

KNOWLEDGE

A Multidisciplinary e-Journal

Journal Website:

<https://www.vivekanandacollegeforwomen.org/ejournal>



SURFACE STRUCTURE OF DORSAL GUARD HAIR OF GIBBON (*Hylobates hoolock*: PRIMATE: MAMMALIA)

Paramita Saha Sarkar, Assistant Professor, Department of Zoology, Vivekananda College for Women, Kolkata, West Bengal, India,

J. K. De. WB Forest Development Corporation, Sector-III, Salt Lake, Kolkata-700098, West Bengal, India

Abstract:

Mammalian hairs have certain advantages from the view point of taxonomy and systematics. So studies of surface structure of dorsal guard hairs have been carried out by various workers around the world including India. But information regarding the dorsal hair structure of the only gibbon found in India is scanty. The main aim of this paper is to identify the species on the basis of hair structure, which in turn may help agencies engaged in controlling illegal trade of wildlife and its derivatives. Characters like transverse section, medullary configuration, cuticular structures and measurements of the hair are studied for analysis.

Keywords: Dorsal guard hair, gibbon, hair structure, illegal trade.

Introduction

The environment encompasses all living and non-living things occurring naturally on Earth. The natural environment consists of ecological units that function as natural systems without massive civilized human intervention, including all vegetation, micro-organisms, soil, rocks, atmosphere, and natural phenomena that occur within their boundaries. Only the planet earth is blessed with an environment compatible for existence of living beings.

Evidence suggests that life on Earth has existed for about 3.7 billion years. However over-exploitation and indiscriminate use of our natural resources, both flora and fauna over a long period of time has caused considerable and irreversible loss. As living organisms are continually engaged in a highly interrelated set of relationships with every other element constituting the environment in which they exist, so a slight change in one of them is bound to affect the others.



In order to save the natural environment considerable awareness has been created in all spheres in the last few years. Conservation, preservation and protection to wild flora and fauna are one of the measures adopted by environmental scientists. Accordingly taxonomists are also involved deeply in this noble movement to save our planet from destruction.

Animal protection laws and acts were made to stop indiscriminate killing of animals for products obtained from them. However the authority to prosecute the offenders should be scientifically equipped to avoid any legal hassles. Tricho-taxonomy is one such method to nab the culprits of illegal trade of wildlife animals, specially mammals.

Tricho-taxonomy, the science of studying hair surface structures for identifying a mammal has gained much progress in the recent years. Presence of hair is one of the basic characteristic features of mammals. Tricho-taxonomic studies have often been used in food habit analysis, forensic sciences, taxonomy, archeology, etc. A lot of study is being done both in India and abroad by taxonomists and persons associated with animal forensic science. In lieu of the present socio-economic scenario affecting our precious wildlife, this study provides immense help to our enforcement personnel for effective implementation of Indian Wildlife (Protection) Act, 1972, and prosecution of offenders. Taxonomic studies on hairs have been done by several authors like Brunner and Coman (1974); Moore *et al.* (1974); Kopikker and Sabnis (1976, 1977); Kennedy (1982); Valente (1983); Hess *et al.* (1985); Teerink (1991); Oli (1993); Wallis (1993); Dagnall *et al.* (1995); Meyer *et al.* (1995); Chakraborty *et al.* (1996); De *et al.* (1998); Dove *et al.* (2001); De and Chakraborty (2002, 2010, 2012); Amman *et al.* (2002), Saha and De (2013). But very meager works have been found in India on the dorsal guard hairs of the species belonging to the order Primate. Koppiker and Sabnis (1976), De (1993), Bahuguna *et al.* (2010), Sarkar *et al.* (2012, 2011), made some works on the dorsal guard hairs of Primate species. But no work is done so far on the tricho-taxonomic study of *Hoolock* Gibbon.

