HISTOMORPHOLOGY OF HAIR FOLLICLE PATTERN IN WILD BIG CATS AND SLOTH BEAR SKIN: A TOOL FOR FORENSIC IDENTIFICATION

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Abstract: This study comprised of horizontal skin sections obtained from big cats and sloth bear. The Leopard skin showed a single primary hair follicle surrounded by circumferentially arranged groups of compound follicles. Each compound follicle consisted of 6-8 fine secondary hair follicles interspersed with fine connective tissue fibers. Bengal tiger skin showed sparsely distributed compound follicles. Within each compound follicle a primary hair follicle located at one end underneath which 6-8 secondary hair follicles were observed. Lion skin comprised of clusters of compound hair follicles around a primary hair follicle bundle. Within each compound follicle a primary hair follicle was always noticed. In sloth bear skin sparsely distributed elliptical shaped compound hair follicles were recorded. Within each compound follicle 2-4 primary hair follicles were irregularly arranged. Thus on the bases of hair follicle structure of skins various wild animals can be identified.

Key words: Wild animals, Skin, Hair follicles,

INTRODUCTION

Wild cats, viz., Bengal tiger (Panthera tigris tigris), Asiatic lion (Panthera leo) and leopard (Panthera pardus) and sloth bear (Melursus ursinus) are some of the important wild animals which have become endangered and facing the risk of extinction in India [1]. The identification of skin of wild carnivores plays an important role in forensic study to differentiate the original wild carnivorous skin from that of fake skins. The arrangement of hair follicles in the domestic animals such as cattle, sheep, goat, dog and cat have been described and indicated that they have species specific arrangement of hair follicles [2].

Review of literature has not shown any detail on the architecture of hair follicle in wild carnivore animals. Keeping in view the present study has been conducted on the original skin of carnivore animals such as bengal tiger, leopard, asiatic lion and sloth bear. This study will help in the identification of fake skin from the original carnivores skin which are sold at an exuberant prices by the poachers in the international market.

MATERIALS AND METHODS

15 lions, 8 bengal tigers, 11 leopards and 6 sloth bears skin samples were collected from Bannerghatta National Park, Bangalore, Mysore Zoo and other National Parks and zoos located in Karnataka state. The skin samples were collected from lateral abdominal region and cut into 2cm X 2cm size and fixed in 10 % Neutral Buffered Formalin for a minimum of 48 hr. The skin samples were processed for paraffin embedding and 6μm thick horizontal and
Fig. 1: Photo micrograph showing individual compound follicle in the horizontal section of skin of leopard. p-primary hair follicle, s- secondary hair follicles. H&E- Phloxine X100

Fig. 2: Photo micrograph showing individual compound follicle in the horizontal section of skin of Bengal tiger. H&E- Phloxine X100

Fig. 3: Photo micrograph showing within the cluster of hair follicle and associated sebaceous glands(sb) and collagen bundles in the skin of Bengal tiger. H&E- Phloxine X200

Fig. 4: Photo micrograph showing individual compound follicle in the horizontal section of skin of lion. p-primary hair follicle, s- secondary hair follicles. H&E- Phloxine X40

Fig. 5: Photo micrograph showing evenly distributed sweat glands (sw) in the hair follicle bundles in lion skin. Verhoeff’s x 40

Fig. 6: Photo micrograph showing individual compound follicle in the horizontal section of skin of sloth bear. Masson’s trichrome X200
vertical sections were cut to understand the skin structure and pattern of hair follicles. The paraffin sections thus obtained were subjected for routine and special staining techniques [3-5].

RESULTS AND DISCUSSION

Leopard skin: The skin of leopard showed uniform distribution of hair follicle bundles which were separated by dense connective tissue. Circumferential arrangement of hair follicle bundles appear to be a characteristic of the leopard skin. Within each bundle single primary hair follicle surrounded by groups of compound follicles. Each compound follicle consisted of 6-8 fine secondary follicles interspersed by fine connective tissue fibers (Fig. 1). Although these features morphologically resembled that of the cat, but they varied in the shapes of arrangement of hair follicle. Primary hair surrounded by clusters of compound follicle with secondary hairs appeared round to oval in the leopard while it was clearly elliptical in the cat [2].

Bengal tiger skin: Bengal tiger skin presented sparingly distributed compound follicles. In each compound follicle a primary hair follicle located at one end below which 6-8 secondary hair follicles were noticed (Fig. 2). This feature is characteristic and unique useful in its identification. This appearance neither resembles the domestic cat nor domestic dog which have different arrangement of hair follicle [2]. In the present observation dense irregular connective tissue separated the individual hair follicles with profusely distributed sebaceous glands in both primary and secondary hair follicles (Fig. 3) noticed. However, no sweat glands were seen. A similar observation was made in dog and cat [6].

Lion Skin: The arrangement of hair follicles in lion resembled that of the cat but it differed from it by the presence of smaller primary hair follicles in the surrounding clusters of compound follicles (Fig. 4). The shape of the surrounding compound follicles varied and did not follow any specific shape. The sweat glands were evenly distributed in the hair follicle bundles between primary and secondary hair follicles, the apocrine sweat glands coiled in nature were observed around the clusters of hair follicles in the dermis (Fig. 5).

The presence of sweat glands in the lower abdominal region of lion skin [7] were similar to tubular shaped sweat glands found in the skin of hyena [8]. The presence of sweat glands which serve to remove excess heat in the form of sweat, a function true in the non panting animals was surprisingly observed in the skin of lion. More works need to be under taken to clearly explain the mode of elimination of heat in this species, from our observation it appears that lion do not pant while the tiger certainly do.

Sloth bear: The horizontal sections of the sloth bear skin showed sparsely distributed hair follicle bundles, surrounded by connective tissue and were elliptical in out line. Each hair follicle bundle consisted of 3-4 primary hair follicles only. There were no secondary hair follicles associated with it (Fig. 6).

Primary follicle grouped in clusters of two to four in number, with three being most common surrounded by dense connective tissue and densely populated follicle groups were reported in the pig skin [2], whereas sparingly distributed cluster of follicles were observed in the present study in the sloth bear.

CONCLUSION

In the present study the horizontal section of the skin of leopard, lion, Bengal tiger and sloth bear presented a characteristic architecture and distribution of hair follicles, which can form a data base in the identification of wild carnivore skins.

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