HISTOLOGICAL, HISTOCHEMICAL AND IMMUNOHISTOCHEMICAL STUDIES OF THE POLL GLAND OF ONE-HUMPED CAMEL (CAMELUS DROMEDARIUS)

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SUMMARY

The poll glands of male camels were present under the skin of both the poll region on sides of the ligamentum nuchae. The gland became active during the breeding season; from September to March. It was formed of well established secretory alveoli supported by a delicate stroma and inter alveolar cells. The alveoli were lined by high cuboidal to columnar cells showing bleb-like projections. The cells showed positive reactions with ATPase, 3beta and 17beta-hydroxysteroid dehydrogenases. The inter alveolar cells showed, in addition, a strong immunoperoxidase reaction against androgen. The secretion of the alveoli is drained by ducts to the hair follicles in situ.

From April to August, the poll glands appeared inactive showing massive proliferation of the connective tissue stroma on the expense of the alveoli. The latter appeared smaller in size and were lined by flattened non secretory epithelium.

INTRODUCTION

The dromedary camel is known to be a seasonal breeder animal (Atoji et al, 1998). The poll gland are two symmetrical bodies situated subcutaneously on the back of the neck behind the ears on either sides of the ligamentum nuchae of the male camel. They drive their name from their position in the poll region (Leese, 1927).

The main function of the gland is to produce a yellowish watery secretion with characteristic offensive odour during the rutting season (Taha and Abdalla, 1980; Yagil and Etzion, 1980 and Tingari et al, 1984). The latter authors mentioned that the concentration of androgen and activities of metabolic enzymes for androgen in the poll gland reach their peak from November to January.

Morphologically, the poll glands undergo seasonal variations, it consists mainly of apocrine glandular alveoli vary in shape and activity with the different seasons of the year (Singh and Bharadwaj, 1978; Tingari et al, 1984 and Atoji et al, 1998).

Our work aimed to elucidate the nature and onset of the structural changes in the poll gland of adult male camel and to clarify their enzymatic, hormonal and secretory activities during the different seasons of the year.

MATERIALS AND METHODS

Samples from the poll glands of 18 mature healthy male camels were collected from Cairo abattoir monthly during a period of one year. The specimens were fixed in 10% neutral buffered formalin for 24 hours. Paraffin sections of 4-6 micrometer-thick were prepared and stained with Harris hematoxylin and eosin, Crossmon's trichrome and Periodic acid Schiff stains. Parts from the collected specimens were immersed directly in liquid nitrogen at -196C, cut with the cryostat at 8 micromerers-thick and prepared for detection of adenosine triphosphatase, 3beta and 17beta-hydroxysteroid dehydrogenase enzymes. For immunohistochemistry, indirect immunoperoxidase antiperoxidase PAP for the detection of androgen. Labeled antibody method using STAT polyclonal kits from Diagnostic Products Corporation, Los Angelos, USA. All above mentioned stains and reactions were applied according Drury and Wallington (1980).

RESULTS

The poll gland appeared as two oval or bean-shaped structures situated subcutaneously in the poll region on either side of the ligamentum nuchae. Each gland was surrounded by a thick dense irregular fibrous connective tissue capsule continuous with the dermis of skin in situ (Fig.1). From the capsule thick trabeculae or septa arise dividing the gland into many lobules of different shapes. The trabeculae carried blood and lymph vessels into the gland (Fig.2). Inside the lobules, each secretory alveolus and excretory duct was individually surrounded by strands of collagen fibers (Fig.3). The amount of interlobular connective tissue and the structure of the gland itself showed wide variations where correlated with the functional state of the gland.

The poll gland (September – March):

The poll gland was active during the period extending from September to March with the highst activity during November, December and January. During this period, the connective tissue stroma became thin and markedly reduced (Fig.3). The lobules became enlarged and most of the secretory alveoli were lined by high cuboidal to columnar cells. Their vesicular nuclei were situated in acidophilic vacuolated cytoplasm (Fig.4). The apical parts of lining epithelial cells were granular, deeply stained and showed bleb-like protrusions into the lumen (Fig.5). Occasionally the lumina of some of the active alveoli contained acidophilic homogenous materials. Elongated curved myoepithelial cells with flattened slender-like nuclei were frequently observed around the alveoli and the excretory ducts. Clusters of inter alveolar polyhedral cells with central spherical nuclei and finely granular acidophilic

cytoplasm were clearly identified (Fig.6). The inter alveolar cells were permeated by numerous blood capillaries and infiltrated with lymphocytes and monocytes.

