

201

Endemic Mammals of India

J.R.B. ALFRED
S. CHAKRABORTY

Zoological Survey of India

OCCASIONAL PAPER No. 201

**RECORDS OF THE
ZOOLOGICAL SURVEY OF INDIA**

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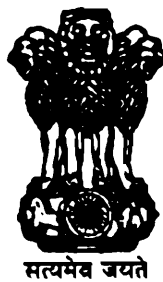
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CONTENTS

INTRODUCTION 1

SYSTEMATIC ACCOUNT

Family ERINACEIDAE

1. *Hemiechinus mediventris* (Horsfield) 2

Family SORICIDAE

2. *Crocidura andamanensis* Miller 2

3. *Crocidura nicobarica* Miller 3

4. *Crocidura jenkinsi* Chakraborty 3

5. *Crocidura hispida* Thomas 4

6. *Suncus dayi* (Dobson) 4

Family TUPAIIDAE

7. *Anathana ellioti* (Waterhouse) 5

8. *Tupaia nicobarica* (Zelevor) 5

Family PTEROPODIDAE

9. *Latidens Salimali* (Thonglongya) 6

10. *Pteropus faunulus* Miller 7

Family RHINOLOPHIDAE

11. *Rhinolophus mitratus* Blyth 7

12. *Rhinolophus cognatus* Andersen 8

13. *Hipposideros schistaceus* Andersen 8

14. *Hipposideros hypophyllus* Kock and Bhat 9

Family MOLOSSIDAE

15. *Otomops wroughtoni* (Thomas)..... 9

Family VESPERTILIONIDAE

16. *Eptesicus tatei* Ellerman and Morrison-Scott..... 10
 17. *Murina grisea* Peters..... 11
 18. *Scotomanes emarginatus* (Dobson) 11

Family CERCOPITHECIDAE

19. *Macaca silenus* (Linnaeus)..... 12
 20. *Macaca radiata* (Geoffroy) 12
 21. *Trachypithecus johnii* (Fischer) 13

Family VIVERRIDAE

22. *Paradoxurus jerdoni* Blanford 14
 23. *Viverra civettina* Blyth 15

Family HERPESTIDAE

24. *Herpestes palustris* Ghose 16

Family MUSTELIDAE

25. *Martes gwatkinsii* Horsfield 16

Family BOVIDAE

26. *Hemitragus hylocrius* (Ogilby) 17

Family SCIURIDAE

27. *Ratufa indica* (Erxleben) 18
 28. *Funambulus tristriatus* Waterhouse)..... 19
 29. *Biswamoypterus biswasi* Saha..... 20

Family MURIDAE

30. *Cremnomys elvira* (Ellerman)..... 20
 31. *Cremnomys cutchicus* Wroughton 21
 32. *Alticola albicauda* (True) 22
 33. *Alticola montosa* (True) 22
 34. *Alticola roylei* (Gray) 23

35. <i>Millardia kondana</i> Mishra and Dhanda	24
36. <i>Rattus palmarum</i> (Zelebor)	24
37. <i>Rattus ranjinae</i> Agrawal and Ghosal	25
38. <i>Rattus stoicus</i> (Miller).....	25
39. <i>Rattus burrus</i> (Miller)	26
40. <i>Mus famulus</i> Bonhote	26
41. <i>Mus phillipsi</i> Wroughton	27
42. <i>Mus platythrix</i> (Bennett)	27
43. <i>Apodemus rusiges</i> Miller	28
44. <i>Platacanthomys lasiurus</i> Blyth	28

