

HISTOCHEMICAL AND ULTRASTRUCTURAL OBSERVATIONS OF THE SKIN IN ONE HUMPED CAMEL

(Camelus Dromedarius).

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ABSTRACT

The present study was carried out on fifty healthy camel skin , the samples were collected from Al-Zubair abattoir in Basrah, counting each of the skin of the back, neck, and muzzle .

The results of study was determined the histological and histochemical characterization (Glycogen and Lipids) and ultrastructural examined samples. The histological structure of skin of all examined regions of the camel composed of the epidermis and dermis. The epidermis layer was appeared different in thickness among the examined samples, depending on the site of sample, however, the epidermis was composed of four secondary layers contain stratum corneum, stratum granulosum, stratum spinosum and stratum basal layers, while the dermis composed of two nuclear non separated layers includes superficial papillary and reticular layers.

The histochemical study was referred to the presence of glycogen and lipid. The glycogen granules were noticed in the cells of the basal layer of the epidermis, which appeared as a dense granules in the dermis layer, also, the glycogen compound was found in blood vessels, smooth muscle which associated with the follicles and sweat gland ducts. The lipid drops were shown in the dermis and epidermis layer, the lipid droplets found in graduate concentration toward the tissue lining cells.

INTRODUCTION

The skin consists of two layers the Epidermis that are working as protected layer of the dermis and the dermis the next thicker one, as well as the in Skin appendages

and glands (1) , (2) , (3). Epidermis layer Consists of Keratinizing stratified squamous epithelium and composed of several layers, and in the presence of the Stratum corneum, Stratum granulosum, and spinous layer and base layer (4); (5); (6).

As well as the existence of another layer is the stratum lucidum , which appear clearly in the free zones of the hair (7). The dermis, which contains of connective tissues composed of collagen fibers, elastic fibers and reticular fibers and fibroblasts as well as hair follicles sebaceous glands , sweat glands , blood vessels, lymphatic vessels and Nerve fibers (8) .

The dermis divided into superficial papillary layer and deep reticular layer . The hair follicle consists of two layers, internal root sheath which is the inner layer of the hair follicle and corresponding to the root of the hair. and outer root sheath that surrounds the root sheath.

(9) mention that the hair follicles divided into primary hair follicle and the Secondary hair follicle. The primary hair follicles characterized as the largest initial size and submerged deep within the dermis and accompanied by sebaceous gland and sweat gland and the erector muscle of hair. The secondary follicle is smaller than the first and close to the surface and accompanied by sebaceous gland only (10).

Many investigators: (2) and (11) classified the sweat glands by their formal and functional characteristics into two types apocrine secretion glands and granular merocrine glands. (12) pointed that the apocrine gland secretion spread in most parts of the of skin in animals, the simple tubular or convoluted glands located deeply into the dermis and sometimes extending into the upper part of the tissue under the skin (13).

(14) explain the responsibility of the small subcutaneous nerve trunks on the establishment of nerve plexus, which in turn sends branches to the reticular layer of the dermis,.

(15) in his studies on mammals find that the presence of different nerve fiber endings the motor nerve endings that seek to regulate secretion of the sweat glands and control the blood flow in blood vessels, as well as the movement of the hair erector muscles arrector pili muscles.

(16) shows that the distribution of glycogen varies in the dermis layer, as it noted that the dermal papilla be rich in glycogen granules, while the quantities begin to recede in collagen fiber bundles in the retinal layer . (17) pointed out that the neutral fat granules distributed through the hair follicles as distinct with different size granules, where it was observed the presence of neutral pigment lipid granules in the upper part of the hair bulb, and the external root sheath of the hair follicle (16).

MATERIALS AND METHODS

The study was carried out on ten camels skin , the samples were obtained from Thi-Qar abattoir, counting each of skin of back, neck, muzzle chest , dorsal and ventral abdomen ,dorsal aspect of the feet , the samples were fixed in 10% formalin solution before being transported to the laboratory for the gross microscopic examination.

-Histological preparations

For histological study the samples cuts into small pieces (1cm²) by sharp knife, and placed in 10% formalin solution. , sequentially numbered and post fixed for 24 hours in 10% formalin. Fixed tissue was washed in Running tap water the dehydrated by increasing graded series of alcohol, cleared in xylene and embedded in paraffin wax. Serial sections of five micrometers thick were made. Mounted on slides and stained with haematoxylin and eosin (18) .