Hylobates hoolock (Harlan, 1834), commonly called Hoolock Gibbon are distributed over north-eastern region and south of river Brahmaputra in India. They are the only ape species found in India. Among the nine known species of South-east Asian lesser apes, the hoolock is the largest gibbon after Siamang (Nowak and Paradiso, 1983). The hoolock is slender bodied tail-less ape with long arms (double the length of legs) and with shaggy fur. Adult hoolock is sexually dichromatic, i.e. males are always black with white band above eyebrows and females are golden or buff or brownish buff coloured blondes (Roonwal and Mohnot, 1977). Gibbon belongs to Schedule– I of Indian Wildlife (Protection) Act, 1972 (IWPA), and Appendix – I of Convention on International Trade in Endangered Species of Wildlife Fauna and Flora (CITES).

Tricho-taxonomic study of the dorsal guard hairs of the Hoolock Gibbon was carried out for having the detailed structures of hairs which will ultimately help the persons to identify the species from the parts of skin or hairs, if the species are poached or hunted for illegal trades as per Wildlife (P) Act, 1972.

Material and Methods

10-15 tufts of dorsal guard hairs were collected randomly from the mid-dorsal region of 5-6 specimens present in the Zoological Survey of India, washed in acetone and kept in Carbon Tetra Chloride overnight according to the method of Chakraborty *et al.* (1996). Macroscopical study i.e. diameter, total length were measured by dial calipers and nomenclature of colour is after Ridgway (1886). Microscopical study was made after Chakraborty *et al.* (1996). Structural nomenclature of different parameters is followed after Moore *et al.* (1974) and Teerink (1991).

The main objective of this study is to have a basic surface structure, medullary structure and transverse section of dorsal guard hairs of Hoolock Gibbon. These help in identification of the species from scanty available sample such as skin parts and its derivatives and which in turn helps different enforcement agencies engaged for implementation of Wildlife (Protection) Act, 1972.

Observations

A) Physical Characters:

- (i) Profile: Curly; (ii) Colour: Black (Female-Golden); (iii) No. of Bands: none; (iv) Length (mm): 25-45 (36.8 ± 6.5); (v) Diameter (μ): 10-20 (10 ± 7).

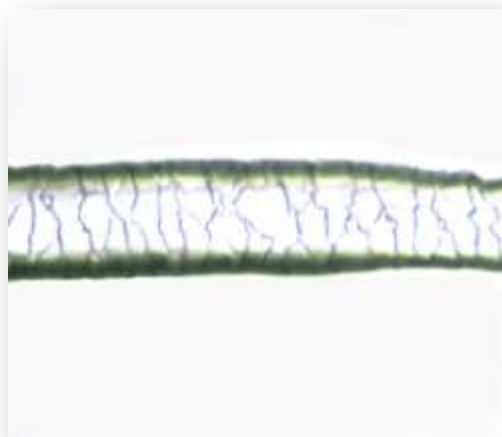
B) Surface structure (Fig. A):

- (i) Scale margin distance: Distant; (ii) Scale margin: Crenate; (iii) Scale pattern: Irregular wave; (iv) Scale count (per mm length of hair): 1656-1853 (1739.4 ± 76.6); (v) Side to side scale length (SS): 8.5-9.2 (8.8 ± 0.2) μ ; (vi) Proximo-distal scale length (PD): 4.47-6.2 (5.2 ± 0.73) μ .