DISCUSSION	29
------------------	----

SUMMARY	30
---------------	----

REFERENCES	31
------------------	----

TABLE-1	35
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INTRODUCTION

Today, the world is on the threshold of major changes brought about by the revolutionary developments in the field of biotechnology. This has resulted the development of new Intellectual Property Right (IPR) regimes and also new regimes of management of biodiversity resources embodied in the Trade Related Intellectual Property Rights (TRIPs) component of GATT and in the Convention of Biological Diversity (CBD). In CBD regime genetic resources are the sovereign property of a country. As such, each and every component of a country's biodiversity may be tagged with economic significance. Under the situation, a species endemic to a country becomes most important in the context of patent right. Moreover, assessment of endemic species of a country and their range provide a key for determining the areas of conservation priority. Obviously the areas, holding high concentration of endemic species, deserve topmost conservation priority. Of all the living creatures, mammals are by far the most important in their economic uses. In addition to being the only animals capable of giving labour for mankind, they furnish the greatest portion of animal food of many races of man and likewise a large amount of their clothings. They are also most important as experimental animals. Thus, from the dawn of civilization, mammalian species are being domesticated and native breeds are developed for more and more meat, milk, wool, *etc.* India alone has developed atleast 16 native breeds of buffalo, 56 of cattle, 32 of goat, 7 of horse, 3 of pig, 56 of sheep and one of Ass (Groombridge 1992). Thus, from the conservation as well as economic point of view, it is most important to identify the endemic components of Indian mammalian fauna. Lists of Indian endemic mammals have been provided by Chakraborty (1997), Agrawal (1998), Molur *et al.* (1998) and Mandal (1999). However, none of the list is complete. In the present paper an attempt has been made to list the endemic mammals of India alongwith their diagnostic characters, distribution, intraspecific variations, habitat, population and status. In this connection a survey was undertaken to the Western Ghats, the areas with highest concentration of endemic species, to study the status of different species. While making the list it has been found that for many of the species there are difference of opinions among the various authors as regard to their taxonomic status. The present listing was mainly done on the basis of Wilson and Reeder (1993), with remarks wherever necessary. IUCN status for different species is given after Molur *et al.* (1998).

Following abbreviations have been used in the text.

Hb = Head and body length; Fa = Length of forearm; RDB - N (1994) = Red Data Book - National (1994); IWPA - 1972 = Indian Wildlife (Protection) Act, 1972.

Unless otherwise mentioned all measurements are in millimetres.

SYSTEMATIC ACCOUNT

Order INSECTIVORA

Family ERINACEIDAE

1. *Hemiechinus nudiventris* (Horsfield)

1851. *Erinaceus nudiventris* Horsfield, *Cat. Mamm. Mus., E. India Co.*, p. 136.

Common Name : Eng. South Indian Hedgehog.

Diagnostic characters : Head and body around 165, ear 24-27 and does not rise above spines. Dorsum brownish; a brown bangle above wrist and a brown collar on throat present.

Distribution : Kerala, Tamil Nadu.

Intraspecific variation : Not known.

Habitat : Plains with patches of bush or scrub forest.

Population : Not known, but there is only a few records of its occurrence.

Status : Not determined.

Remarks : Ellerman and Morrison-Scott (1951), Corbet and Hill (1992) considered *nudiventris* as a subspecies of *Paraechinus micropus* (Blyth). Biswas and Ghose (1970) provided the species specific distinctive characters of *nudiventris* and Hutterer (in Wilson and Reeder 1993) maintained it as a distinct species.

Family SORICIDAE

2. *Crocidura andamanensis* Miller

1902. *Crocidura andamanensis* Miller, *Proc. U.S. natl. Mus.*, 24 : 777.

Common name : Not available.

Diagnostic characters : Large-sized (Hb : 114), tail about 75% of Head and body length. Dorsal pelage soft; hairs long (7 mm) and medium brown in colour. Ventral pelage grey.

Distribution : South Andaman Island.

Intraspecific variation : Not known.

Habitat : Not known.

Population : Not known. Apart from the type specimen, no other record is available.

Status : IUCN : Data Deficient.

3. *Crocidura nicobarica* Miller

1902. *Crocidura nicobarica* Miller, *Proc. U.S. Natl. Mus.*, 24 : 776.

Common name : Eng.-Nicobar Shrew.

Diagnostic characters : Large-sized (Hb : 107-120), tail about 67% of head and body in length. Dorsal pelage short (4 mm), bristly and sooty brown in colour.

Distribution : Nicobar Islands.

Intraspecific variation : Not known.

Habitat : Not known.

Population : Not known.

Status : IUCN : Krumbiegel (1978) listed *nicobarica* under the genus *Suncus* Ehrenberg without any explanation. However, Corbet and Hill (1992) described the skull and teeth of *nicobarica* as similar to those of *Suncus murinus* (Linnaeus) from Jammu ad Kashmir except for the absence of 4th unicuspid.

4. *Crocidura jenkinsi* Chakraborty

1978. *Crocidura jenkinsi* Chakraborty, *Bull. zool. Surv. India*, 1 : 303.

Common name : Eng.-Jenkins' Shrew.

Diagnostic characters : Large-sized (Hb : 100-107), tail slightly smaller being 98% of head and body length. Dorsal pelage long (7 mm), bristly and brown in colour.

Distribution : South Andaman Islands.

Intraspecific variation : Not known.

Habitat : Scrub jungle, preferably adjacent to human habitation.

Population : A good population of this species was recorded in Mt. 1 Harriet during 1997. Appears to be common.

Status : IUCN : Data Deficient.

5. *Crocidura hispida* Thomas

1913. *Crocidura hispida* Thomas, *Ann. Mag. nat. Hist.*, ser. 2, 17 : 23.

