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MORPHOLOGICAL STUDIES ON THE LIPS OF BUFFALO

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ABSTRACT

This study was carried out on the lips of twenty buffalo heads of both sexes collected from Kafrelsheikh abattoir to illustrate the morphological features of the lips by using light microscope and scanning electron microscope. The lips and the oral commissure are covered externally with thin skin and lined internally with mucous membrane. The nasolabial plate is covered with stratified squamous keratinized epithelium.

The core of the lips is formed of bundles of skeletal muscles separated with connective tissue fibers.The core of the commissure is formed of bundles of skeletal muscles, collagen fibers, adipose tissue and PAS and Ab positive seromucoid glands. The core of the nasolabial plate is formed mainly of connective tissue followed by lobules of serous glands with few bundles of skeletal muscles.

Tow types of hair follicles were found in the dermis of the covering skin; the ordinary and covernous types. Conical papillae are found in the internal aspect of the oral commissure, while the free border of the lips carried blunt and short papillae.

INTRODUCTIO

The lips frame the opening of the mouth and form the rostral part of lateral borders of the oral vestibule. They are used for prehension of food, communication and suckling in new-born animals ***(Konig et.al,***

2004), therefore, the form and structure of the lips are determined by diet and feeding habits, in the horse, as stated by ***Nickel et al. (1979)***, the lips are used for collecting food and introducing it in to the mouth, so it is sensitive and mobile, while in cat, where the teeth and tongue are more important for prehension, the lips are less mobile and much reduced in size ***(Nickel et al., 1979)***. The lips of dog can be drawn back from the teeth to signal aggression and form an important factor in communication, but are incapable of food intake ***(Miller et al., 1964).*** In cattle, the lips are thick, rigid and comparatively immobile ***(McLeod, 1958; Raghavan and Kachroo, 1964)***. The lips of small ruminants are very mobile and are important for the prehension of food ***(May, 1970).***

The present study deals mainly with the structure of the lips of buffalo, which form the boundaries of the mouth and responsible for prehension of food, using scanning electron microscope and light microscope to restore more balanced understanding of the function of lips and how they adapted to feeding habits of this animal.

MATERIAL AND METHODS

This study was carried out on twenty buffalo heads of both sexes. These heads were collected directly after slaughtering from the Kafrelsheikh abbatoir. These specimens were used for scanning electron microscopy and light microscopy

I- Scanning electron microscopical studies (S.E.M): :-

The collected specimens were taken immediately after slaughtering and quickly cutted into small blocks. These small blocks were fixed in 3% gluteraldhyde for 24 hours then dehydrated through a graded series

of acetone. After the dehydration was completed, the blocks were transformed into the critical point drier (taab laboratory, England), where a liquid Co_2 gradually substitute the acetone within the tissue blocks, according to the critical point drying method, the dried samples were mounted on metal stubs with conducting carbon paint and sputter Coated with gold by sputtering device (teoljfc- 1100E). The specimens were examined with a scanning electron microscope (Jeol jsm 5300) at 25 KV in the Faculty of Science, Alexandria University.

II- Light microscopic examination:

The samples were fixed either in Bouin solution for 24 hours or 10% fromaldhyde solution, dehydrated in ascending concentrations of ethanol, cleared in xylene and embedded in paraffin wax. Sections of 5 mm thickness were prepared by microtome (LEICA RM 2035). The sections were stained with: Harris haematoxylin and Eosin (H&E), Periodic acid schiff (PAS) technique, Alcian blue (Ab) (PH 2-5), Crossman's trichrome, Van Gieson and Gomory stain. The staining methods were adopted according to **Bancroft and Stevens (1997).**

RESULTS

I- Scanning electron microscopical studies:

By the aid of scanning electron microscopy, the free border of the lips carried a blunt, short papillae. These papillae were separated from each other by narrow fissures, which crossed each other **(Fig. 1)**. Each papilla had undulating surface. Elsewhere the skin of the lips was

covered by keratinized epithelium in the form of folia of different sizes **(Fig. 2).** A network of numerous microridges were spread out on the surface of these exfoliated cells **(Fig. 3).**

The skin of the lower lip showed numerous scales of keratinized epithelium and a depression, from which the tactile hair was arised. The tactile hair had a cylindrical shape and carry scales of keratinized stratified squamous epithelium **(Fig.4).**

The mucous membrane of the lower lip showed numerous folds, carried microridges, and depressions with scales of keratinized epithelium **(Fig.5a and b).** Openings of the labial glands with different shapes and sizes were found at the mucous surface of the lower lip **(Fig.6).**

The surface of the nasolabial plate presented hexagonal shapped areas separated from each other by grooves. In the center of these areas, a small opening of the nasolabial gland was present, it had irregular border, which showed scales of keratinized epithelium **(Fig. 7a and b).** The surface of nasolabial plate showed both microridges and microvilli (minute papillae) **(Fig.8).**