C) Medulla (Fig. B):

- (i) Medullary configuration: Interrupted; (ii) Medullary Index: 0.22-0.25 (0.234 ± 0.011)

D) Transverse section: Round (Fig. C)

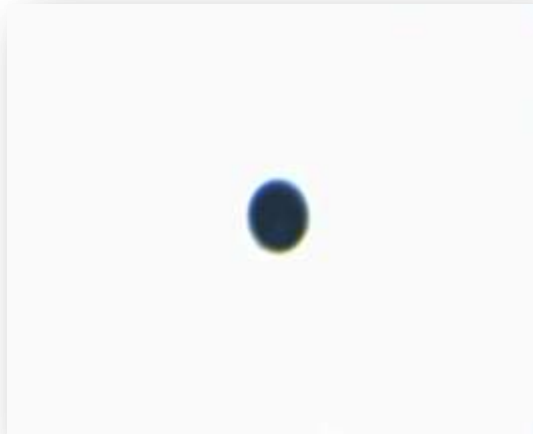


A) Surface structure of hairs of

Hylobates hoolock X400



B) Medulla of hairs of *Hylobates hoolock* X400



C) Transverse section of hairs of *Hylobates hoolock* X400

Discussion

Hairs of males are black while that of female is golden in colour. This was also reported by Prater (1971). Hairs of hoolock gibbon are curly and devoid of any band. But according to Bahuguna *et al.* (2010), hair are black in colour, profile is straight and rough. Average length of *H. hoolock* is (36.8 ± 6.5) mm and diameter of (10 ± 7) μ . Whereas Bahuguna *et al.* (2010) reported the thickness of hair of *H. hoolock* as (0.06 ± 0.005) mm.

Hairs of *H. hoolock* have 'crenate' scale margin with scale count of (1739.4 ± 76.6) . It has 'irregular wave' of scale pattern. This study is inconformity with the observation of Bahuguna *et al.* (2010). 'SS' and 'PD' are recorded as (8.8 ± 0.2) μ and (5.2 ± 0.73) μ respectively. Medullary configuration is 'interrupted' and medullary index is (0.234 ± 0.011) . Transverse section of dorsal guard hair of *H. hoolock*. is 'round', whereas Bahuguna *et al.* (2010) reported 'fragmental medulla' and 'circular to oval' cross-section for *H. hoolock*.

Acknowledgements

We are thankful to Dr. Venkataraman, Director, Zoological Survey of India for providing facilities for this work and also for his kind valuable suggestions in every step for enriching the study.

References

- Amman, B. R., Owen, R.D., Bradley, R.D. 2002. Utility of hair structure for taxonomic discrimination in bats, with an example from the bats of Colorado. *Occasional Papers*. Museum of Texas Tech University **216**:1-14.
- Bahuguna, A., Sahajpal, V., Goyal, S. P., Mukherjee, S. K., and Thakur, V. 2010. *Forensic manual: Identification of some selected species of mammals through hair*. Pub. Wildlife Institute of India, Dehradun, Uttarakhand, India. 400pp.
- Brunner, H. and Coman, B. J. 1974. *The identification of mammalian hair*. Inkata Press, Victoria, Australia, p196.