Common name : Eng.–Andaman Island Spiny Shrew.

Diagnostic characters : Medium-sized (Hb : 85), tail longer than head and body, being 121%. Dorsal pelage bristly, grey in colour, with brownish wash.

Distribution : Middle Andaman Island.

Intraspecific variation : Not known.

Habitat : Not known.

Population : Not known.

Status IUCN : Endangered.

6. *Suncus dayi* (Dobson)

1888. *Crocidura dayi* Dobson, *Ann. Mag. nat. Hist.*, ser. 6, 1 : 428.

Common name : Eng.–Day's Shrew.

Diagnostic characters : Small-sized (Hb. : 71), hind foot relatively large being 15. Dorsum dark brown, beneath dark with silvery sheen.

Distribution : Kerala and Tamil Nadu.

Intraspecific variation : Not known.

Habitat : Montane humid forests at elevations from 1000 to 2500.

Population : Recently recorded from a number of localities in Anamalai and Nilgiri hills. However, exact population is not known, but appears to be moderately common.

Status : IUCN : Vulnerable.

Order SCANDENTIA
Family TUPAIIDAE

7. *Anathana ellioti* (Waterhouse)

1850. *Tupaia ellioti* Waterhouse, *Proc. zool. Soc. Lond.*, 1849 : 107 (1850).

Common name : Eng.–Madras Tree- Shrew; Tam. – Munghil ananthan.

Diagnostic characters : Squirrel-like, without any dorsal stripe. Head and body length 178 to 200, tail a little shorter. Above yellowish-brown speckled; middle of back, rump and sometimes upper surface of tail tinged to a variable extent with rusty red. Lower surface nearly white; a distinct stripe from throat below the ear passing obliquely up in front of the shoulder.

Distribution : Greater part of the Indian Peninsula from south of the Indo-gangetic plain in Gujarat, Madhya Pradesh and West Bengal to Tamil Nadu and Kerala in the south.

Intraspecific variation : Exhibits much intraspecific geographical variations and following three subspecies have been recognised on the basis of body colour–

A.e. ellioti (Waterhouse)–Upper parts reddish brown; feet buff.

A.e. wroughtoni Lyon–Upper parts dull grizzled brown; feet grayish.

A.e. pallida Lyon–Upper parts paler; feet buff.

Habitat : Scrub jungle, dry and moist deciduous forests and Shola forest.

Population Groups of 2-8 are found in many areas, but often in isolated patches.

Status : IUCN : Lower Risk–Near Threatened.

Remarks : The species has been wiped out from many areas of its earlier range mainly due to extension of agricultural fields.

8. *Tupaia nicobarica* (Zeblebor)

1869. *Cladobates nicobarica* Zeblebor, *Reise Oesterr. Fregatte Novara Zool. I (Wirbelthierre), I, (Saugeth.)* : 17, pl. 1.)

Common name : Eng.–Nicobar Tree Shrew.

Diagnostic characters : Head and body length about 180, tail a little longer than head and body. Colour of posterior part of back uniform black. A band extends from the back of head to between the shoulders. Sides of the head and neck and outside of limbs yellowish golden brown. Undersurface pale brown.

Distribution : Great and Little Nicobar Islands.

Intraspecific variations : Population from Little Nicobar Island has been considered as a separate subspecies, *T. n. surda* Miller on the basis of duller colour.

Habitat : Lower and middle canopy of rain forests.

Population : Not known.

Status : IUCN : Endangered.

Order CHIROPTERA

Family PTEROPODIDAE

9. *Latidens salimali* Thonglongya

1972. *Latidens salimalii* Thonglongya, *J. Bombay nat.Hist. Soc.*, 69 : 153.

Common name : Eng.-Salim Ali's Fruit Bat.

Diagnostic characters : Moderate-sized fruit bat with broad and long wing (Fa 60). Calcar well-developed, extending far behind the tibia. Adult male strongly built, with a grotesque muscular head. Fur on the head short and slightly more dark brown than the rest of the body; ears uniformly dark without any distinct margin of pale colour. Upper and lower incisors 1-1.

Distribution : Meghamalai Range and Kalakkad-Mundanthurai Tiger Reserve in Tamil Nadu.

Intraspecific variation : Not known.

Habitat : Evergreen forests.

Population : Not known, but this bat is regarded as common in Kalakkad-Mundanthurai Tiger Reserve (Ghosh *et al.*, 1999).

Status : IUCN : Endangered.



Fruit Bats

10. *Pteropus faunulus* Miller

1902. *Pteropus faunulus* Miller, *Proc. U.S. Natl. Mus.*, 24 : 785.

Common name : Not available.

