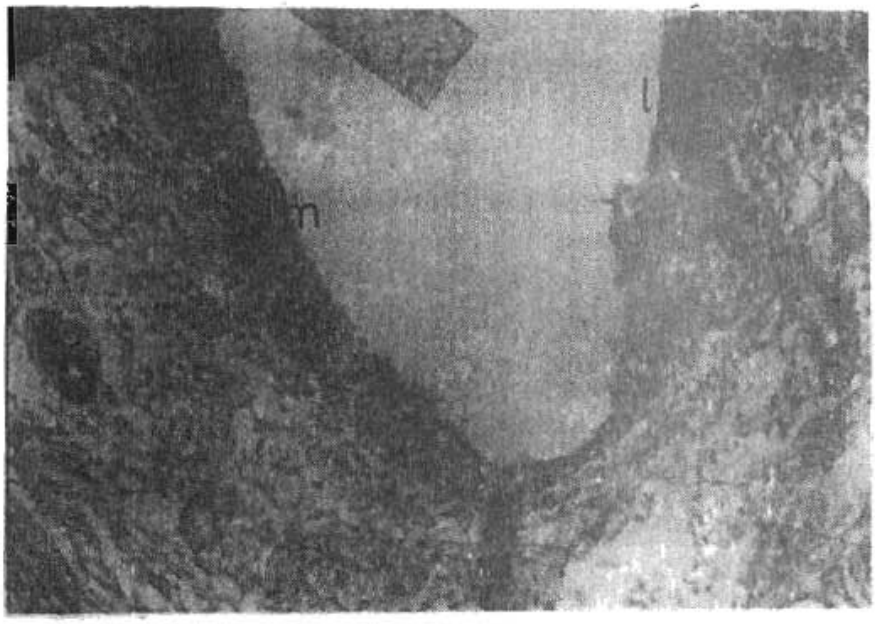

Fig. (13): High magnification of Fig. (12) showing. the distribution of the glandular buds (b) deep to both respiratory (l) and olfactory (m) epithelium. excretory duct (d). H & E. stain X 200 .

Fig. (14): A photomicrograph of cross section at the middle part of the vomeronasal organ in 254 days-old buffalo foetus showing, dense fibrous propria-submucosa (p), convex and corrugated lateral wall (l), uniform concave medial wall (m), large blood sinuses (V), patches of glandular acini (g), nerve fasciculi (e), crescentic lumen (n), vomeronasal cartilage (c). AB/PAS stain X 40.

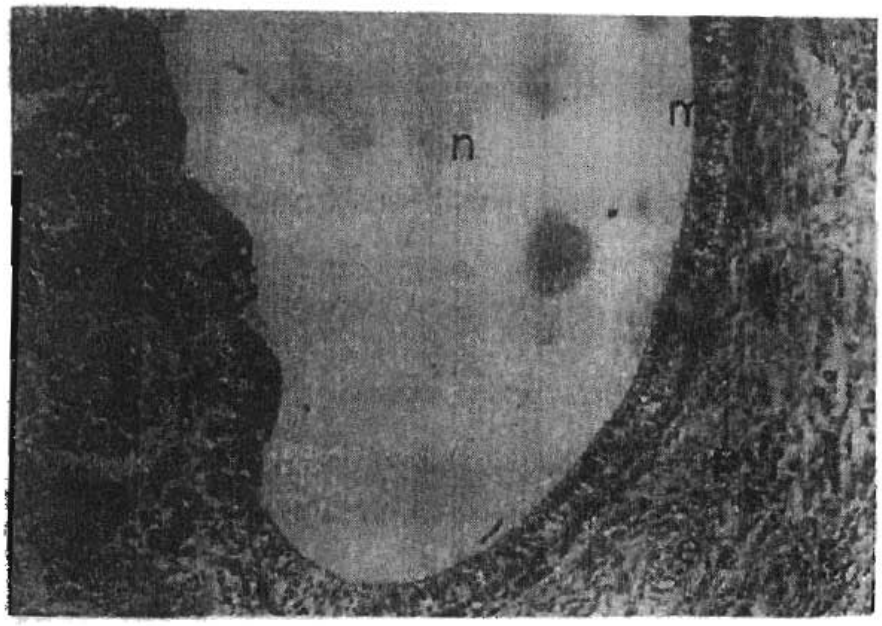

Fig. (15): A photomicrograph of cross section at the middle part of the vomeronasal organ in 254 days-old buffalo foetus showing dense fibrous propria-submucosa (p), convex and corrugated lateral wall (l), uniform concave medial wall (m), large blood sinuses (V), patches of glandular acini (g), nerve fasiculi (e), crescen-tic lumen (n), vomeronasal cartilage (c). Crossman's trichrome stain X 40.

