



COMPARATIVE MORPHOLOGICAL STUDY OF TACTILE HAIR OF TIGER AND LEOPARD

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ABSTRACT

The present work was carried out on the tactile hairs. Samples were collected from two adult Tiger and two Leopard for morphometric analysis. Individual vibrissae were opportunistically collected when shed by live, captive animals. The collected hair was washed thoroughly in distilled water to remove dirt particles and grossly examined for its physical characteristics as colour, total length and thickness. The tactile hair was smooth, stiff and slight curved in both species but pigmentation around root side of the tactile hair was more in tiger than leopard. Length of the tiger's tactile hair differed from 12 to 14 cm, while in leopard length differed from 9 to 13 cm. In Tigers, the mean thickness of hair at root, shaft and tip was 0.19 ± 0.00 , 0.16 ± 0.00 and 0.02 ± 0.01 cm respectively whereas in Leopards, the mean thickness at root, shaft and tip was 0.13 ± 0.04 , 0.07 ± 0.00 and 0.03 ± 0.01 cm. The samples were examined for qualitative characteristics using whole mount and scale cast specimens. Specific variations were observed in the Tiger and Leopard during the present study as cuticle scale pattern, medullary pattern, and pigment distribution.

KEYWORDS: Tiger, Leopard, tactile hairs, scale pattern, medullary pattern.

INTRODUCTION

Morphological examination of hair samples is the first step in forensic hair comparisons. Mammalian hairs differ among species and breeds so are used for identification of animals at species level (Cavia *et al.*, 2008). The practical applications of hair identification in biological and forensic sciences have been enumerated by several investigators (Mayer, 1952; Adorjan & Kolenosky, 1969). Many investigators have worked on species identification from dorsal guard hair using microscopic techniques. In spite of large quantum of literature available on guard hair, the reports on vibrissae or tactile hair in mammals are meagre. On the same ground present research work is planned to differentiate two species of wild cat, the tiger (*Panthera tigris*) and leopard (*Panthera pardus*) with the help of their tactile hair pattern.

Hair is comprised of three major portions- outer cuticle, middle cortex, and inner medulla. The cuticle or covering of individual hair is made up of overlapping scales. The shape of the each scale is also an important feature used for identification of species. The primary function of the cuticle is protection of the hair (Rudall, 1941; Azzola and Shurmann, 1969). The middle layer of a hair shaft is cortex. The cortex is made up of fusiform or spindle-shaped cells, which interdigitate with each other along the long axis of the shaft. The central portion of the hair shaft is medulla. It is made up of cells of various shapes, which are often interspaced with air pockets. The patterns of these cells have been used to distinguish various kinds of

hair (Dearborn, 1939; Day, 1966; Mayer, 1952). Pigment is normally concentrated in the medulla cell, but may be lacking entirely.

MATERIALS & METHODS

The present study on tactile hair of Tiger (*Panthera tigris*) and Leopard (*Panthera pardus*) was conducted at the Department of Veterinary Anatomy, Nagpur Veterinary College, Nagpur. Naturally shaded hair samples from two live, captive adult animals of each species were collected from local Zoological Park. Physical examination for qualitative characteristics was undertaken for colour, total length and thickness. Morphological examination of hair was conducted to observe the cuticle, cortex and medulla pattern using whole mount and scale cast specimens. Cuticle scale casts were obtained by clear nail polish method (Deedrick and Koch, 2004) and Medulla pattern was observed by preparing whole mounts of hair samples (Sahajpal *et al.*, 2009). Due to pigmentation of tactile hair, after processing 'bleaching step' was followed (Kshirsagar *et al.*, 2009) then cleared with Xylene. Each hair was mounted on microscopic slide in a drop of DPX and observed under the light microscope at its proximal, middle and distal part.

RESULTS & DISCUSSION

In the present study, the findings of the tactile hair of both species i.e. tiger and leopard were assessed by macro and microscopic observations as follows in Table -1:

TABLE 1:

A.	Physical characters	Tiger	Leopard
1.	Profile	Slight Curved	Slight Curved
2.	Colour	Tip: pale, Base: brown	Tip: pale, Base: brown
3.	No. of Bands	2	2
B.	Surface Structure		
1.	Scale arrangement	Transverse	Transverse
2.	Scale pattern	Streaked	Regular wave
3.	Scale margin	Crenate margin	Smooth margin
4.	Scale margin distance	Near	Near
C.	Medullary pattern		
1.	Medullary configuration	Uniserial ladder-type	Uniserial ladder-type

Physical characters

The tactile hair was long, smooth, stiff and slight curved in both species but pigmentation around root side of the tactile hair was more in tiger than leopard. Length of the tiger's tactile hair ranged from 12 to 14 cm, while in leopard length ranged from 9 to 13 cm. In tiger, the mean thickness of hair at root, shaft and tip is 0.19 ± 0.00 , 0.16 ± 0.00 and 0.02 ± 0.01 cm respectively whereas in Leopards, the mean thickness at root, shaft and tip is 0.13 ± 0.04 , 0.07 ± 0.00 and 0.03 ± 0.01 cm respectively.