The intralobular excretory ducts were found to be lined by simple columnar. The epithelium was changed gradually into stratified columnar in the interlobular ducts. The latter had a wide lumen, slightly folded mucosa and were surrounded by connective tissue sheeth (Fig.7). Examination of step-serial sections revealed that the gland's lobules were drained by several excretory ducts which run in a tortuous course towards the surface to open into the upper part of the hair follicle.

The gland during the period from September to March showed a moderate PAS-reaction in the epithelial alveolar cells but more intensive in the bleb-like projections (Fig.8). The luminal content, if present showed a weak to slight reaction, as the alveolar and inter alveolar cells showed moderate fuchsinophilic reaction.

The secretory alveoli and proximal parts of the excretory ducts during the rutting season showed a strong adenosine triphosphatase reaction while the inter alveolar cells reacted moderately (Fig.9).

A strong reaction for 3beta-hydroxysteroid dehydrogenase reaction was recognized in the secretory alveoli and the inter alveolar cells during November, December and January (Fig.10) while during September, October, February and March the reaction ranged from moderate to slight (Fig.11). Regarding the enzyme 17beta-hydroxysteroid dehydrogenase, a strong to moderate reaction was showed in the gland's parenchyma (Fig.12).

Immunohistochemistry using the indirect immunoperoxidase antiperoxidase technique revealed a strong reaction to anti androgen antibodies mainly in the alveolar and inter alveolar cells (Fig.13).

The poll gland (April-Augast):

The samples collected during the period from April and August showed that the gland's lobule were decreased in size with a marked increase in the interlobular stroma (Fig.14). Also, the connective tissue strands between the alveoli became apparently thick (Fig.15). The alveoli were characterized by wider lumina and thinner walls which were lined by low cuboidal to flattened squamous cells with deeply stained nuclei (Fig.16). The inter alveolar cells were greatly reduced or totally regressed and the myoepithelial cells became very few in number.

The gland during this period showed negative reactions to 3beta, 17beta-hydroxysteroid dehydrogenases and androgen immunohistochemistry while the adenosine triphosphatase reaction became very weak.

DISCUSSION

As it is described by Singh and Bharadwaj (1978), Taha and Abdalla (1980) and Tingari et al (1984), the poll gland was located subcutaneously in the poll region of camel on both sides of the ligamentum nuchae. Also, as it was described by the later authers, that the gland was surrounded by dense fibrous connective tissue capsule which was continuous with the dermis

The present investigation revealed that the glands was active during the period from September to March, a findings which was concided with the findings of Singh and Bharadwaj (1978) and Tingari et al (1984). Aboul-Ela (1991); Wilson (1991) and Vyas et al (2001) who reported that the breeding season of camels extends from September to March and the camels show a high sexual activity with a marked increase in the levels of plasma androgens. The poll glands of our study was formed of active secreting alveoli lined by high cuboidal to columnar epithelium and the cells showing a strong PAS reaction denoting a high content of a neutral mucopolysacharide. These findings agree with the resuts of Singh and Bharadwaj (1978), Tingari et al (1984) and Atoji et al (1998).Tingari et al (1983&1984) mentioned that the poll glands during rutting season produce a profuse yellowish watery secretion with characteristic foetid odour.

The activity of the poll glands during the rutting season in the period between September and March was found to be associated with a strong adenosine triphosphatase reaction.Tingari and Rahma (1981) explained the relationship between the activity and the progressive increase in the ATPase reactivity.