II- <u>Light microscopical studies:-</u>

The light microscopic examination showed that, the two lips were covered externally with thin skin with hair follicles and sebaceous glands and internally with mucous membrane, while the middle layer, of both lips, was formed of skeletal muscles and connective tissue **(Fig. 9 a and b).** The mucous membrane was formed of stratified squamous

keratinized epithelium supported by dense connective tissue lamina propria. The core of the lips was formed of bundles of skeletal muscles separated with connective tissue fibers **(Fig. 9a and b).**

Two types of hair follicles were found in the dermis of the covering skin; the ordinary and cavernous types **(Fig. 9 a and b)**. The cavernous type was characterized by containing cavernous spaces between the external and internal dermal sheaths. These spaces were formed of anastomosing connective tissue trabeculae arised from the external and internal dermal sheath **(Fig. 10).**

The oral commissure was covered externally by thin skin with hair follicles and sebaceous glands, while its internal aspect was lined with mucous membrane. The internal aspect of the commissure showed conical papillae arised from the mucous membrane **(Fig. 11).** The core of the commissure was formed of bundles of skeletal muscles and collagenous fibers as well as adipose tissue **(Fig. 12).** PAS and Ab positive seromucoid glands were occasionally found under the mucous membrane of the oral commissure **(Fig.13).**

The nasolabial plate was covered externally with stratified squamous keratinized epithelium, under which, there was connective tissue layer followed by lobules of serous glands and adipose tissue. Few bundles of skeletal muscles were found between the glands. The ducts of the glands opened in the external surface of the nasolabial plate **(Fig. 14a).** The free border of the nasolabial plate was lined by stratified squamous keratinized epithelium followed by highly vascular connective tissue layer followed by small bundles of skeletal muscles **(Fig. 14 b).**

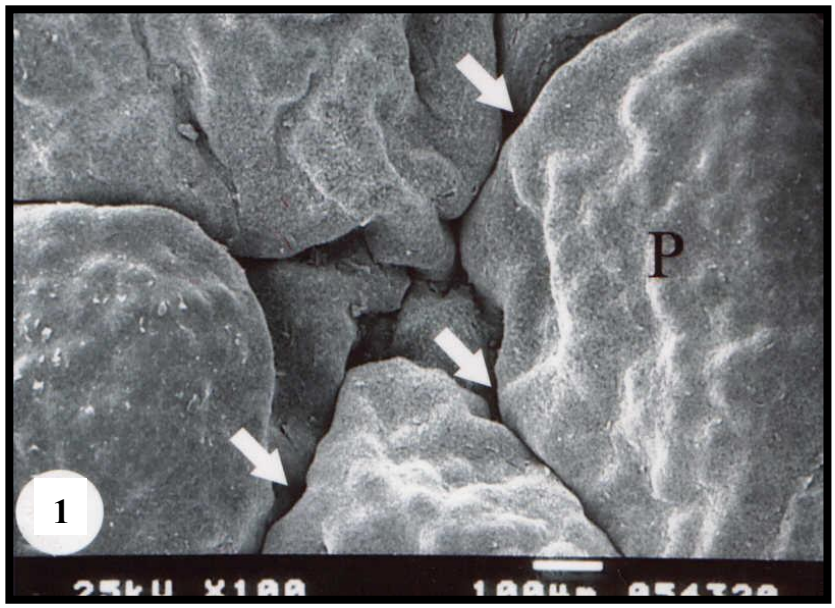

Fig.(1): A scanning electron micrograph of the free border of lips showing blunt papillae (P) separated by fissures (white arrow) X1000

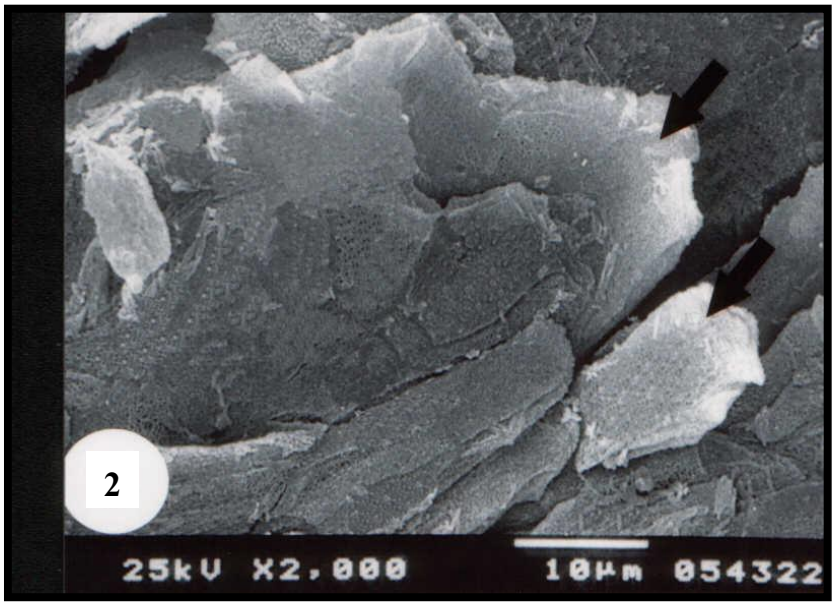

Fig.(2): A scanning electron micrograph of the free border of lips showing exfoliation of keratinized epithelium (black arrow) X2000