Diagnostic characters : Much smaller than mainland form *P. giganteus* Brünnich, forearm being only 118. Back Prout's Brown but rump approximating Wood Brown and tinged with Cinnamon; underparts Ochraceous-buffy strongly tinged with pale Cinnamon; Crown and sides of head grizzled with grey and Wood brown. Fur long, longest hairs at the middle of back about 16-17.

Distribution : Andaman and Nicobar Islands : Car Nicobar, Camorta and Nancowry.

Intraspecific variation : Specimens from Camorta and Nancowry have darker back than those from Car Nicobar and the head more greyish rather than brownish.

Habitat : Tropical Evergreen Forests.

Population : Not known, but reported from four different localities of Nicobar Islands. During surveys of the area by the Zoological Survey of India, no specimen could be noticed.

Status : IUCN : Vulnerable; CITES : Appendix II.

Family RHINOLOPHIDAE

11. *Rhinolophus mitratus* Blyth

1844. *Rhinolophus mitratus* Blyth, *J. Asiat. Soc. Bengal*, 13 : 483.

Common name : Not available.

Diagnostic characters : Ears large, with a broad well-developed antitragus separated from the outer margin by a shallow angular notch. Single groove in lower lip. Horizontal base of sella between nostrils much expanded and turned upwards, forming a deep cup-like cavity. Terminal nose-leaf triangular, acutely pointed. Fur above brownish with paler base; undersurface lighter. Forearm 51-63.

Distribution : Bihar.

Intraspecific variation : Not known.

Population : Not known, reported from a single locality in Chaibasa, Bihar.

Status : IUCN : Vulnerable.

12. *Rhinolophus cognatus* Andersen

1906. *Rhinolophus cognatus* Andersen, *Ann. Mus. Stor. Nat. Genova* 3, 2 : 181.

Common name : Not available.

Diagnostic characters : Forearm less than 43. Median anterior rostral swelling moderately inflated. Posterior palatal emargination wider than interior palatal emargination.

Distribution : Andaman Islands.

Intraspecific variation : Two subspecies have been recognised (Corbet and Hill, 1992), viz., *R. c. famulus* Andersen from North Central Island and nominate one from South Andaman Island. Former is smaller than nominate one.

Habitat : Not known.

Population : Not known.

Status : IUCN : Data deficient.

13. *Hipposideros schistaceus* Andersen

1918. *Hipposideros schistaceus* Andersen, *Ann. Mag. nat. Hist. ser 9*, 2 : 282.

Common name : Not available.

Diagnostic characters : Forearm 73-82. Palation V-shaped. Ear large, acutely pointed with posterior margin slightly concave behind the tip. Fourth supplementary leaflet rudimentary. Colour pale brown. Frontal region convex and flattened. Condylbasal length less than 25.5.

Distribution : Karnataka and Andhra Pradesh.

Intraspecific variation : Not known.

Habitat : Not known.

Status : IUCN : Lower Risk - Near Threatened.

Remarks : *H. schistaceus* may be a smaller subspecies of *H. lankadiva* Kelaart (Hill 1963).

14. *Hipposideros hypophyllus* Kock and Bhat

1994. *Hipposideros hypophyllus* Kock and Bhat, *Senckenbergiana biologica*, 73 : 25.

Common name : Not available.

Diagnostic characters : Small-sized (Fa 37-40). Colour varies in hair tips from greyish brown to rufous brown on the back, and from white to fulvous white on the front; hair bases white. A well-developed pair of supplementary leaflets projecting from beneath the lateral margin of the anterior leaf.

Distribution : Kolar district, Karnataka.

Intraspecific variations : Adults look duller in colour during June to October, and brighter during November to May.

Habitat : Inaccessibly narrow subterranean caves in granite rocks in association with other species of the genus.

Population : So far two populations have been located – one in Hanumanhalli village, 15 km E of Kolar town and other at Therhalli, 3 km of W. of Kolar town. However, no estimate about the population size is available.

Status : Not determined.

Family MOLOSSIDAE

15. *Otomops wroughtoni* (Thomas)

1913. *Nyctinomus wroughtoni* Thomas, *J. Bombay nat. Hist., Soc.*, 22 : 87.

Common name : Eng. - Wroughton's Free-tailed Bat.

Diagnostic characters : Hb 99, Fa 68. Colour above dark rich Chocolate Brown with a strongly contrasted greyish drabby white mantle across the shoulder. Lowside of neck greyish, rest of the undersurface dull brown.

Ears large, rounded, connected at their inner base; inner margin convex and dotted with a dozen or more small hairy points. No antitragus. Small, shallow, inconspicuous gular sac in male. A prominent vertical projection on zygoma.