The following Stains were used for histochemical studies

- **Sevier – munger neural tissue stain** ; For nerve ending demonstration
- **best carmine stain**: For glycogen investigation.
- **periodic acid schife**: For glycoproteinen investigation.
- **osmium tetroxide**: For lipids demonstrations.

For scanning electron microscope,the skin Specimens were fixed in 2% buffer gluteraldehyd followed by 1% osmium tetraoxide in 0.1 M cacodylate buffer, after dehydrated in an acetone series of increasing concentrations . the specimens were coated with platinum and gold with sputter coating (SC7620), the mounted specimens were then observed by scanning electron microscope (LEO 1450VP) at accel erating voltages of 20.0 kV.

RESULTS AND DISCUSSIONS

The study of the normal camel skin showed that it was consisted of two main layers, the epidermis and dermis, and this corresponds with the study of many researchers to mammals (2) ; (7). Camels skin is composed of stratified quamous epithelium that composed of the stratum corneum, the granular layer , spinous layer and base layer (fig 1). This is identical to what mentioned (19) in their study of the skin of bovine claw, where they said that skin layers consist of the four above-mentioned. As confirmed by both (20) , (21) in their studies at the local goat skin, and (22) who study the skin of one humped camel.

The basal layer of stratum basal consists one row of vertical cells. They are of prominent elongated dark color stained basophilic nucleus, with cytoplasmic projections into the dermis neighbors. These results are identical to what is observed by (23) in their study of the skin of Awasi sheep, with (24) in their study of sheep. Also, the results were identical with the remark (20) in the study of local goat's skin, The Stratum spinosum cells characterized by their polygonal shaped with spherical nucleus. And the number of cell layers varies depending on the thickness of the skin and this is identical to what mentioned by (25) in their study of the cow skin. The Stratum granulosum cells are large flat longitudinal and parallel to the surface of the skin. And were filled with cytoplasmic basophilic granules. This layer showed nuclei with Progressive degeneration toward stratum corneum. These result come in agreement with (3) in their study of Indian buffalo's skin and (26) through the skin of their cows. The stratum corneum findings were compatible with the observation of (27) in cattle and (28) with the skin of goats.

The dermis is divided into two layers, The dermis divided into superficial papillary layer and deep reticular layer. This is identical to what is observed by (29) in the study of the skin of surti buffalo, and (28) in goats. The papillary surface layer consisting of a network of thin collagen and elastic fibers. In addition to the cells and connective tissue such as plasma cells, fibrocytes , mast cells and macrophages, and this corresponds the find of (10) when studying the skin in ruminants. The hair follicles are arranged individually and in the regular style, this is what was observed in most mammals (9). The primary hair follicles in camels (initial) are large and

accompanied by sebaceous gland as well as erectile hair muscle

A single large follicles, present in the muzzle only. Characterized by the presence of a bloody semi-circular sinus between the outer and inner sheath (Fig 2).. This is consistent with (30); (31). Sebaceous gland appeared as alveolar simple or branching were observed in all regions examined. Which a companied with hair follicles, the gland opens directly by excretory duct, to excrete their content to the neck of hair (Fig 3) and this in agreements with (16) in the skin of cows and sheep. during his study of the skin of one humped camel , (32) pointed that the multi-lobed gland in the upper lip only remaining areas were either non-lobed and opens in the hair follicle through a shared channel.

The sweat glands of the camel were simple tubular glands, distributed in all regions except the muzzle and always escorted to the hair follicles. (Fig 4) and this result similar to (33) when studying the Indian buffalo skin, the secretory system located deep within the dermis., And the cavity is broad and lined with a single layer of cuboidal epithelium that separated from the basement membrane cells, myoepithelial cells and this is identical to what mentioned by (3) and (12).

The skin of the camel distinct sensory structures. As it varies in different parts of the nervous processing of the body. This is identical to what observed in most mammals including human (2); (11). The skin of camel innervated through nerve trunks under the skin, sending nerve fiber branches into the deep layer of the epidermis, which sends branches to innervate the layers of the skin of other accessories, as well as send branches closer to penetrate the connective tissue of the dermis. This is an agreement with (34) in their study of sheep and goats and (14).

The nerve fibers branched into smaller branches, which in turn ends with different types of nerve endings. Including the sensory nerve endings and this was confirmed (35).