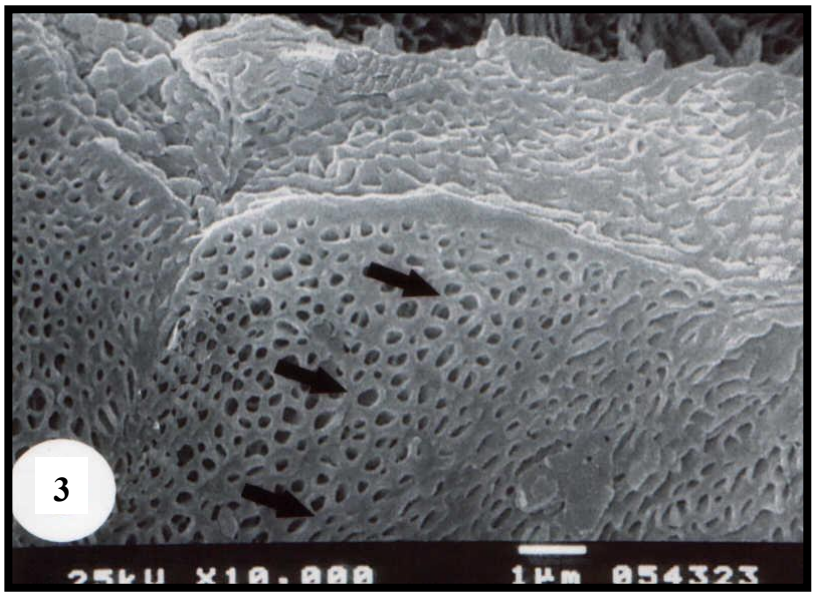

Fig. (3): A scanning electron micrograph of the free border of lips showing numerous micro- ridges on the cell surface (black arrow) X10.000

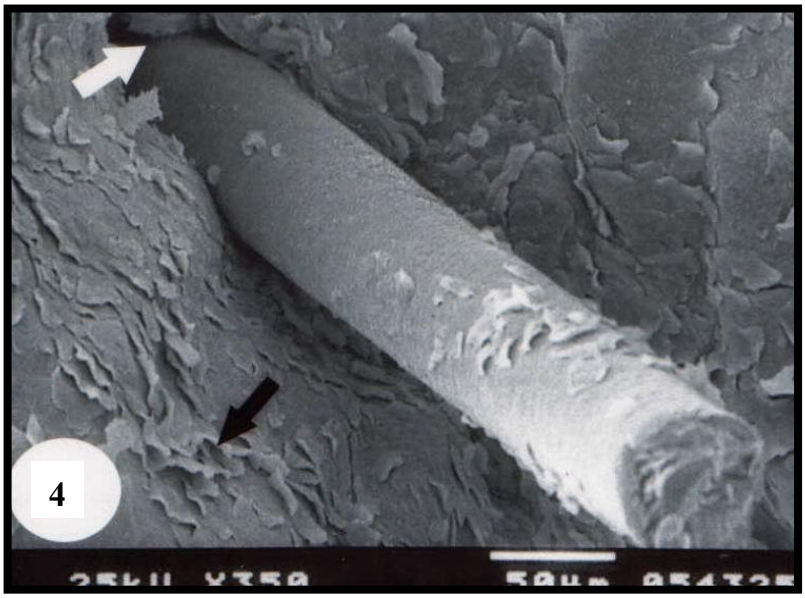

Fig. (4): A scanning electron micrograph of the lips showing a depression at the site of emergence of tactile hair (white arrow) and scales of keratinized epithelium (black arrow) X350