Distribution : Known from a single location in Barapede cave near Taliwadi, North Karana, Karnataka.

Intraspecific variation : Not known.

Habitat : Caves.

Population : Known by a single population of Barapede cave. Roosts of 4-12 individuals could be observed at different parts of the cave.

Status : IUCN : Critically Endangered.

Family VESPERTILIONIDAE

16. *Eptesicus tatei* Ellerman and Morrison-Scott

1863. *Nycticeius atratus* Blyth *Cat. Mamm. Mus., Asiat. Soc. Bengal*, pp. 31.

Preoccupied by *Amblyotus atratus* Kolenati, 1858. in *Eptesicus nilssonii*.

1951. *Eptesicus tatei* Ellerman and Morrison-Scott, *Checklist Palaearctic and Indian Mammals*, pp. 158.

Common name : Not available.

Diagnostic characters : Head broad, slightly elevated above the face; muzzle obtuse. A heart-shaped depression behind the nostrils. Ears oval with rounded tip. Fur long, dense, intensively black throughout. Forearm 43.

Distribution : Darjeeling, West Bengal.

Intraspecific variation : Not known.

Habitat : Not exactly known, but appears to be temperate forests area.

Population : Not known, so far only three specimens were obtained.

Status : IUCN : Data Deficient.

Remarks : Taxonomic status of the species needs verification.

17. *Murina grisea* Peters

1872. *Murina grisea* Peters, *Monatsb. K. Preuss. Akaad. Wiss. Berlin*, 1872 : 258.

Common name : Eng.—Peter's Tube-nosed Bat.

Diagnostic characters : Muzzle narrow; ears small (about 7.5), tip narrowly rounded off. Thumb long, with a strong claw. Last vertebra of tail free. Wings from the base of the toes. Fur above dark brown with yellow brown tips; beneath similar, but tips slaty.

Distribution : Kumaon Hills, Uttaranchal; Mizoram (Bhattacharyya in press).

Intraspecific variation : Not known.

Habitat : According to Hutton (1872), occurs at around elevation of 1676m.

Population : Not known, but as early as 1872, Hutton considered the species as not very common.

Status : IUCN : Vulnerable.

Remarks : Bhattacharyya (in press) kept *grisea* under the genus *Harpiola* Thomas.

18. *Scotomanes emarginatus* (Dobson)

1871. *Nycticejus emarginatus* Dobson, *Proc. Asiat. Soc. Beng.*, 40 : 211.

Common name : Not available.

Diagnostic characters : Large-sized (Fa. 55.2). Glands of the upper lip large forming round prominences between nostrils and eyes. Ears large (21), with broadly rounded tips; inner margin convex. Covered with short close fur, above tricolored, at the base dark ferruginous brown, then buff, tips light yellowish brown.

Distribution : Known only by the holotype, whose distribution is recorded as 'India'

Intraspecific variation : Not known.

Habitat : Not known.

Population : Not known.

Status : Not dertermined.

Order PRIMATES
Family CERCOPITHECIDAE

19. *Macaca silenus* (Linnaeus)
(Plate 1a)

1758. *Simia silenus* Linnaeus, *Syst. Nat.* 10th ed., 1 : 26.

Common names : Eng.-Lion-tailed Macaque; Kan.-Singalika; Mal.-Nella Manthi; Tam.-Korangu; Tel.-Kondamachu.

Diagnostic characters : A medium-sized macaque (Hb ♂ : 508-610, ♀ : 415-581). Glossy black pelage with brownish grey mane around the face. A short tufted tail, 254-286 in male, 254-318 in female.

Distribution : Southern India between latitudes 9°30'N and 15°N in the states of Karnataka, Kerala and Tamil Nadu (Kurup 1978, Karanth 1985). Maximum concentration has been observed at Kudremukh, Brahmagiri Mukambika, Talakaveri, Pushpagiri, Someshwara Sharavathi, Nilgiri Hills, Anamalai Hills, Cardamon Hills and Periyar Lake.

Intraspecific variation : No subspecies. However, the population found at Wynaad Plateau and High Wavy mountains are reported to be bigger than those found in Anaimalai Hills (Hutton, 1949).

Habitat : Dense evergreen or semi-evergreen rainforests of high trees in secluded and infrequented areas between 600-1600m. altitudes. Also occurs in tea and cardamom plantation interspersed with undisturbed or selectively felled evergreen forests.

Population : 3000-4000.

Status : RDB-N (1994) : Endangered; IUCN : Endangered; IWPA-1972 : Schedule I; CITES : Appendix-I.

Remarks : Solitary as well as troops of 4-22 individuals have been observed during survey of Western Ghats in the different protected areas. Habitats appeared to be very much fragmented.

