

**IDENTIFICATION OF DORSAL GUARD HAIR OF TIBETAN
ANTELOPE *PANTHOLOPS HODGSONII* (ABEL, 1826)
(BOVIDAE: ARTIODACTYLA: MAMMALIA)**

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Abstract: The physical and microscopic characteristics of dorsal guard hairs of *Pantholops hodgsonii* were examined using optical light and scanning electron microscopes for species identification. The hair of *P. hodgsonii* is characterised by mainly its intermediate scale position and diamond scale pattern of cuticular of hair, apart from other hair characteristics. The microphotographs and characteristics of dorsal guard hair of *P. hodgsonii* are presented here can be used in forensic science as well as predator diet analysis as an appropriate reference for the species identification.

Keywords: *Pantholops hodgsonii*, tricho-taxonomy, dorsal guard hair, physical and microscopic characteristics.

Introduction

Detailed knowledge of the hair structure is required to identify the species, where the morpho-taxonomy cannot give the proper result. In India, the tricho-taxonomic studies have been carried out by many workers on different orders of class Mammalia viz., Carnivora (Chakraborty and De, 2010), Primates (De, 1993; Sarkar, *et al.*, 2011) and Rodentia (Bahuguna, 2008) and a few studies on Tibetan antelope by Bahuguna and Mukherjee (2000) and Sahajibal *et al.* (2010). The aim of this study is to give a complete physical and microscopic characteristics with high-resolution microphotographs of hair of Tibetan antelope *Pantholops hodgsonii* for species identification.

The Tibetan antelope is a medium sized, rufous brown and antelope-like animal. It is slightly larger than the blackbuck with a black face and white underparts, distributed in Jammu & Kashmir in India (Prater, 1971; Menon, 2014). The poaching for wool to make shawls and human interference are the major threat to this species. As per the IUCN Red List category, it is a Near Threatened species and listed under the Schedule I of the Indian Wildlife (Protection) Act, 1972 and listed under the Appendix –I of CITES.

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Materials and methods

The hair samples were processed with Carbon tetrachloride and Acetone to remove the dirt of exogenous materials. Physical characteristics of hairs such as colour, no. of bands and profile of hair were recorded by hand lens, and diameter and the total length of hair were measured through dial calliper. Microscopic characteristics of hair such as cuticular scale position, scale pattern, scale margin and scale margin distance of hair were studied with help of the digital camera fitted on an optical light microscope (Olympus BX41) and Scanning Electron Microscope (ZEISS Evo18- Special Edition). The medullary configurations of hair such as composition, structure and margins of the medulla of hair were also noted. The measurement values of cuticula and medulla were recorded with the help of an optical light microscope. Nomenclature of different parameters was followed by Brunner and Coman (1974); Teerink (1991) and nomenclature of colour was followed as per Ridgway (1886).

Results and discussion

The adults of *P. hodgsonii* are sexually dimorphic, male (reddish fawn) and female (rust-fawn) have distinct coat colour (Menon, 2014). However, the individual hair observed was pearl colour and unbanded. The profile of hair observed was undulated. The average length and diameter of hair were observed as 13.4 ± 36 mm and 65 ± 167 μ m, respectively. The cuticular scale characteristics of hair recorded as scale position- 'intermediate', scale patterns- 'diamond petal', structure of scale margins- 'smooth' and the distance between scale margins- 'distant'. The medullary characteristics of hair observed as composition of medulla- 'multicellular in rows', structure of medulla- 'wide medulla lattice', form of the medulla margins- 'straight' and the average width of the medulla of hair was recorded as 84.2 ± 4.6 μ m (Table 1; Figure 1-3).

The cuticular scale characteristics of family Bovidae is almost similar in all species (Kamalakannan, 2015). However, particularly the species *P. hodgsonii* can easily be identified by its 'intermediate' scale position and 'diamond' scale patterns of cuticular of hair, while other species have 'transversal' and 'regular wave' scale position of cuticula of hair. This study also supports the findings of Sahajibal *et al.* (2010).

The *P. hodgsonii* is highly trafficked in the illegal trade for their wool (hair) to make shawls. The identification keys along with the high-resolution microphotographs are presented here can be used in the animal forensic science, as an appropriate reference for species identification.

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Table 1. Physical and microscopic characters of dorsal guard hairs of *Pantholops hodgsonii*

Physical characteristics	
Coat colour	Reddish fawn (♂), Rust-fawn (♀)
Colour of dorsal guard hair	Pearl
No. of colour bands	Unbanded
Profile	Undulated
Length (mm)	13.4–36 (28±6.8)
Width (µm)	65–167 (142±13.1)
Cuticular characteristics	
Scale position	Intermediate
Scale patterns	Diamond petal
Structure of scale margins	Smooth
Distance between scale margins	Distant
Scale count/mm length of hair	79–116 (94.5±12.1)
Length of scale (µm)	38–42.1 (40.1±2.6)
Width of scale (µm)	9.8–19.4 (14.8±2.6)
Medullary characteristics	
Composition of medulla	Multicellular in rows
Structure of medulla	Wide medulla lattice
Margins of medulla	Straight
Width of medulla (µm)	73.2–89.5 (84.2±4.6)

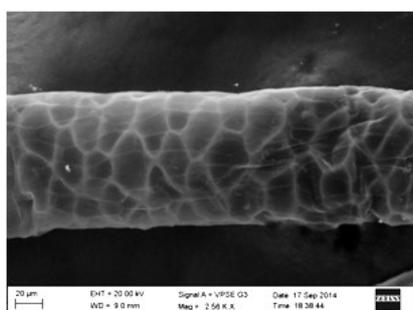
**Figure 1****Figure 2****Figure 3**

Figure 1. Scanning electron micrographs of cuticula of hair of *Pantholops hodgsonii*

Figure 2. Cuticular of hair of *Pantholops hodgsonii* (400 X)

Figure 3. Medulla of hair of *Pantholops hodgsonii* (400 X)