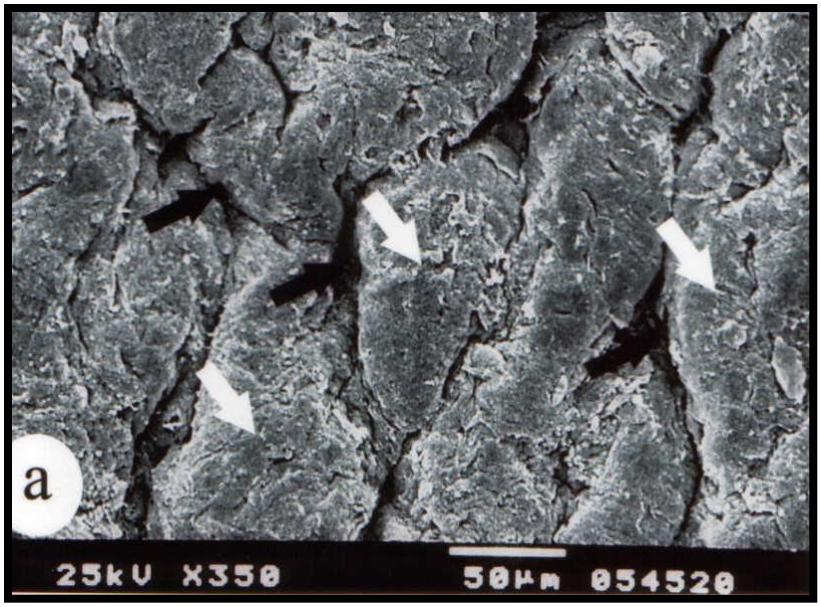

Fig. (5a): A scanning electron micrograph of labial mucous membrane showing folds of mucous membrane (white arrow) and depressions in between the folds (black arrows) X350

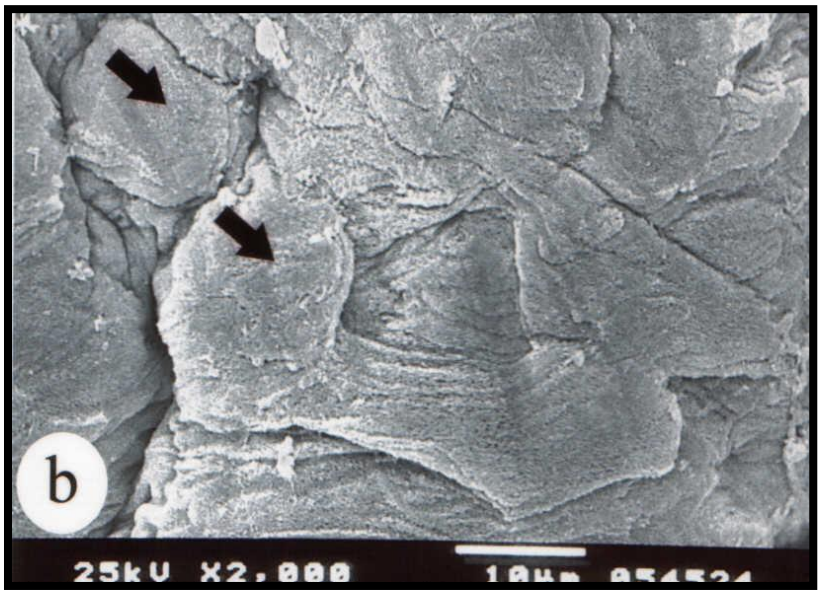

Fig. (5b): A scanning electron micrograph of labial mucous membrane showing folds of mucous membrane (black arrow)X 2000

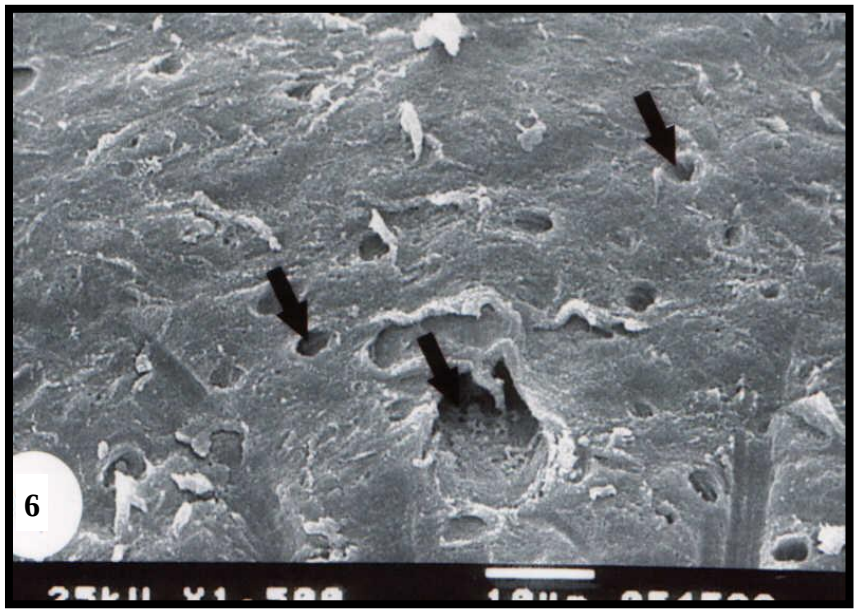

Fig. (6): A scanning electron micrograph of labial mucous membrane showing openings of labial glands (black arrows) X1500