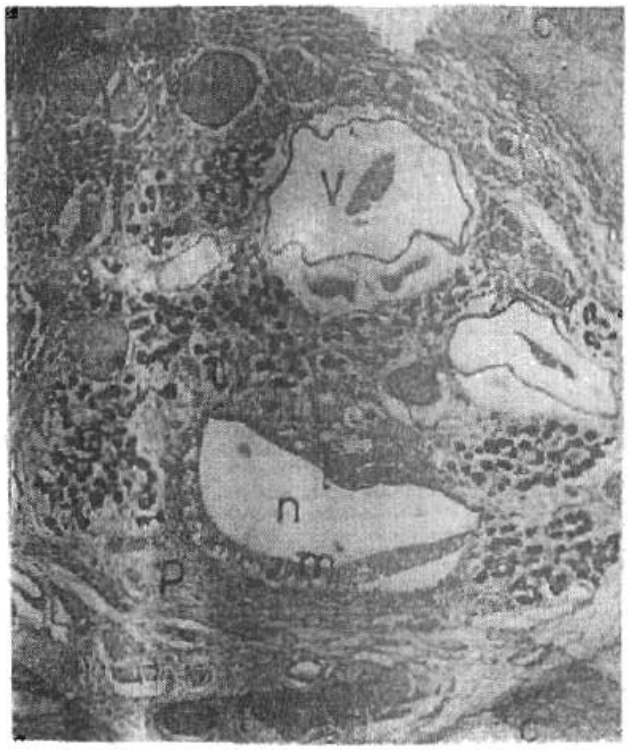

Fig. (16): A photomicrograph of cross section at the caudal part of the vomeronasal organ in 308 days-old buffalo foetus showing numerous glandular patches (g), large blood sinuses (V), several nerve bundles (e) narrow lumen (n) reduced respiratory (l) and olfactory (m) epithelium, propria-sub-mucosa (p) and vomeronasal cartilage (c) H&E stain X 40 .

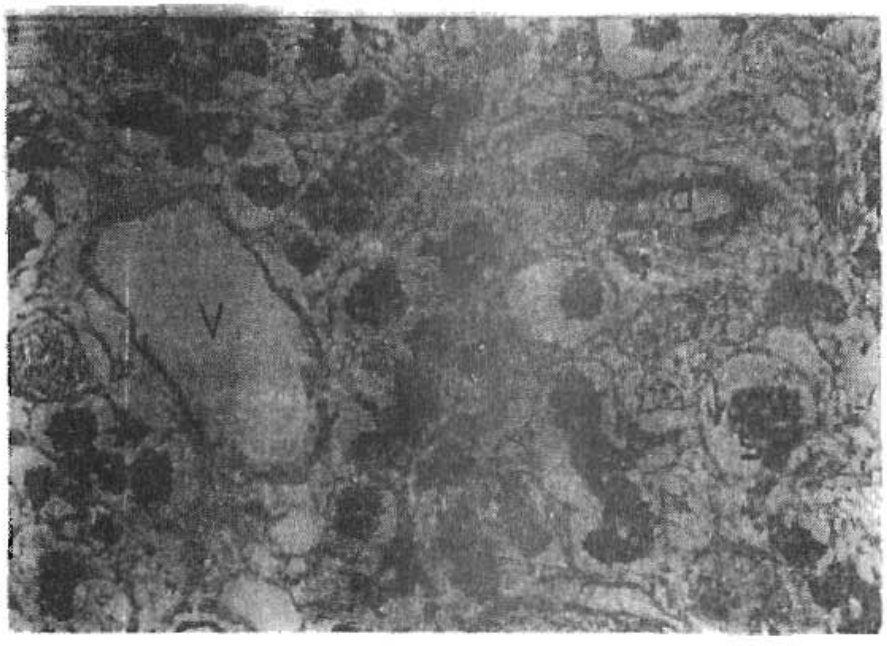

Fig. (17): High magnification of Fig. (16) showing strong PAS positive and AB negative glandular acini (g) periglandular lymph spaces (arrow), excretory duct (d) blood sinuses (V) AB/PAS stain X 200.