The histochemical localization of 3beta-hydroxysteroid and 17beta-hydroxysteroid dehydrogenases is interesting since it indicated the ability of the inter alveolar cells and alveolar cells to synthesize some steroids. Mertil et al (1994), Singh and Krishna (1996) and Soma and Wingfield (2001) mentioned that both 3beta 1nd 17beta-hydroxysteroid dehydrogenases are required for the formation of active sex steroids in males and females. The presence of such enzymes in the poll glands concided with the strong positive immunological reaction to androgen. Moreover, the inter alveolar cells of our study were permeated by many blood vessels as mentioned by Tingari et al (1983 &1984). This leads to the fact that the inter alveolar cells are endocrine in nature and produce androgen of camels. Yagil and Etzion (1980) suppose that the poll glands produce androgen since the activity of the gland was increase during the rutting season of the animal. The present investigation revealed that the activity of ATPase, 3beta and 17beta hydroxysteroid dehydrogenases and androgen immunoreactivity is restricted to the period between September and March and is highst during November and December. This is the same period during which the gland is found to be morphologically active . Furthermore it has been reported recently (Atoji et al, 1998 and Vyas et al, 2001) that the reproductive activity of the male camel seems to build up during September and October and the animal is acually in

rut during November, December, january and February. Hence a direct relationship exist between poll glandular function and the reproductive activity of the animal.

Specimens collected from the poll glands during April to August appeared to be inactive since they showed massive increase of connective tissue and marked reduction of the parenchyma. The alveoli were smaller in size, few in number with wider lumen and lined by flattened cells. Similar findings were mentioned by Singh and Bharadwaj (1978); Taha and abdalla (1980); Yagil and Etzion (1980) ; Tingari et al (1983&1984) and Atoji et al (1998). The authors agreed that the poll gland during the inactive period showed no signs of secretory activity.

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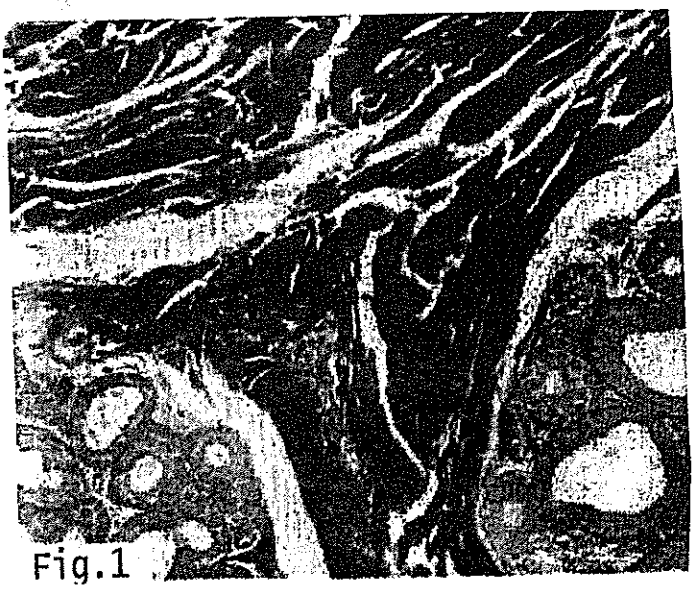

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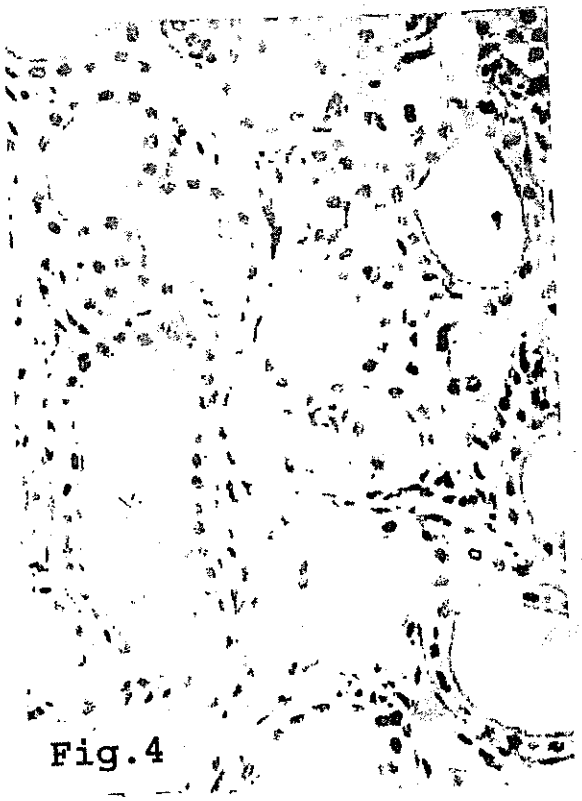