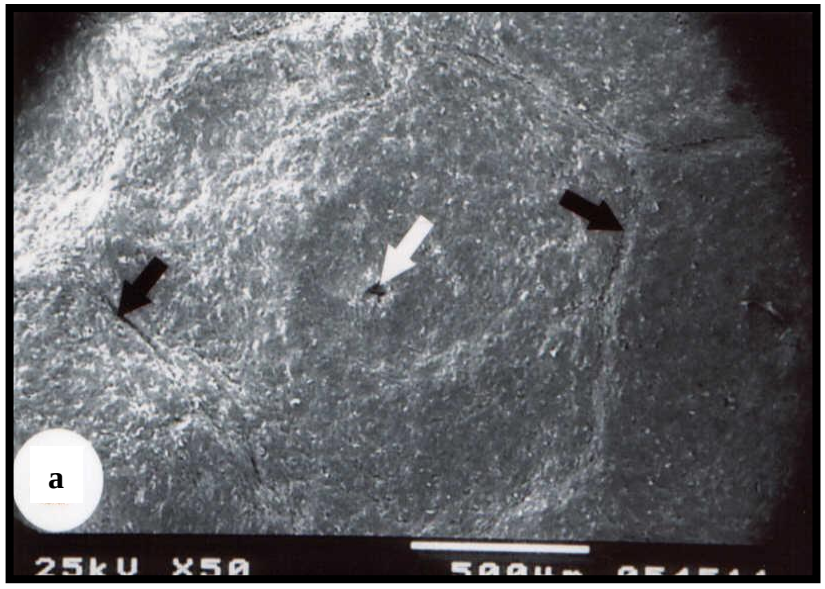

Fig. (7a): A scanning electron micrograph of nasolabial plate showing openings of nasolabial glands (white arrows) and grooves divided the surface into polyhedral areas (black arrow) X50

Fig. (7b): A scanning electron micrograph of nasolabial plate showing openings of the nasolabial glands (black arrow) X750

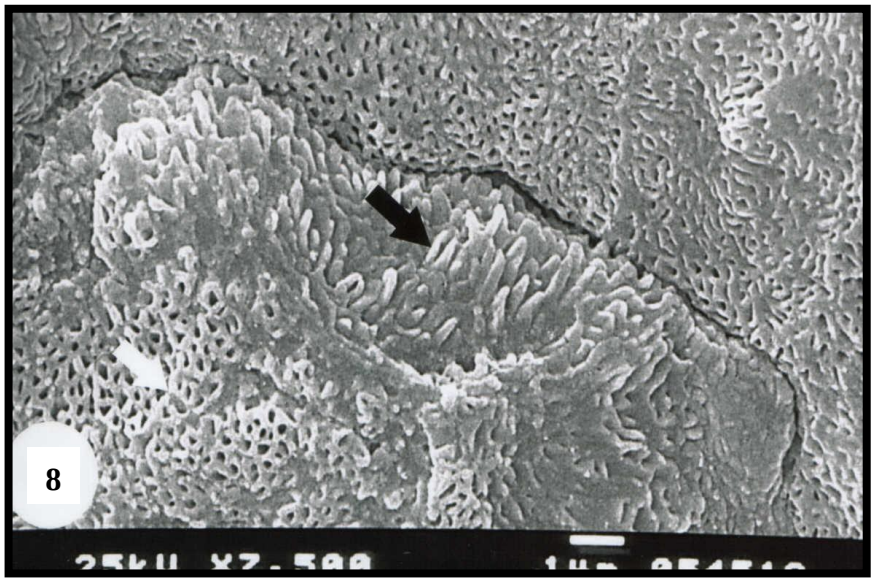

Fig. (8): A scanning electron micrograph of nasolabial plate showing both minute papillae (black arrow) and micro-ridges (white arrow) on the cell surface X7500