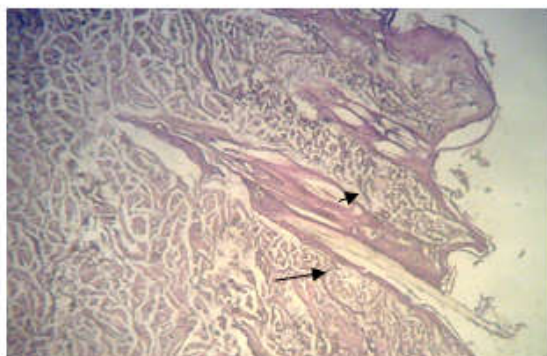
The study proved that the vast majority of the layers of the epidermis except the basal layer and basement membrane takes a negative reaction with PAS and best Carmine to detect glycogen and carbohydrates. The spinous , granular and corium cells do not contain the neutral polysaccharides, and this is an indicator of the non-existence glycogen in those layers.

While the results showed the presence of glycogen in the basal layer and basement membrane of the skin and in large quantities (positive reaction with the PAS technique and Best Carmine). This disagreement with (6) and (31). Dermis layer is

characterized by the presence of neutral polysaccharide. And gave a positive reaction with PAS. Can be explained by the presence of glycogen in this layer because of high supply of the blood vessels, where it notes the spread of granules around the blood vessels , as well as the spread in the cytoplasm of connective tissue cells of connective tissue (Fig 5,6). This finding is similar to (16).

The skin layer gives a strong response to the neutral lipid technique, especially in the stratum corneum. (Fig 7) This corresponds with the findings of (36) and (37) and (31) who emphasized that the stratum corneum contains many lipids granules.

While our results were disagreement with (38) and (39) who stated that the dermis layer show a negative response to the techniques used. The follicles show a positive reaction to the lipid technique.



