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التطور الهستولوجي لمخاطية الاثنى عشر في الجاموس المصرى أثناء فترة الحمل

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تمر عملية تنسج الغشاء المخاطي للاثنى عشر بمرحلة ما قبل وجود الخملات وتشمل المراحل المختلفة حتى تتكون الخملات في الجنين البالغ ٧٥ سم .

وأيضا مرحلة ظهور الخملات وتشمل المرحلة الأكثر تطورا والتي بدأ ملاحظتها في الجنين البالغ ٧٥ سم طولاً وتتكون الخملات عند بدأ ظهورها من بروزات من الغشاء المخاطي مشرعة في التجويف المعوى ومدعمة بالأوعية الدموية .

يبدأ ظهور الغدد المعوية في الجنين البالغ من الطول ١٤٥ سم على هيئة انغمادات بين الخملات .

أما الصفحة العضلية المخاطية فيبدأ ظهورها عند ما يبلغ الجنين طول ٩٤ سم .

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**HISTOGENESIS OF THE DUODENAL MUCOSA
OF THE EGYPTIAN WATER BUFFALO
(*Bos bulalus* L.) DURING THE PRENATAL LIFE.**
(With 5 Figures)

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SUMMARY

The histogenesis of the duodenal mucosa passes through a previllous stage, comprising development until the formation of villi (at CVRL of about 7.5 cm), and villous stage, comprising further development. The villi were firstly observed at CVRL 7.5 cm as luminal epithelial outgrowths associated with vascularised mesenchymal stalks. The intestinal glands were firstly observed at CVRL 14.5 cm as downgrowths of the intervillous epithelium into the underlying mesenchyme. The lamina muscularis mucosae was firstly observed at the 94 cm stage.

INTRODUCTION

The histogenesis of the intestine during the prenatal life has been taken into consideration by many human histologists long time ago. In this respect, very little has been recorded on the domestic farm animals especially on the buffalo. The histogenesis of the human fetal intestine has been described by JOHNSON (1910), JIRASEK *et al.* (1965), GARBARSCHE (1969) and MOXEY and TRIER (1978). The histogenesis of the fetal intestine was also described by SENGAR & SINGH (1969) in the Indian buffalo, HERMOS *et al.* (1971) in the rat and TOOFANIAN (1976) in ovines and bovines.

MATERIAL and METHODS

The material was obtained from 15 buffalo fetuses which include the following curved crown rump lengths (CVRL): 4 cm., 7.5 cm, 11.5 cm, 14.5 cm, 22.3 cm, 48 cm, 67 cm, 69 cm, 94 cm. Specimens of the duodenum were fixed in 10% formalin for 24 hours, dehydrated with graded series of ethanol, cleared with xylene, embedded in paraffin and finally cut into slices of 6 μ m thickness.

The following stains were used:

- 1- Elastic stain after WELGERT (1898).
- 2- Iron haematoxylin after HEIDENHAIN (1896).
- 3- The section were stained with: HARRIS' haematoxylin and eosin (HARRIS 1900).
- 4- MASSON'S trichrome (1929).
- 5- Reticulin stain after GORDON and SWEET (1936).
- 6- Alcian blue (STEEDMAN, 1950).
- 7- Alcian blue-PAS (MOWRY, 1956).

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RESULTS and DISCUSSION

The histogenesis of the duodenal mucosa of the buffalo fetus passes through two constructive stages, a previllous stage, comprising development until the formation of villi, and villous stage comprising further development.

1- PREVILLOUS STAGE.

In the previllous stage the mucosa consists of a lamina epithelialis and lamina propria. The lamina propria mucosae and the submucosa are continuous without any line of demarcation (lamina-propria/sub mucosa).

Epithelium:

The epithelium is described as pseudostratified by JIRASEK *et al.* (1965) in the human fetal intestine and LIM, LOW (1977) in the chick embryo during this stage, while it is described as stratified by JOHNSON (1910), MOXEY and TRIER (1978) in human intestine, TOOFANIAN (1976) in ovine intestine and MICHEL (1977) in the fetal intestines of domestic mammals.

Our observations at a CVRL 4 cm is that the epithelium is neither pseudostratified nor stratified due to the fast divisions of the epithelial cells in a relatively constant surface area, the epithelium is made up of poorly differentiated densely packed cells whose nuclei are arranged in 2-3 levels. The nuclei are moderately basophilic and finely granular while the cytoplasm is lightly basophilic and it contains PAS positive material which is concentrated underneath the epithelial luminal surface. Both the epithelial surface and the epitheliomesenchymal interface are even (Fig. 1) lamina propria and submucosa.

It is made up of homogenous mesenchyme devoid of blood vessels. The cells are vermiform and stellate in shape having scanty basophilic cytoplasm and oval to ovoid nuclei. The intercellular spaces are filled with Alcianophilic material. Scanty and fine argyrophilic fibers are observed subepithelially.

2- VILLOUS STAGE:

This stage is characterized by the development of villi and further differentiation of the mucosa/cells. Morphologically, in the agreement with JOHNSON (1910) in the human fetus the villi start to appear as knob like epithelial projections and mesenchymal stalks which are always vascularized (Fig. 2). Hence, the appearance of the villi is associated with the appearance of blood vessels in the mesenchyme. The first appearance of villi in the present study was observed at the 7.5 cm stage and at the 14.5 cm CVRL stage discrete, well-defined villi appear all over the duodenum.