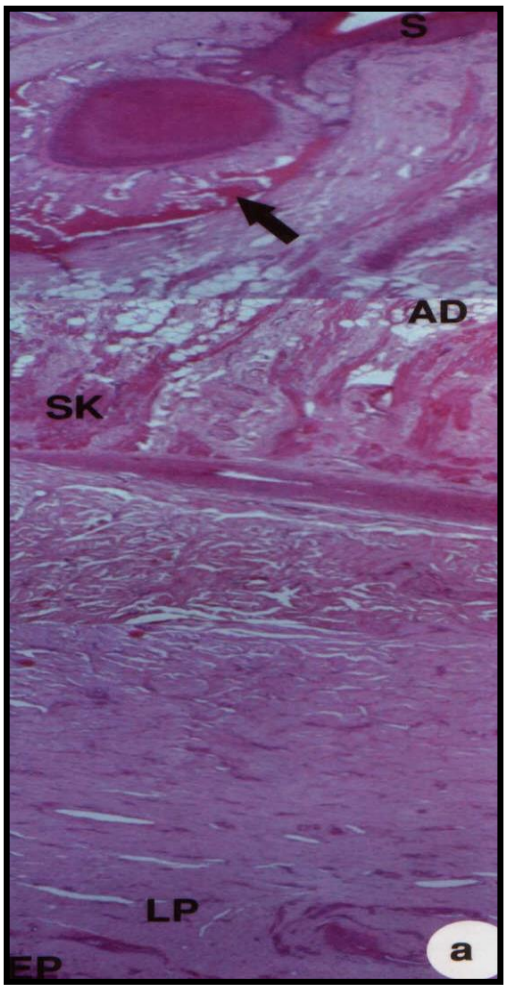

Fig. (9a): Photomicrograph of the upper lip showing skin (s), tactile hair (black arrow), adipose tissue (AD), skeletal muscle (SK), lamina propria (LP) and stratified squamous epithelium (EP). Stain H&E, X40

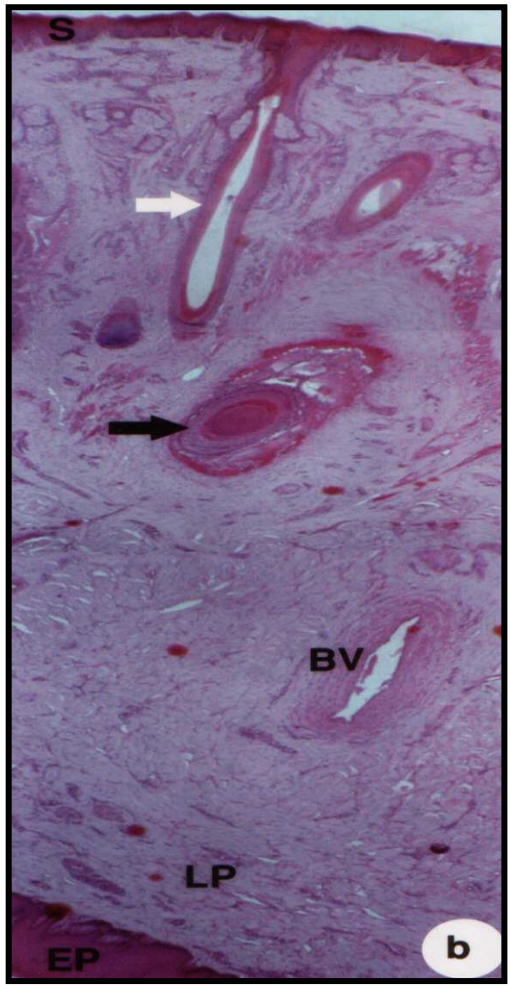

Fig. (9b): Photomicrograph of the lower lip showing skin (S), Ordinary hair (white arrow), tactile hair (black arrow), blood vessels (BV) lamina propria(LP)and stratified squamous epithelium (EP). Stain H&E, X40

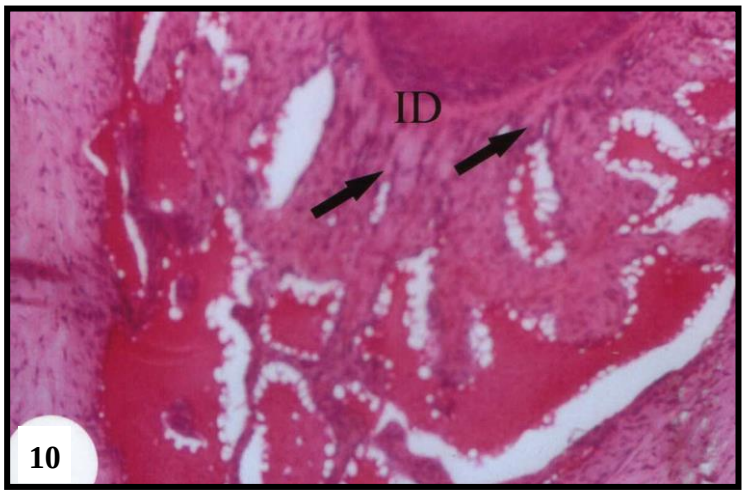

Fig. (10): Photomicrograph of tactile hair showing internal dermal sheath (ID), connective tissue trabeculae (black arrow). Stain H&E X400