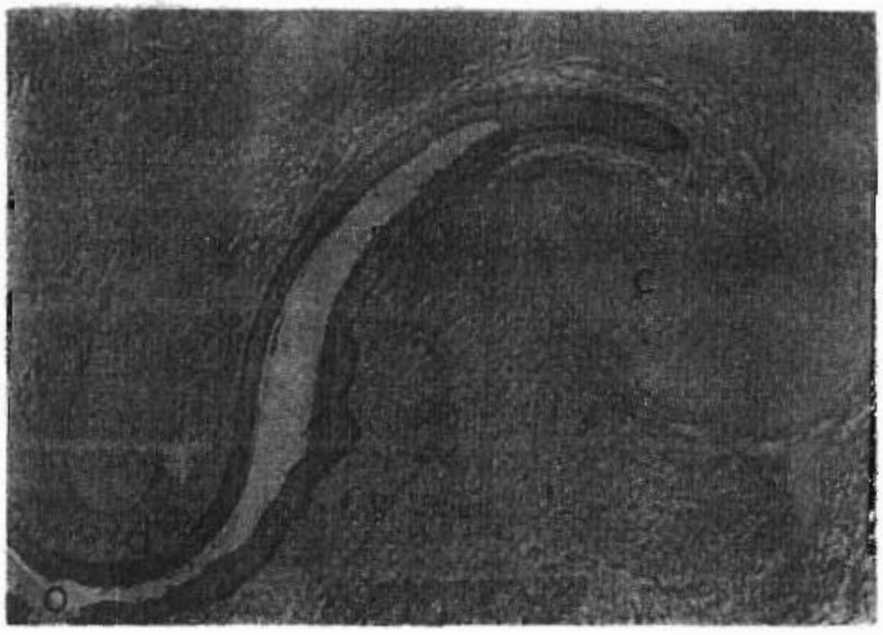

Fig. (18): A photomicrograph of sagittal section at the level of incisive papilla of 308 days-old foetus showing, stratified squamous epithelium (s), incisive duct (d) and its oral orifice (o), comma shaped cartilaginous plate (c). H&E stain X 40.

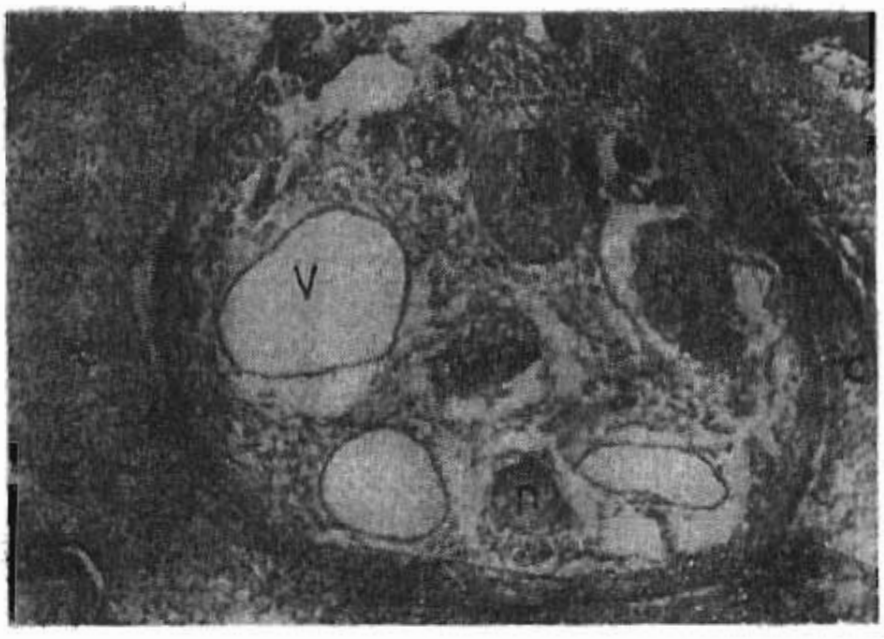

Fig. (19): A photomicrograph of cross section of the vomeronasal cartilage caudal to closed end of the duct in 308 days-old buffalo foetus showing, vomeronasal cartilage (c) bundles of vomicronasal nerve (n), large blood sinuses (V) and vessels (v) H&E stain X 200.