- Chakraborty, R., Chakraborty, S. and De, J. K. 1996. Identification of Dorsal guard hairs of five Indian species of the genus *Panthera* Oken (Carnivora: Felidae). *Mammalia*, **60**: 473-480.
- Chakraborty, R and De, J.K. 2010. Atlas on Hairs of Indian Mammals. *Part 1: Carnivora*: 1-144 (Published by Director, Zoological Survey of India).
- Dagnall, J.L., Duckett, J. G. and Gurnell, J. 1995. A simple staining technique for the identification of mammal hairs. *Journal of Zoology*, London, **237**:670-675.
- De, J. K. 1993. Study of surface structure of hair of some primates of Indian sub-continent. *Rec. zool. Surv. India.*, **93**(1-2): 31-34.
- De, J. K., Chakraborty, R. and Chakraborty, S.1998. Identification of dorsal guard hairs of five Indian species of Mongoose *Herpestes illiger* (Mammalia: Carnivora). *Mammalia*, **62**(2): 285-295
- De, J. K. and Chakraborty, R. 2002. Identification of dorsal guard hairs of striped hyena, *Hyaena hyaena* (Linnaeus, 1758) Hyaenidae: Carnivora: Mammalia. *J. Bombay nat. Hist. Soc.*, **99**(3).
- De, J. K. and R. Chakraborty, 2012. Identification of Dorsal guard hairs of nine species of the family Bovidae: (Artiodactyla : Mammalia) *Rec. zool. Surv. India*: **112** (Part-2):39-52.
- Dove, C.J. and Peurach, S.C. 2001. The use of microscopic hair characters to aid in identification of a bat involved in a damaging aircraft strike. *Bat Research News*, **42**:10-11.
- Hess, W.M., Flinders, J.T., Pritchett, C. L. and Allen, J. V. 1985. Characterization of hair morphology in families Tayassuidae and Suidae with scanning electron microscope, *Journal of Mammology*. **68**:75-84.
- Kennedy, A.J. 1982. Distinguishing characteristics of the hairs of wild and domestic canids from Alberta. *Canadian Journal of Zoology*. **60**:536-541.
- Koppiker, B. R. and Sabnis, J. H. 1976. Identification of hairs of some Indian mammals. *J. Bombay Nat. Hist. Soc.* **73**:5-20.
- Koppiker, B. R. and Sabnis, J. H. 1977. Further studies on the identification of hairs of some Indian mammals. *J. Bombay Nat. Hist. Soc.* **74**:50-59.
- Meyer, W., Hulmann, G. and Seger, H. 1995. Remarks on specific adaptive scale structure of hair cuticle in some European bats. *European Journal of Morphology*. **33** :509-513.
- Moore, T. D., Spence, L. E. and Dugnolle, E. E. 1974. Identification of the dorsal guard hairs of some mammals of Wyoming. Wyoming Game & Fish Dept. Bull. No. **14**. Cheyenne. p77.
- Nowak, R. M. and Paradiso, J. L. 1983. *Walkers' Mammals of the World*. 4th Edt. The Johns Hopkins University Press Baltimore and London, 1983. **I**: 1-568.
- Oli. M. K. 1993. A key for the identification of the hair of mammals of a snow leopard (*Panthera unica*) habitat in Nepal. *Journal of Zoology*. London. **231**:71-93.
- Prater, S. H. 1971. *The book of Indian Animals*. 3rd ed. Bombay Natural History Society,



- Oxford University Press. Bombay. 1-324 pp.
- Sarkar, P. S., De, J. K., Manna, C. K. (2010). Identification of Dorsal Guard Hair of Seven Species of the Family Cercopithecidae (Primates: Mammalia). *Proc. zool. Soc.* (2010) **63 (2)**: 121-128.
- Sarkar, P. S., De, J. K., Manna, C. K. (2011). Identification of dorsal guard hairs of five species of the family Cercopithecidae (Primates: Mammalia). *Current Science*, **Vol. 100, No. 11**, 10 June 2011: 1725-1728.
- Sarkar, P. S. and De, J. K., 2013. Tricho-taxonomic study of dorsal guard Hairs of Indian species of Rodentia belonging to Sub-family Sciurinae (Sciuridae: Rodentia: Mammalia) *Biological Forum-An International Journal* **5(1)**:1-190.
- Ridgway, R. 1886. Nomenclature of Colours. Univ. Press, John Wilson & Son, Cambridge. p129.
- Roonwal M. L. and Mohnot S. M. 1977. *Primates of South Asia. Ecology, Sociobiology and Behaviour*. Harvard University Press, Cambridge, Massachusetts, London, England. 21 pp.
- Teerink, B. J. 1991. *Hairs of West European Mammals*. Cambridge University Press, Cambridge. p223.
- Valente, A. 1983. Hair structure of the woolly mammoth, *Mammuthus primigenius* and the modern elephants, *Elphas maximus* and *Loxodonta Africana*. *Journal of Zoology*, London. **199**:271-274.
- Wallis, R. L. 1993. A key for the identification of guard hairs of some Ontario Mammals. *Can. J. Zool.*, **71**: 587-591.