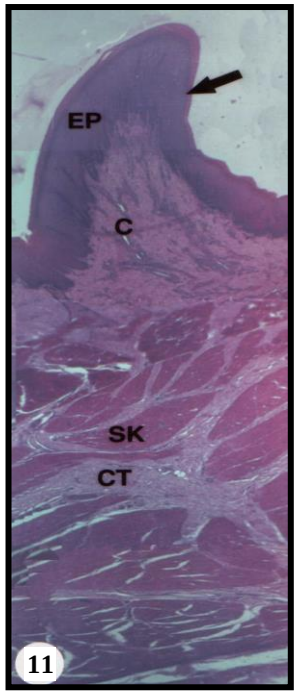

Fig. (11): Photomicrograph of oral commissar showing conical papillae (black arrow), stratified squamous keratinized epithelium (EP), connective tissue papilla (C), skeletal muscle fibers (SK), and connective tissue septae (CT). stain H&E, X40

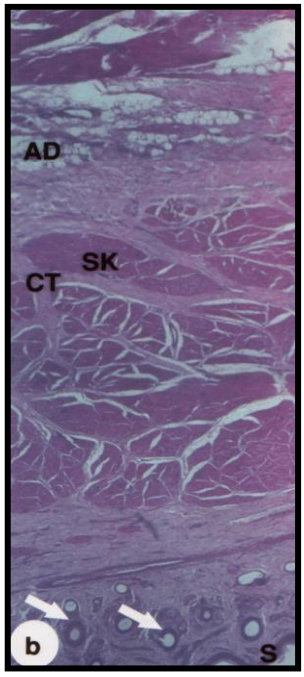

Fig. (12): Photomicrograph of oral commissar showing adipose tissue (AD), ordinary hair (white arrow), skeletal muscle fibers (SK), connective tissue septa (CT) and thin skin (S). Stain H&E, X 40

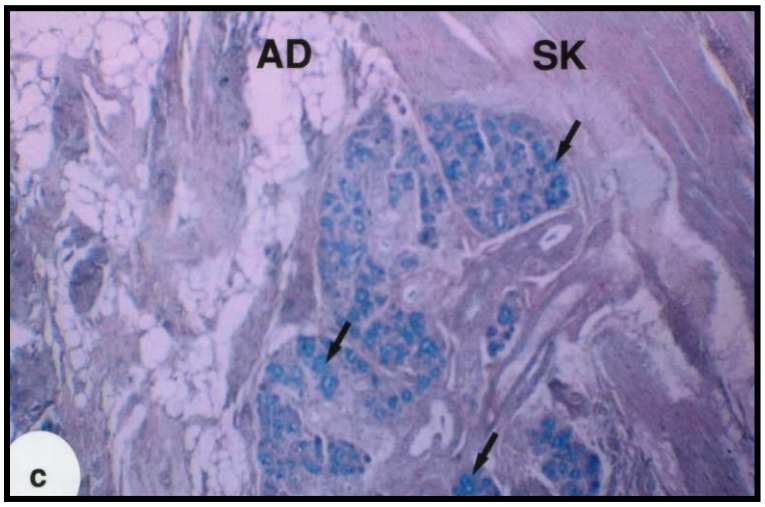

Fig. (13): Photomicrograph of oral commissar showing labial glands (black arrow), adipose tissue (AD), and skeletal muscle fibers (SK). Stain Ab, X40

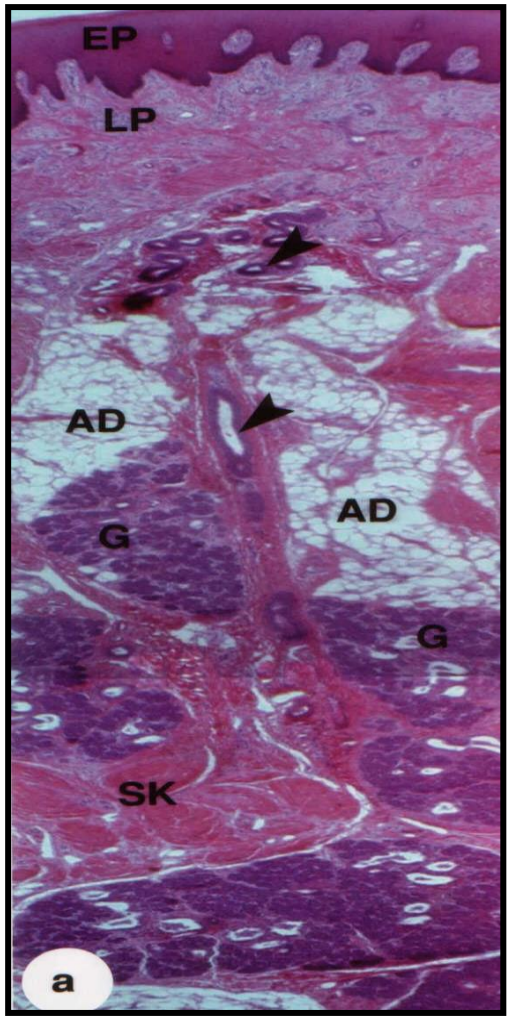

Fig. (14a): Photomicrograph of nasolabial plate showing stratifieds squamous epithelium (EP), lamina propria (LP), ducts of the nasolabial glands (black arrow), nasolabial glands (G) adipose tissue (AD) and skeletal muscle fibers (SK). Stain H&E, X40