Fig; 1; show the Skin layers ↗
dermis and epidermis ↖ **H&E**

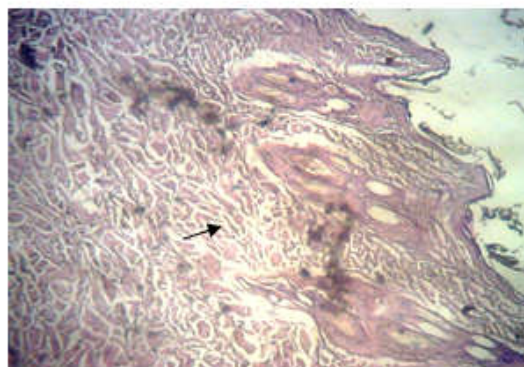


Fig 2; The hair follicle of camel
skin ↗ **H&E stain 100X**

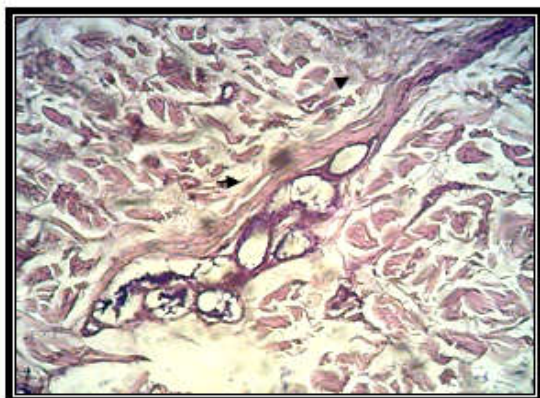


Fig 3:Sebaceous gland associated with
hair root ↗ **H&E stain 400X**

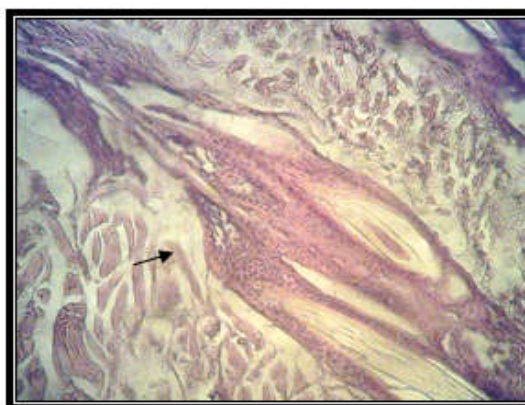


Fig 4; show the sweat gland in the skin of
camel ↗ **H&E stain 100X**

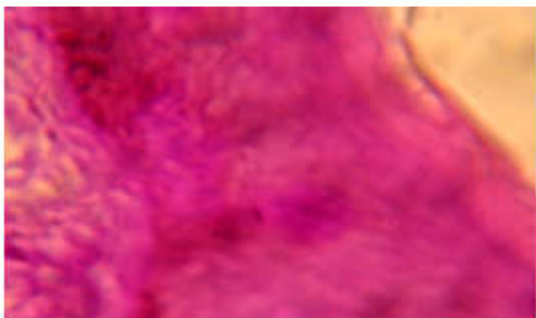


Fig 5; Basal layer glycogen distributions PAS 400X

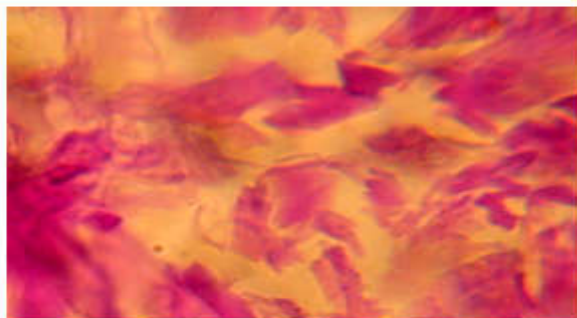


Fig 6 ; Glycogen distributions at the collagen fibers of dermis PAS 400X

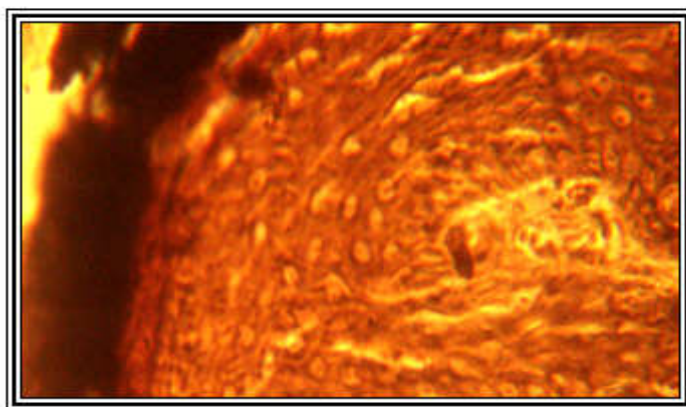


Fig 7 ; Hair follicle Lipids distributions osmium tetroxide 400X

The ultrastructure of the camel epidermis composed of the keratin layer that not contains of blood vessels, therefore its supplies nutritions from papillary layer, (fig 8).

The dermis layer was a connective tissue which consist of a papillary and reticular layers composed of elastic and collagen fibers, with hair follicles and blood vessels in addition to the nerves. (fig 9)

The epidermis of the camel skin possessed four layers characteristics of the epidermis in the skin of mammals. The dermis was divided indistinctly into superficial and deep reticular layers and the dermis was composed of collagen elastic and reticular fibers; hair follicles, sebaceous and sweat glands and arrector pili muscles. Hair follicles distributed singly (40).

The epidermis appeared to comprises of keratinized stratified squamous epithelium involves of several sublayers , these are stratum corneum, , stratum granulosum,

stratum spinosum and stratum basale. The Stratum corneum (horny layer) appeared as the outermost layer and primarily consisted of dying and dead skin cell filled with mature keratin. (41)

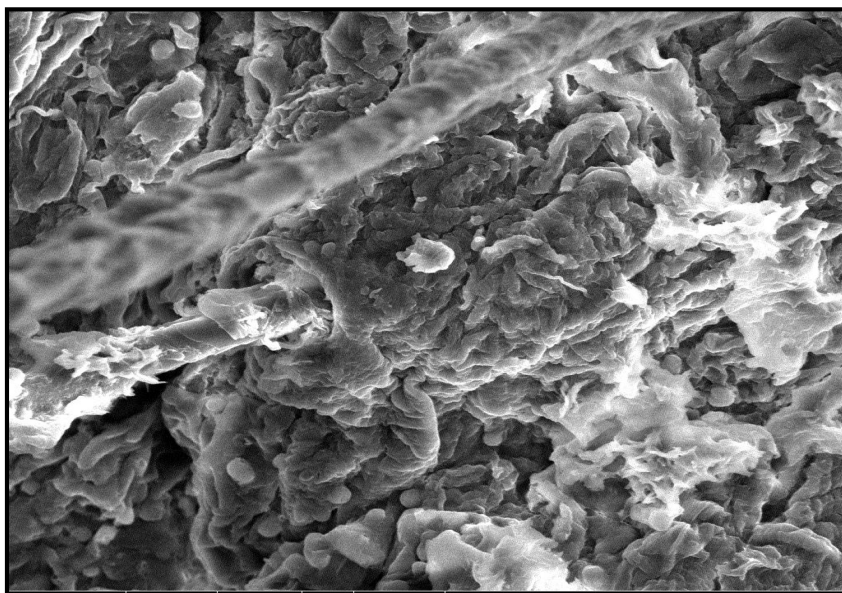


Fig 8;Scanning electron microscope showing free surface of the camel epidermal layer (X2388),A stratum coreum , B.Hair root ,C stratum granulosum