20. *Macaca radiata* (Geoffroy)
(Plate 1b.)

1812. *Cercocebus radiatus* Geoffroy, *Ann. Mus. Hist. Nat. Paris.*, 19 : 98.

PLATE 1a : Lion-tailed Macaque

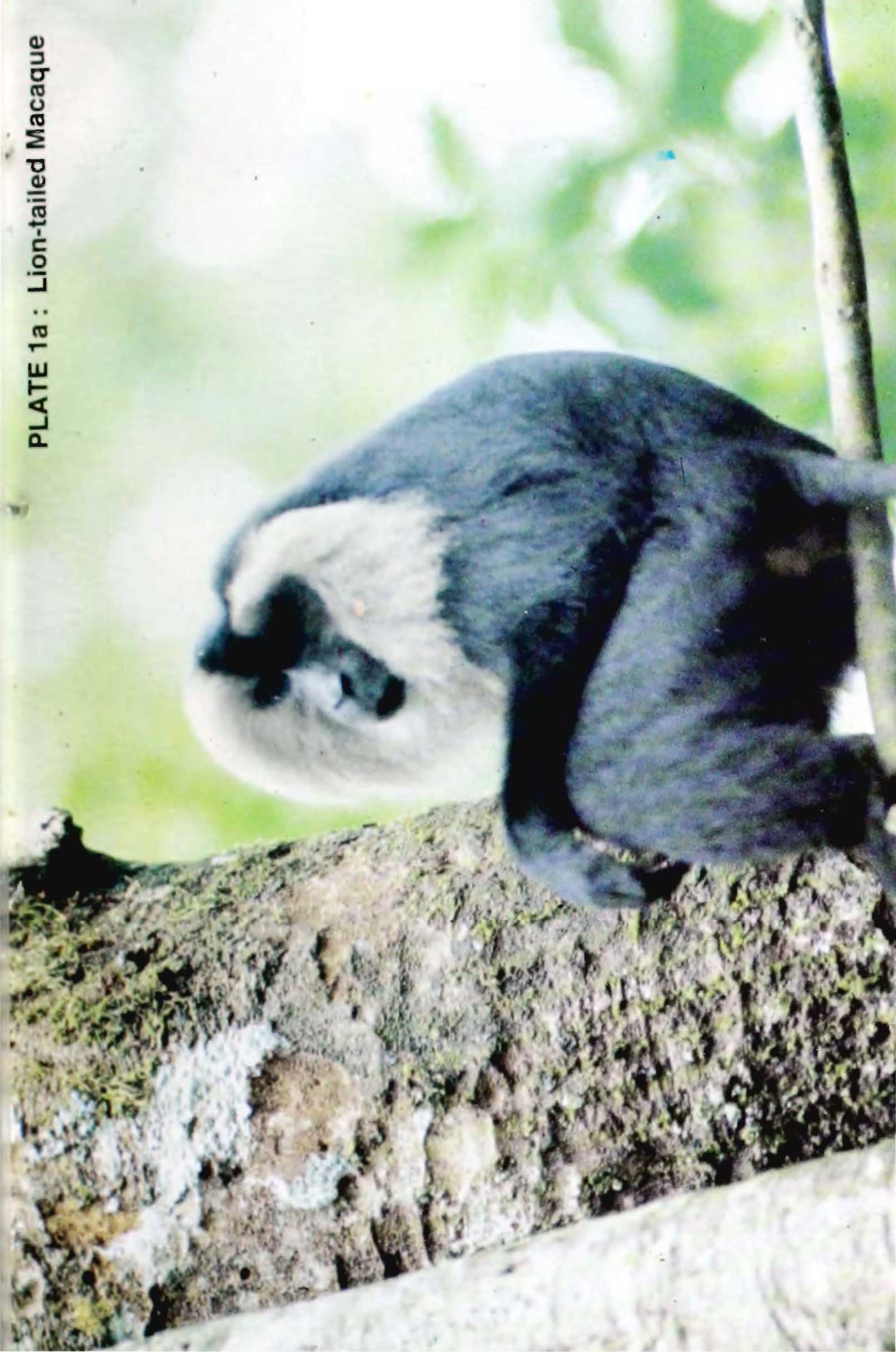


PLATE 1b : Bonnet Monkey



Common names : Eng.-Bonnet Monkey; Hin.-Makadu, Wanar, Kerda : Kan.-Koti; Mah.-Manga, Kodaga; Mal.-Kurangu; Tam.-Mucha, Murg; Tel.-Korangu, Vella Manthi.