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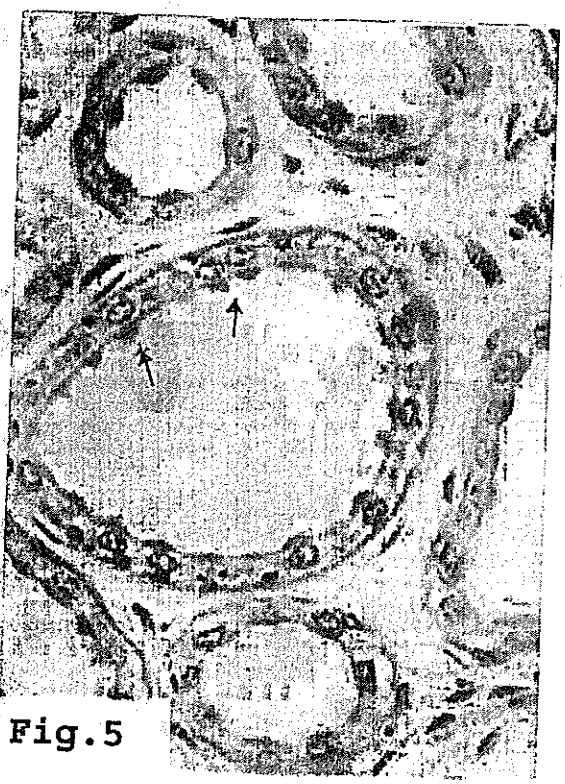

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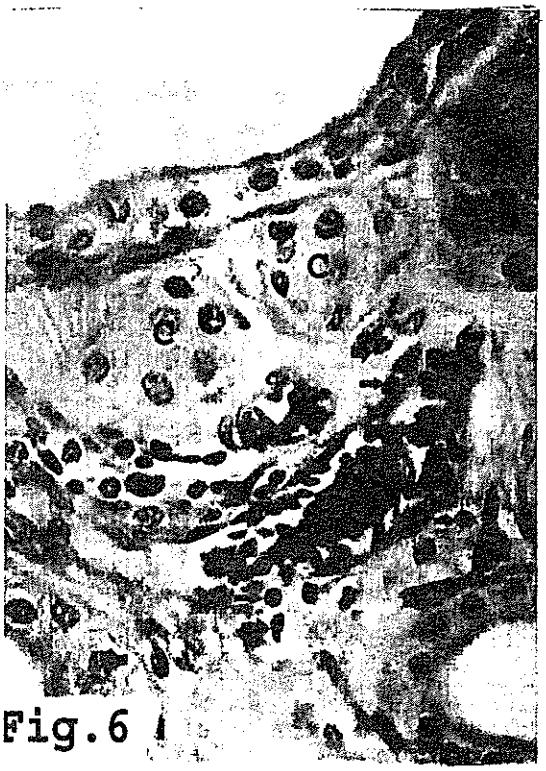