Epithelium:

At the beginning of this stage, the epithelium is still poorly differentiated and shows a high mitotic activity. Occasional, oligomucous goblet cells were observed at the 7.5 cm stage. Thus, the goblet cells were the firstly differentiated cells among the epithelium. As the villi increase in height, the epithelium is gradually reduced to a single layer (Fig. 3). At the 11.5 cm stage the villi are clothed with a single layer of cylindrical cells and the goblet cells are increased in number. The cylindrical cells have, at first apically situated nuclei and basophilic cytoplasm rich in PAS positive material. With the increase of age the nuclei became gradually basally situated and the PAS positive material is markedly reduced except at the luminal striated epithelial border.

The intestinal glands were firstly observed at the 14.5 cm stage as downgrowths of the intervillous epithelium into the underlying lamina propria/submucosa. (Fig. 3.).

The whole structure gives the appearance of a branched tubulo-acinar gland. (Fig. 4).

They are lined with the same villous epithelium the crypt-base pyramidal cells (PANETH cells) were firstly observed at the bottoms of the glands (Crypts of LIBERKUHNN) at the 24 cm stage. (Fig. 5).

Lamina propria / submucosa.

In the early stages, both the lamina propria mucosae and the submucosa are continuous without any line of demarcation. Anyhow, it is predominantly cellular.

The main cells are the spherical cells (Lymphocytes) and to lesser extent the spindle cells (Fibroblasts). Histocytes are also not uncommon especially at the summits of the villous core. Plasma cells and some eosinophils are observed at the late fetal stages.

The main fibrous element is the argyrophilic fibers in addition to some collagenic fibers. Elastic fibers are found in the cores of the developing villi.

The lamina muscularis mucosae was observed for the first time at the 94 cm stage. (Fig. 5).

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LEGENDS**Fig. 1:** Duodenum of the fetus with 4 cm CVRL.

Alcian blue stain' Obj. 20; Ocular 5 :lk.

1. Lamina epithelialis.
2. Luminal epithelial.
3. Tunica muscularis.
4. Tunica serosa.

Fig. 2: Duodenal mucosa of the fetus with 7.5 cm CVRL.

Iron hematoxylin stain' Obj: 40; Ocular 5 : lk.

1. Knob-like projection.
2. Luminal epithelial out growth.
3. Mesenchymal stalk.
4. Subepithelial blood vessel.
5. Cellular Lamina propria / submucosa.

Fig. 3: Duodenum of the fetus with 54 cm CVEL.

MASSON'S trichrome stain' Obj, 10; Ocular 5 : lk.

1. Intestinal villi.
2. Highly cellular lamina propria mucosae.
3. Intestinal glands.
4. Less cellular submucosa.
5. Thin walled blood vessels.
6. Submucosal glands.

Fig. 4: Cross Section through the lamina propria: sub mucosa of the fetus with 54 cm CVRL

MASSON'S trichrome stain. Obj' 20; Ocular 5 : lk.

1. Highly cellular lamina propria mucosae.
2. Less cellular submucosa.
3. Branched submucosal gland.
4. Thin-walled blood vessel.

Fig. 5: Longitudinal section through a duodenal crypt of the fetus with 94 cm CVRL.

Alcian blue-PAS stain. Obj.: 40 Ocular 5 : lk.

1. Goblet cells (Alcian blue positive).
2. Crypt-base pyramidal cells (PAS Positive).
3. Lamina propria mucosae.
4. Lamina muscularis mucosae.

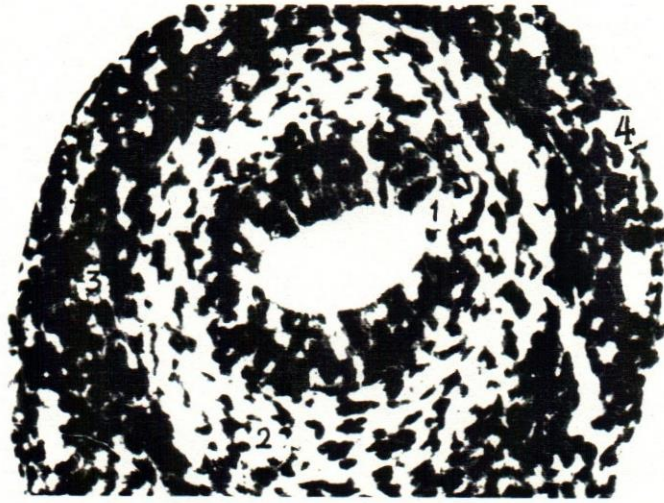


Fig. : (1)



Fig. : (2)



Fig. (3)



Fig. (4)

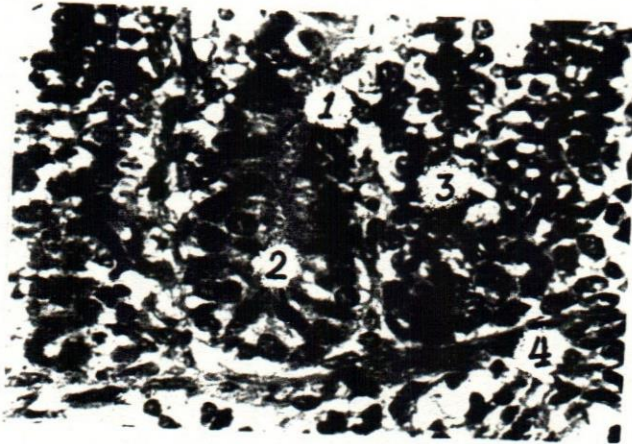


Fig. (5)