Diagnostic characters : A medium-sized macaque (Hb ♂ : 514-599, ♀ : 345-523); tail usually longer than head and body (♂ : 508-685; ♀ : 514-574). A bonnet of long dark hairs radiates in all directions from a whorl on the crown, but hairs on forehead short and nearly parted in the centre. Colour varies seasonally as well as individually; in cold usually lustrous olive brown, under part whitish; in hot coat fades to a buffy gray.

Distribution : Indian Peninsula as far north as Bombay on the west and Godavari river in the east.

Intraspecific variation : Population of Travancore considered as a distinct subspecies, *viz.*, *M. r. diluta* Pocock, which differs from the nominate subspecies by having much paler winter coat, buffy above, cream underside.

Habitat : Forested tracks as well as towns and villages in the foothills and plains; often concentrated in the temple areas.

Population : 25000+

Status : IUCN : Lower Risk-Least Concern; IWPA-1972 : Schedule II; CITES : Appendix II.

Remarks : It has been observed that Bonnet Monkeys are usually driven out from the forests by Nilgiri Langur in Periyar and forced them to settle in the periphery of the forest and adjacent villages. In the temple areas large colonies have been observed which mainly depend upon the offering of the devotees. Road kills are very common.

21. *Trachypithecus johnii* (Fischer)

(Plate 2a)

1829. *Cercopithecus johnii* Fischer, Synopsis mamm. p. 25.

Common names : Eng.-Nilgiri Langur; Mal. -Vella manthi; Tam-Mandi, Manthi.

Diagnostic characters : Large-sized langur (Hb ♂ : 508-700; ♀ : 550-600). Glossy black pelage, but back of head covered with long yellowish brown hairs; rump and base of tail grizzled. Females with a white patch on the

inner side of thighs (Pocock 1939, Napier 1985). Tail long, 680-965 in male, 720-800 in female.

Distribution : Western Ghats – Nilgiri, Anaimalai, Brahmagiri and Palni Hills.

Intraspecific variation : No subspecies.

Habitat : Tropical moist evergreen and moist deciduous forests between 150-2500m, particularly in *Sholas* (composed of tall evergreen trees with dense undergrowth and transected by narrow streams).

Population : 5000-7000.

Status : RDB-N (1994) : Vulnerable; IUCN : Vulnerable; IWPA-1972 : Schedule I; CITES : Appendix II.

Remarks : On way from Kumli to Periyar Lake and along the Periyar lake 9 troops varying from 12-29 individuals of all the age groups have been observed. Often come close to the human settlement areas in search of food.

Order CARNIVORA

Family VIVERRIDAE

22. *Paradoxurus jerdoni* Blanford

1885. *Paradoxurus jerdoni* Blanford, *Proc. zool. Soc., Lond.*, 1885 : 613.

Common names : Eng.–Jerdon's Palm Civet; Mal.–Kart-nai.

Diagnostic characters : Hairs on neck reversed in direction, growing forward from shoulder to the head. General colour typically dark and pattern obscure. Facial vibrissae brown to blackish. Tail with brown or white at tip. Palatal foramina long, projecting beyond the level of canine.

Distribution : Forested tracts of Western Ghats in Karnataka, Kerala and Tamil Nadu.

Intraspecific variation : Great individual variations in colour exhibited. Two subspecies have been recognised, *viz.*, *P. j. jerdoni* Blanford and *P. j. caniscus* Pocock. Subspecies *caniscus* differs from nominate one by having a well-defined grey and black facial pattern or mark. Nominate one is found in Tamil Nadu and Kerala, while *caniscus* is confined to Karnataka.