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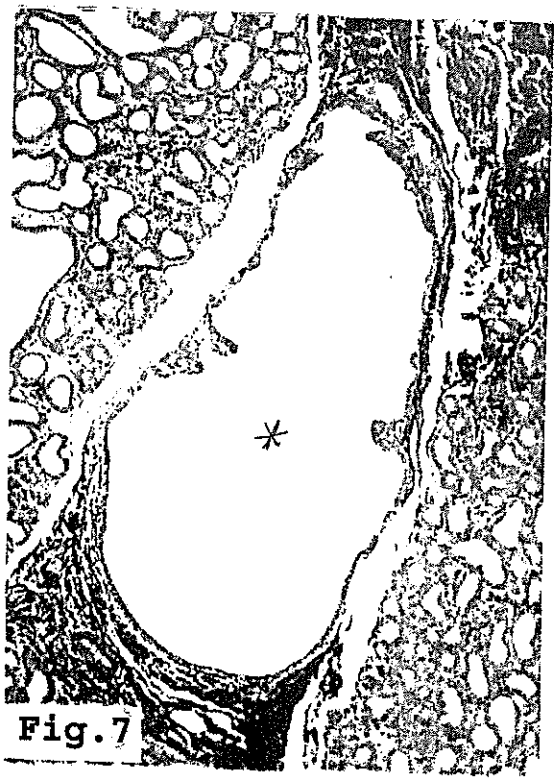

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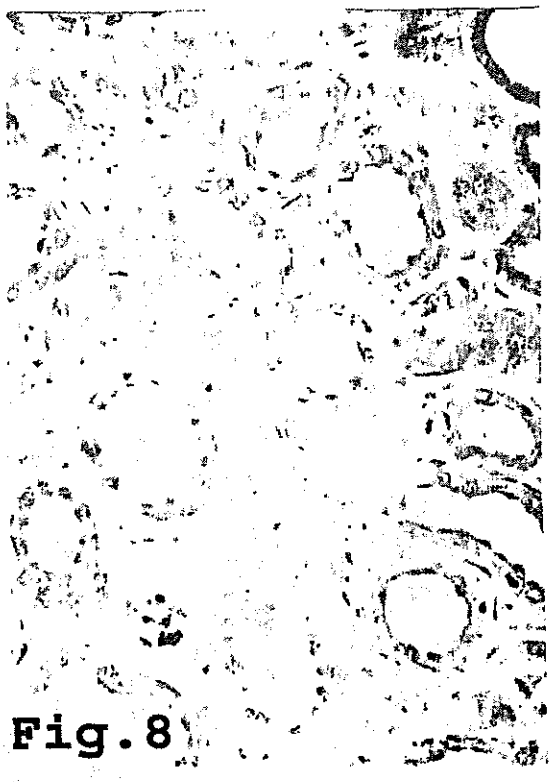

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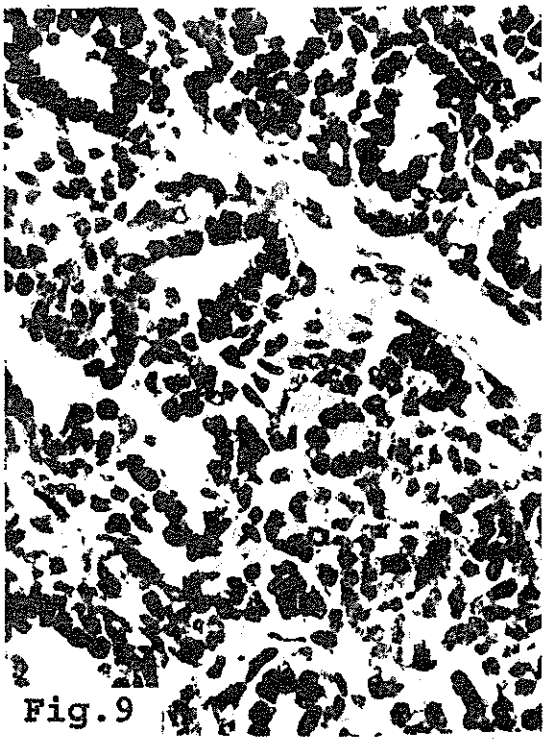