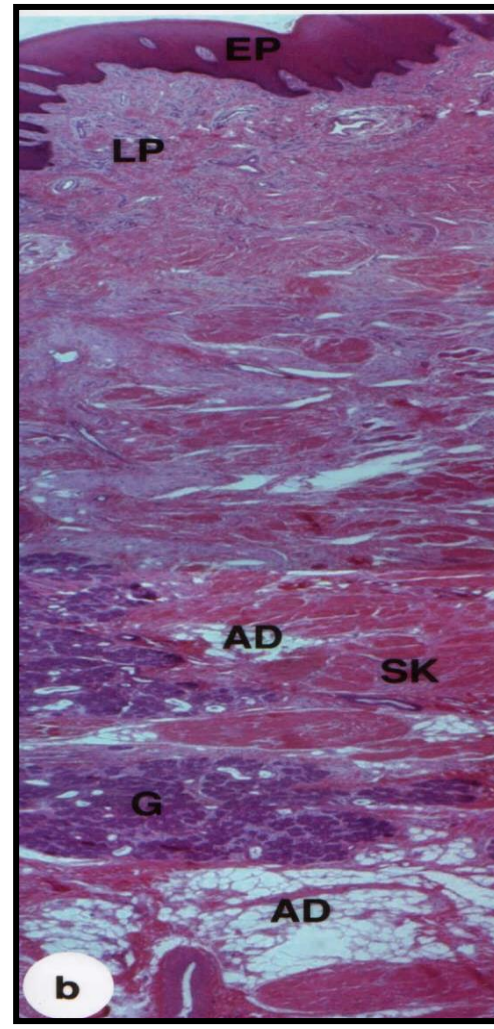

Fig. (14b): Photomicrograph of nasolabial plate showing stratified squamous epithelium (EP), lamina propria (LP), nasolabial glands (G), adipose tissue (AD) and skeletal muscle fibers (SK). Stain H&E, X40

DISCUSSION

The present study revealed that the lips of buffalo were consisted of three layers: outer thin skin, middle muscular layer and inner mucous membrane, this result was in full agreement with the results of ***(El-Hagri, 1967; Dellmann, 1998 and Konig et. al, 2004).***

Two types of hair were found in the skin of the lips in buffalo, ordinary and tactile ones, similar result was reported by ***Yildiz et al. (2004)*** in bovine. He mentioned that the tactile hair are more numerous in lateral parts of upper lip of bovine to compensate the relatively immobile and insensitive upper lip due to presence of nasolabilal plate.

In agreement with our study, ***Stinso and Calhoun (1987)*** in ruminants and horse, mentioned that, the mucous membrane of the internal aspect of the lips is formed of stratifiein squamous keratinized epithelium, in contrast to this, the mucous membrane of dog and pig not keratinized***(Stenson and Calhoun 1987).***This difference in kertinization of mucous membrane refers to the difference in the feeding habits of these animals, both ruminant and horse are herbiviores animals so, the mucous membrane of them highly stratified and highly keratinized epithelium while dog and big are carnivores and ornivores animals.

According to ***Shoaib (2004)*** the opening of the labial gland is nodular-shaped, while the present study revealed that, the mucous membrane of the lips showed numerous openings of the labial glands with different shapes and sizes.

Hexogeonal-shaped areas were found on the surface of nasolabial plate in buffalo, these areas are separated from each other by grooves and contained small round opening of the nasolabial glands in its center, similar results were reported by ***Habel (1975)*** in bovine.

In agreement with ***Habel (1975)*** the present study revealed that, the free border of the lips carried blunt; short papillae, these papillae were separated by fissures.

The present study revealed that, the skin of the lips carried scales of keratinized epithelium of different sizes. This result may be due to that the lips is subjected directly to the food and as a result of nature of feeding of this animal on roughages so, the keratinized epithelium of the lips are subjected continuously to exfoliation of keratin layer

The labial glands was concentrated at the labial commissure, they are seromucoid glands and give positive reaction to PAS and alcian blue. The duct of these glands opened to the mucous membrane, this result is agreed with ***(Banks, 1993 and Dellmann, 1998)*** who stated that these glands are mixed in large ruminants, while ***El-Gaafary (1964)*** in buffalo stated that the acini of the glands close to the oral comissure are purely mucous, while those mingled with middle buccal glands are associated with a few serous demilunes. The nasolabial glands consist of circumscribed lobules separated by connective tissue fibers, fat cells and skeletal muscle fibers.In contrast to this result, ***El-Gaafary (1964)*** stated that the acini of these glands possess the characters of both serous and mucous cells.

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