Microscopic characters

The cuticle scale pattern of tactile hair in tiger in the present study was transverse, streaked, crenate margin

with near scale margin distance (Fig. 1). Whereas in leopard it was transverse, regular waves, smooth margin with near margin distance (Fig. 2). These observations of the present study are in agreement with those reported by Gharu and Trivedi, (2014) in guard hair of *Panthera pardus* and *Panther leo persica* with respect to some features of cuticle scale pattern. However they reported variation in scale margin in both the species and is not in agreement with the present study. This variation in the hair scale margin may be attributed to the difference in the type of hair i.e. guard hair and tactile hair.



FIGURE 1. Cuticle Scale of Tactile hair in Tiger



FIGURE 2. Cuticle Scale of Tactile hair in Leopard

The medulla of tiger tactile hair in the present study was uniserial ladder-type with long segments (Fig. 3). Type of medulla of each hair did not change along the length of the hair but the width of individual medullary segment was found to become narrow towards the basal end. Similar findings were reported by Kitpipit and Thanakiatkrai (2013) and Sarma *et al.*, (2014) in guard hair of tiger. The medulla of tactile hair in leopard was uniserial ladder-like and its width was found to become narrow toward both the ends i.e tip and root (Fig. 4). Similar findings were reported by Gharu and Trivedi (2014) in guard hair of

leopard cub. The pigmentation of the hair in the present study showed clumping of pigment particles near the medulla, while it was evenly distributed throughout the cortex in both the species of animals.

From the present observation, it can be concluded that cuticle scale pattern of tactile hair can be used for differentiation of species.

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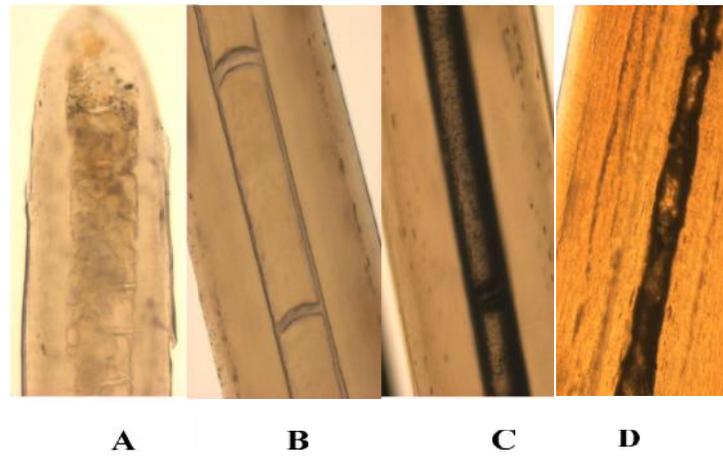


FIGURE 3A: Medullary Pattern in Proximal Part of Hair B) & C) Medullary Pattern having Long Segments in Middle Part D) Medullary Pattern towards Distal Part of Hair in Tiger

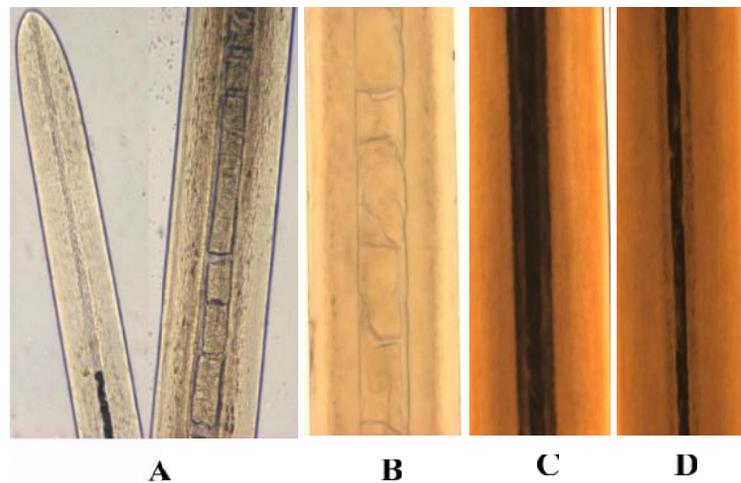


FIGURE 4A. Medullary Pattern in Proximal Part of Hair B) Middle Part C) & D) Medullary Pattern in Distal Part of Tactile Hair in Leopard

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