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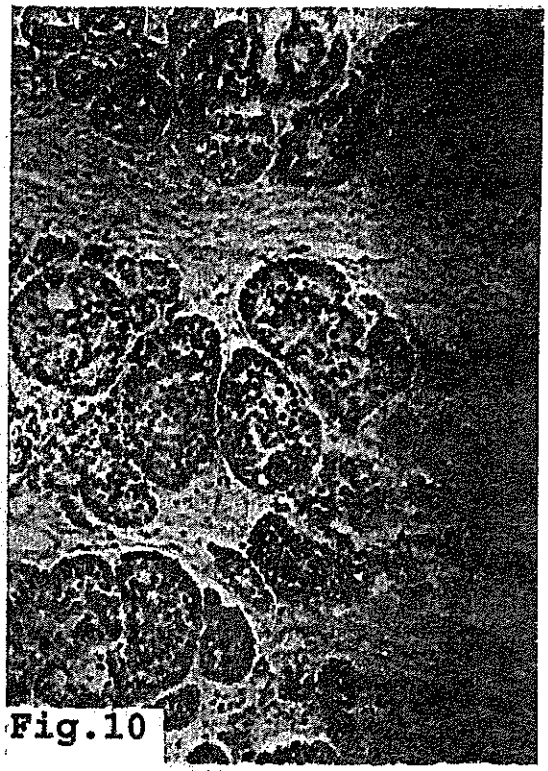

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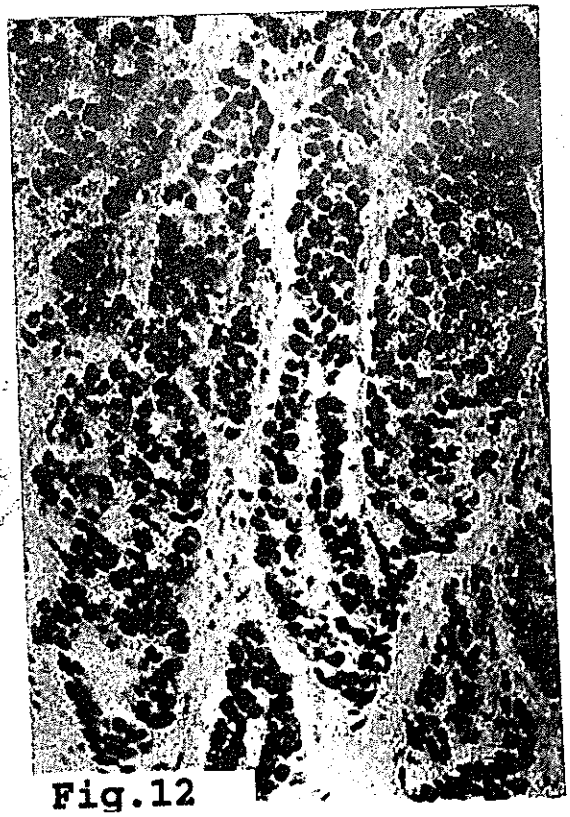

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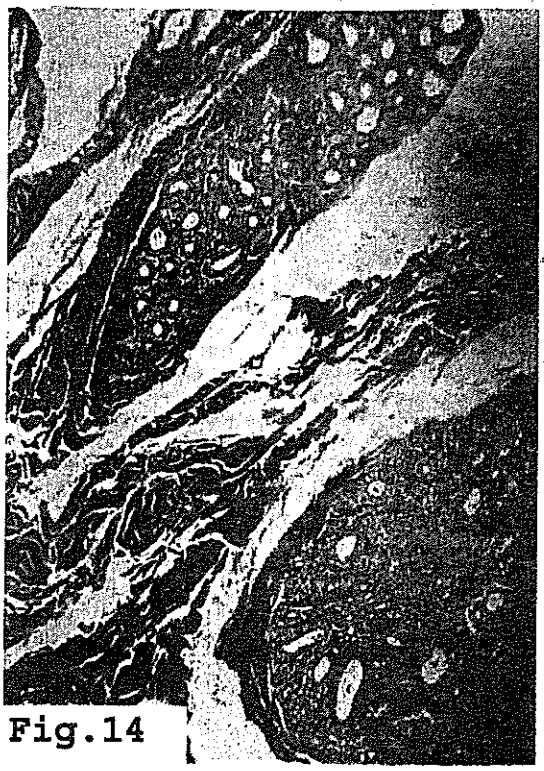