DISCUSSION

The present study revealed that the relative position and relation of the fetal vomeronasal organ to the surrounding structures was closely correlated with that described in the adult bovine (12) and buffalo (1).

The primitive vomeronasal organ of the buffalo was formed of a primitive vomero-nasal duct lined by stratified epithelium rested on loose propria-submucosa and bordered by a sheet of prechondogenic tissue similar to that described in camel (2), goat (3), rat (30) and hamster (28).

The differentiation of the lining epithelial layer of the vomeronasal duct into respiratory and olfactory epithelium was observed in buffalo foetuses of 155 days-old in corresponding to 30 cm CVRL. in camel (2), 13 cm CVRL. in goat (3), 13 days of gestation in hamster (28) and 16 days of gestation in rat (30).

There was a wide agreement that the lateral and dorsal aspects of the vomeronasal duct were lined by respiratory epithelium while its medial and ventral aspects were lined by olfactory epithelium in domestic animal (8), sheep (13), bovine (12), horse and donkey (16), donkey (18), big (14), buffalo (1), camel (2), goat (3), cat (23) hamster (28) and rat (30, 29, 27). Such pattern was confirmed in the present study with some exception that the olfactory epithelium was expanded to line the dorsal aspect of the duct rather than the medial and ventral ones. In agreement with (20) in hamster and (25) in rat and (3) goat, the lumenal surface of respiratory mucosa was corrugated. The corrugated lumenal surface of the lateral respiratory epithelium of the vomeronasal organ was suggested to be an adaptation for the changes of the lumenal contour of the organ (29 and 25).

The caudal parts of the vomeronasal duct was lined by single columnar epithelium in rat (30, 29 and 27), hamster (28) and cat (23) in confliction with the present study where the olfactory epithelium was expanded and extended all over the length of the duct. Such condition together with the aforementioned one may be suggested to reflect the good Flehmen behavior among the buffaloes.

The most extreme rostoral end of the present duct was lined by stratified squamous epithelium in agreement with that described in hamster (26 and 28), rat (30, 29 and 27), buffalo (1), and cat (23). But disagreed with that described in camel in which such part was lined by stratified columnar epithelium (2). The vomeronasal duct of the buffalo was communicated rostorally with incisive duct in agreement with that described in buffalo (1), sheep (13), horse and donkey (16), donkey (18), equines, (11 and 24) and camel (6 and ?). Moreover, it was indirectly connected with both oral and nasal cavities through the oral and nasal orifices of the incisive duct similar to that described in buffalo (1), sheep (13) and bovine (24 and 12). But dissimilar to that de-

scribed in equines (11 and 24), horse and donkey (16), donkey (18) and camel (6 and 2) where it was connected only with the nasal cavity as the incisive duct was blind orally.

The vomeronasal cartilage of the buffalo was hyaline in type. This finding correlated with that described in domestic animals (8), horse and donkey (16), camel (2), goat (3). But conflicted with that described in donkey where it was elastic in type (18).

The vomeronasal duct in the donkey was enclosed in the vomeronasal cartilage along its whole length except at its extremities (18). This finding disagreed to some extent with the present study where such cartilage was prolonged to enclose the caudal end of the duct and extended beyond its termination to enclose the caudal continuation of the nerve bundles and the blood vessels.

The present study reveled that, the propria submucosa of the respiratory epithelium was endowed with large blood sinuses and glandular acini while that of the olfactory one had neither blood sinuses nor glands but contained many nerve bundles. This finding was correlated with that described in sheep (13), bovine (12), mouse (19), camel (2), goat (3), cat (23) and donkey (18).

The highly distributed venous sinuses underneath the lateral epithelium of the vomeronasal duct has been suggested to be means for alternating the pressure inside the duct and subsequent draw of fluid from the incisive duct to inside the organ (20 and 9). The secretory and vasomotor activity of respiratory epithelium probably facilitates the contact between the stimulus with the receptor and the exchange of material contained in the lumen of the organ (9). The cavernous envelop around the vomeronasal organ has been regarded as a regulator of either inspiration and expiration of air or aspiration and expedition of fluid between the nasal cavity and the organ (20, 32 and 25).

