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## Hair morphology of Gray Slender Loris (*Loris lydekkerianus*) and Bengal Slow Loris (*Nycticebus bengalensis*)

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### Abstract

The present study was undertaken to know the hair morphology of two Indian lorises Gray Slender Loris *Loris lydekkerianus* and Bengal Slow Loris *Nycticebus bengalensis*. The laboratory study was conducted at the Mammal & Osteology section, Zoological Survey of India, Kolkata during January – July 2016. Microscopic hair analysis of two lorises was done using an optical light microscope for its species identification. The hair of two lorises can easily be identified on basis of their ‘unicellular regular’ and ‘ladder’ structure of medulla and ‘oval or circular’ shape of the cross-section of hair. The high-resolution photo-micrographs and key characteristics of hair presented here can be used as an appropriate reference for species identification.

**Keywords:** Lorises, hair morphology, dorsal guard hair, unicellular regular, ladder

### 1. Introduction

The identification of mammal species through hair morphology is one of the methods adapted for identification of confiscated materials received from the different wildlife enforcement agencies and the analysis of mammal hairs has long been useful in the study of prey-predator food habits using the scat-hair analysis [3, 9, 10]. Adequate and systematic knowledge of the structure of dorsal guard hair is necessary to identify the species and data generated from microscopic characteristics of dorsal guard hair will provide for a preparation of identification keys for respective species [4]. In India, the tricho-taxonomic studies have been carried out by many workers on different orders of class Mammalia viz., Koppikar and Sabins [7]; Rajaram and Manon [9]; De [5]; Chakraborty and De [4]; Sarkar *et al.* [12]; Kamalakannan [6]. A combination of characters of hairs (cuticula, medulla and cross-section) of Indian mammals are much required in the field of forensic science to identify the mammalian species, as the single character of hair does not help for species identity [2, 13].

There are nine species of lorises under five genera found in the world, of which two species under two genera namely, Gray Slender Loris *Loris lydekkerianus* Cabrera, 1908 and Bengal Slow Loris *Nycticebus bengalensis* (Lacepede, 1800) are found in India [14]. The lorises are a small, lanky animal of the size of a kitten, is characterised by a rounded head, large rounded ears, close-set eyes encircled with brown, and long slender limbs with well-developed index finger; the external tail is absent [1, 8]. The two species Indian lorises can be differentiated by their external pelage viz., the body is well furred, dark grey to reddish brown with embellishment of silvery hairs on the back, and white buff on the under surface in *L. lydekkerianus* and the pelage is silvery white on head and shoulders, grey on flanks and a distinct brown stripe present on the crown and back. Its forearm and hand are almost white; the face is pale brown to whitish with dark markings in *N. bengalensis* [1, 8]. Although there are few hair studies available on Indian primates [5, 11, 12], the hair morphology of lorises is unknown. Therefore, the microscopic characteristics of two species of lorises *L. lydekkerianus* and *N. bengalensis* were presented in this paper.

### 2. Materials and Methods

A tuft of dorsal guard hair was collected from the mid-dorsal region of dry specimens of *L. lydekkerianus* and *N. bengalensis* housed at the National Zoological Collection, Mammal & Osteology Section of the Zoological Survey of India, Kolkata, India during January – July 2016.

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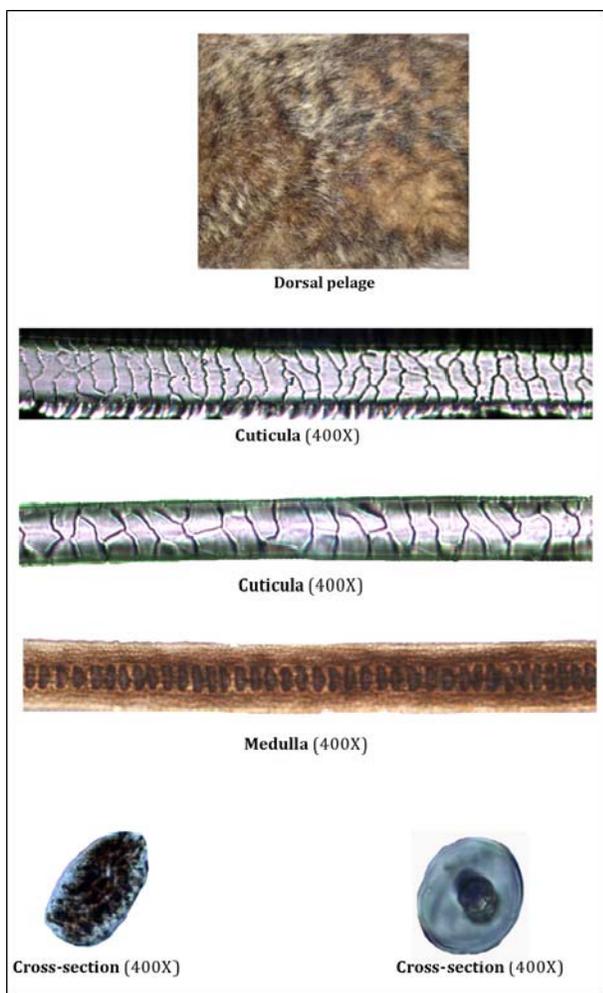
The samples were washed thoroughly in carbon tetra chloride after by Chakraborty *et al.* [3] to remove the dirt of exogenous materials. Microscopic characters such as scale position, scale pattern, scale margin and scale margin distance of dorsal guard hair were studied with help of the digital camera fitted on an optical light microscope (Olympus BX41). The medullary configuration and composition, structure and margins of the medulla and cross-section of dorsal guard hair were recorded and photographed. Nomenclature of different parameters was followed by Bruner and Coman [2]; Teerink [13]; Chakraborty *et al.* [3].