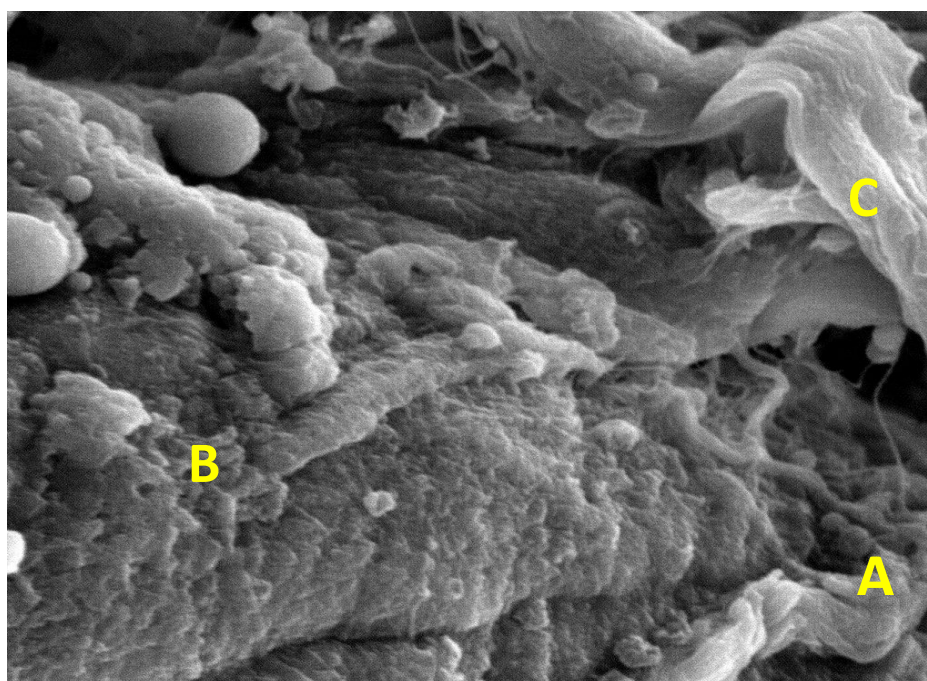


Fig 9;Scanning electron microscope showing ,A.elastic bundles distributed in papillary layer, B .dermal papillae, C.Collagen bundles (X 8185)

دراسة الكيمياء النسيجية والتركييب الفوقي للجلد في الجمل وحيد السنام

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الخلاصة

أجريت الدراسة الحالية على خمسون جملا صحيا(خالية من الامراض). تم جمع العينات من مجزرة الزبير في محافظة البصرة. تم اخذ عينات الجلد من الظهر، العنق، الفم والانف.

حددت نتائج الدراسة الخصائص النسيجية والكيميائية النسيجية ل (الكلايكوجين والدهون) في فحص النماذج. اظهر التركييب النسيجي بان جلد الجمل يتكون من طبقة البشرة والادمة. اظهرت طبقات البشرة اختلافا في السمك من بين النماذج التي تم فحصها اعتمادا على موقع العينة، كما أظهرت البشرة بانها مكونة من أربعة طبقات ثانوية : الطبقة المتقرنة، الطبقة الحبيبية، الطبقة الشوكية والطبقة القاعدية، بينما طبقة الادمة مكونة من طبقتين غير مفصولتين هما الطبقة الحليمية السطحية والطبقة الشوكية.

اشارت الدراسة الكيميائية النسيجية الى وجود الكلايكوجين والدهون حيث لوحظت حبيبات الكلايكوجين داخل خلايا الطبقة القاعدية للبشرة، والتي تظهر بشكل حبيبات كثيفة في طبقة الادمة. كذلك لوحظ وجود مركبات الكلايكوجين في الاوعية الدموية والعضلات والملساء المرتبطة مع الحويصلات وقنوات الغدد العرقية. كما لوحظ وجود القطيرات الدهنية في البشرة والادمة حيث وجدت القطيرات الدهنية متركزة تتدرج باتجاه الخلايا المبطننة للنسيج.

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