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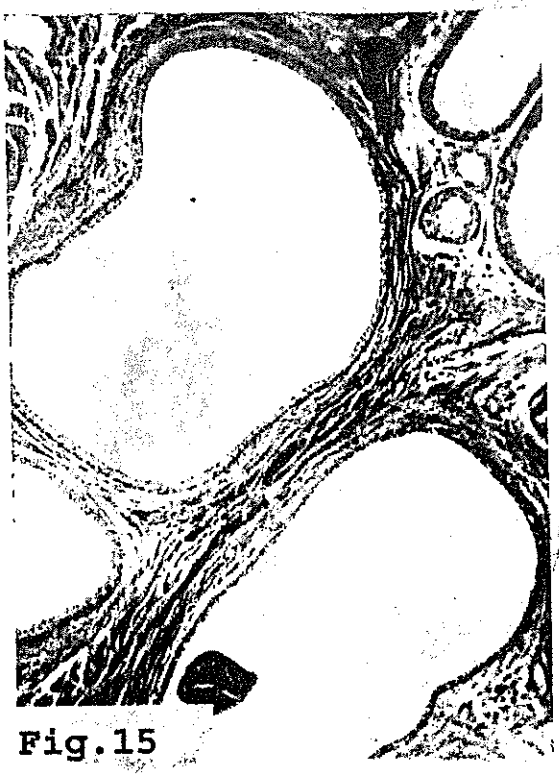

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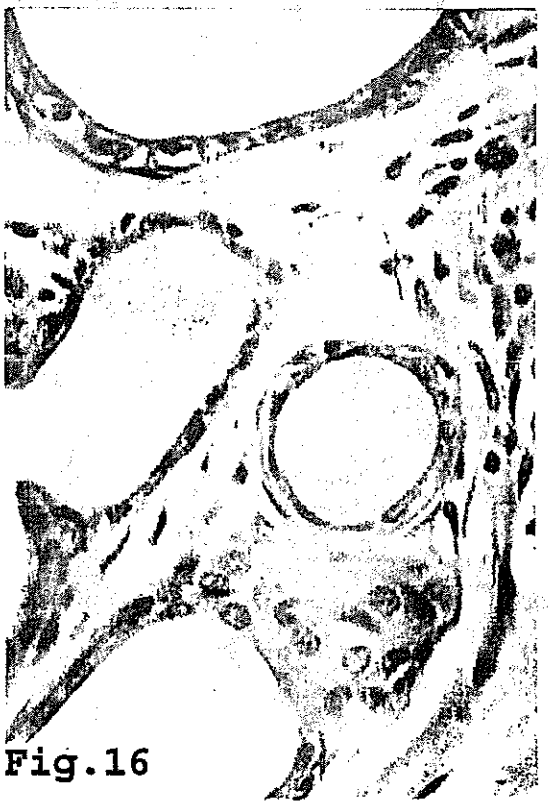

Fig.16

الملخص العربى

دراسات نسيجية و هستوكيميائية ونسيجية مناعية على غدة مؤخرة العنق فى الجمل وحيد السنام

شحاتة محمد سليمان- خالد محمد مظهر- رمضان عبدالله

قسم الخلية و الأنسجة- كلية الطب البيطرى- جامعات بني سويف و أسيوط

* غدة مؤخرة العنق في ذكور الجمال وجدت تحت الجلد في منطقة مؤخرة العنق علي جانبي الرباط العنقى. أصبحت الغدة نشطة أثناء موسم التزاوج و الذي امتد بين شهرى سبتمبر و مارس حيث كانت الغدة مكونة من عنبات مفرزة و مبطنة بخلايا عمادية مميزة ببروزات بثرية.

* أظهرت هذه الخلايا تفاعلات ايجابية لكل من الأدينوسين ثلاثى الفوسفاتيز ، 3،17 بيتا هيدروكسي ستيرويد ديهيدوجينيز و البيروكسيديز الغير مباشر. يتم سحب افرازات الغدة بواسطة قنوات تصب في بصيلات الشعر المجاورة.

* في الفترة بين شهرى أبريل حتى أغسطس كانت الغدة غير نشطة وغير مفرزة و أظهرت تواجدا كثيفا للأنسجة الضامة و تراجعا واضحا للوحدات المفرزة و التى كانت مبطنة بخلايا مبططة غير مفرزة.