### 3. Results and Discussion

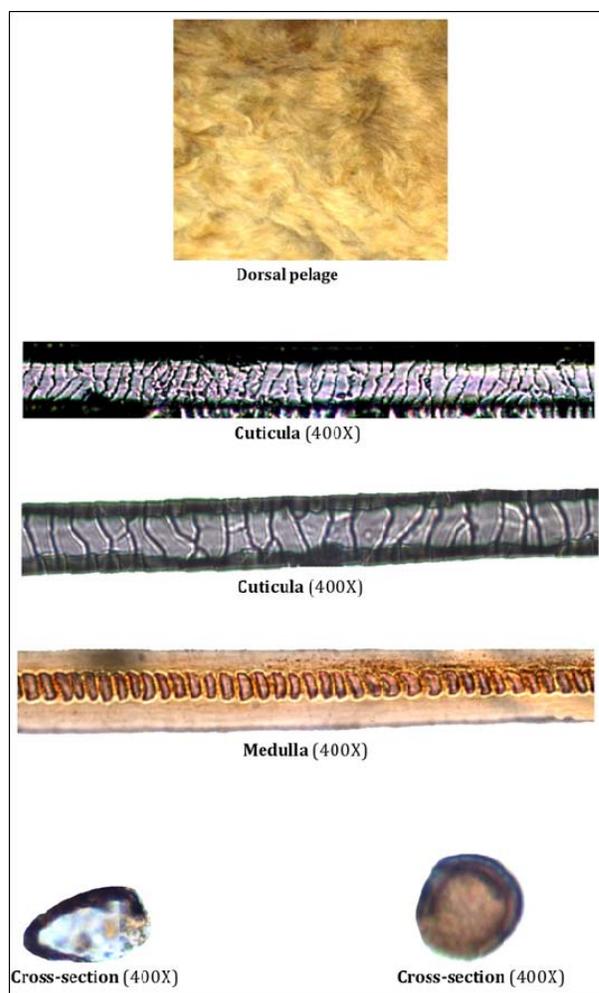
The cuticular characteristics of dorsal guard hair were similar between the two species studied *i.e.* the scale position were 'transversal', scale patterns was 'regular wave', the structure of scale margins was 'smooth' and the distance between scale margins- 'near/distant' (Table 1; Fig 1 and 2). Similarly, the medullary characteristics of dorsal guard hair of the two species studied were also similar between the species and observed as: the composition of medulla- 'unicellular regular', the structure of medulla- 'ladder', and form of the medulla margins- 'scalloped'(Table 1; Fig 1 and 2). The cross-section of hair was also similar between the two species and observed as: 'oval or circular' shape in dorsal guard hair of *L. lydekkerianus* and *N. bengalensis* (Table 1; Fig 1 and 2).

**Table 1:** Microscopic hair characteristics of *L. lydekkerianus* and *N. bengalensis*.

Microscopic hair characteristics	<i>L. lydekkerianus</i>	<i>N. bengalensis</i>
Cuticular scale position	Transversal	Transversal
Cuticular scale patterns	Regular wave	Regular wave
Cuticular Structure of scale margins	Smooth	Smooth
Distance between cuticular scale margins	Near/ Distant	Near/ Distant
Composition of medulla	Unicellular regular	Unicellular regular
Structure of medulla	Ladder	Ladder
Margins of medulla	Scalloped	Scalloped
Shape of cross-section	Oval / Circular	Oval / Circular



**Fig 1:** Photo-micrograph of hairs of *Loris lydekkerianus*.



**Fig 2:** Photo-micrograph of hairs of *Nycticebus bengalensis*

As mentioned earlier, lorises can be diagnosed from other primates by their rounded head, large rounded ears, close-set eyes encircled with brown, and long slender limbs with well-developed index finger and the two species Indian lorises can be differentiated by their external pelage viz., dark grey to reddish brown with embellishment of silvery hairs on the back, and white buff on the under surface in *L. lydekkerianus* and silvery white on head and shoulders, grey on flanks and a distinct brown stripe present on the crown and back in *N. bengalensis* [1, 8]. In addition to that 'unicellular regular' and 'ladder' structure of medulla and 'oval or circular' shape of cross-section of hair also makes the identification characters of lorises, because the hair characteristics of species under the family Cercopithecidae of order Primates are having mostly 'interrupted' medulla structure and 'oval shape of cross-section of hair studied by De [5] and Sarkar *et al.* [11, 12]. Although the two of lorises studied having similar microscopic hair characteristics, the combination of hair characteristics (cuticula, medulla and cross-section) may be used for identification of species [4].

#### 4. Conclusion

The two loris species *L. lydekkerianus* and *N. bengalensis* are listed under Schedule- I of the Indian Wildlife (Protection) Act, 1972 and classified as Vulnerable (*N. bengalensis*) and Near Threatened (*L. lydekkerianus*) by the IUCN Red List. The lorises are being illegally trafficked for the pet trade and used in traditional medicine. It is one of the preys for small and large carnivores in wild. Therefore, the photo-micrographs are presented here can be used in forensic science as well as prey-predator food analysis as an appropriate reference for the species identification.

#### 5. Acknowledgements

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