The glandular buds of the vomeronasal glands were firstly detected in baffalo foetsoes of 182 day-olds in corresponding to 8 cm CVRL. in goat (3), and 35 cm CVRL. in camel (2) and postnatally in rat (30 and 29).

The vomeronasal gland of the buffalo were strong PAS positive and AB negative. This finding agreed with that found in domestic animals (8), rat and rabbit (27), sheep (13), goat (3), camel (2). But disagreed with that described in horse and donkey (16) and donkey (18) and cat (23) where such glands were serous in nature. The secretion of the vomeronasal glands might permit solution of the odures and rinsing of out after smell by the organ for further sampling (17). The present developmental events in this study lead us to speculate that the buffalo foetuses have unique vomeronasal organ that correlated with the good Flehmen displays.

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الملخص العربى

التطور الجنينى للعضو الأنفى الميكعى فى الجاموس

صلاح المرسى المرسى

قسم التشريح وعلم الأجنة - كلية الطب البيطرى - جامعة المنصورة

لقد أجريت هذه الدراسة على عدد ستة عشر رأساً لأجنة جاموس مختلفة الأطوال مابين ١٢-١٠٤سم بقياس الطول CVR والأعمار مابين ٨٣-٣٠٨ يوم وقد جهزت العينات للوصف العيانى والميكروسكوبى الضوئى وقد بينت النتائج الوصفية فى الأجنة اليافعة أن العضو الأنفى الميكعى يمتد على طول جانبى الحافة البطنية للحاجز الأنفى ويرتبط على طوله بالغضروف الميكعى وقد بلغ طوله حوالى ٨سم من بدايته عند إتصاله بالقناة القواطعية حتى نهايته بطرف مسدود قبل الطاحن الأمامى بحوالى ٢-٥ر٢سم وقد ظهر تجويفه هلالى الشكل. بينما بينت الدراسة الميكروسكوبية أن تطور العضو الأنفى الميكعى يمر بثلاث مراحل متتالية فى التطور :

فى المرحلة الأولى : (٨٣-١١٥ يوم) ظهر العضو الميكعى البدائى عند عمر ٨٣ يوم مكوناً من قناة ميكعية بدائية مبطنة بظهارة مركبة مرتكزة على ساندة تحت مخاطية مفككة ومحاط بصفيحة من النسيج الغضروفى البدائى. فى الأعمار ١١٠ ١٢٣ يوم ظهرت الظهارة المبطنة مميزة إلى ظهارة وحشية رفيعة وأخرى إنسية سميكة بينما تميزت تلك الظهارة إلى عمادية كاذبة مهدبه على الجانب الوحشى والظهرى وإلى ظهارة شمية على الجانب البطنى والإنسى على عمر ١٥٥ يوم.

فى المرحلة الثانية : (١٨٢-١٢٧ يوم) بدأت براعم الغدد الميكعية فى الظهور على معظم طول القناة الميكعية عند عمر ١٨٢ - ١٩١ يوم وتأخر ظهورها على الجزء الأمامى إلى عمر ٢٢٧ يوم. كذلك ظهرت الساندة تحت مخاطية سميكة ومحتوية على براعم تلك الغدد وعلى جيوب دموية فى الجهة الوحشية للقناة الميكعية.

فى المرحلة الثالثة : (١٥٤-٣٠٨ يوم) ظهرت الساندة تحت مخاطية أكثر تدكناً ومنبعجة داخل التجويف الميكعى واحتوت على العديد من عينات الغدد الميكعية والجيوب الدموية فى الجانب الوحشى للقناة الميكعية بينما إحتوت على العديد من الحزم العصبية فى الجانب الأنسى على عمر ٢٥٤. عند عمر ٣٠٨ ظهر التجويف الميكعى أكثر ضيقاً بزيادة التكون والتدكن للساندة تحت مخاطية وامتلائها بالعديد من الغدد الميكعية والجيوب الدموية وظهر العضو الميكعى مكتمل النمو والتركيب.