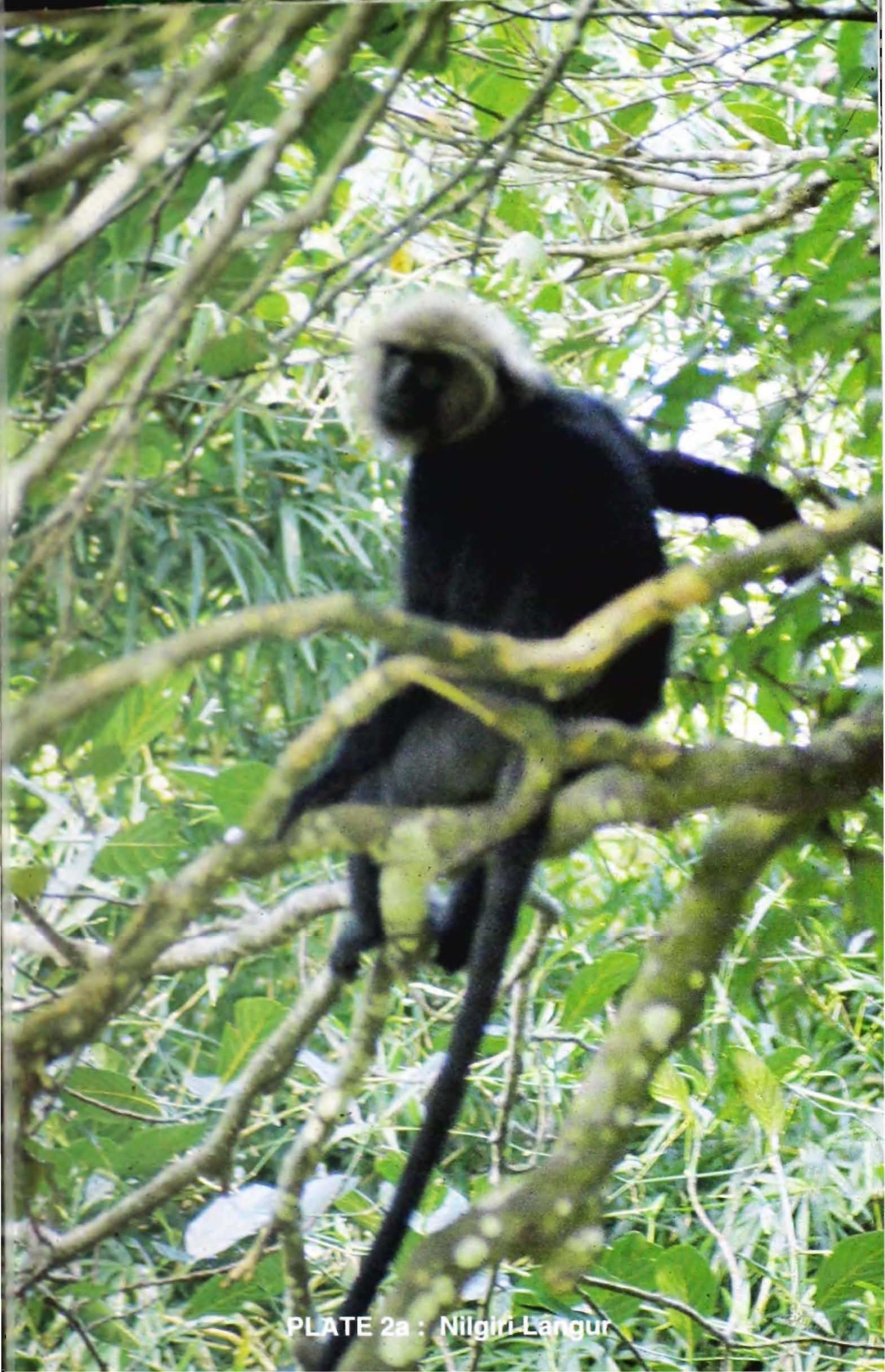


PLATE 2a : Nilgiri Langur

Diagnostic characters : Head and body length ranges from 450 to 600; tail about three-fourth length of head and body. Dorsum from head to rump deep brown, fore quarters of leg almost reddish; a dark stripe running along the side of the neck from behind the ear; throat pale yellowish to yellowish brown. Skull low, its dorsal profile flattened.

Distribution : Western Ghats in Kerala, Karnataka and Tamil Nadu.

Intraspecific variation : Not known.

Habitat : Shola grass land, dry and moist deciduous forests, tropical evergreen forest at 350-2500 m elevation.

Population : Not known. During the recent survey in the Western Ghats neither a single specimen could be observed nor a recent record of its sightings by the local people could be obtained. From indirect evidence, the species appears to be very rare.

Status : IUCN : Vulnerable; IWPA-1972 : Schedule II; CITES : Appendix II.

Remarks : Included in *Martes flavigula* (Boddaert) by Corbert (1978), Honacki *et. al.* (1982), and Corbet and Hill (1992). However, Bonhote (1901), Pocock (1941), Ellerman and Morrison-Scott (1951), Anderson (1970) and Wozencroft (in Wilson and Reeder 1993) treated *gwatkinsi* as a distinct species.

Order ARTIODACTYLA

Family BOVIDAE

26. *Hemitragus hylocrius* (Ogilby)
(Plate 2b)

1838. *Kemas hylocrius* Ogilby, *Proc. zool. Soc. Lond.*, 1837 : 81 (1838).

Common names : Eng.-Nilgiri Tahr; Kan.-Kard-ardu; Mal.-Mulla-atu; Tam.-Warri-adu, Warri-atu.

Diagnostic characters : Size of a goat (Height at shoulder : Buck 990-1061; doe smaller). Short, crisp coat dark yellowish brown above, paler below; doe grey, old buck deep brown or black with a distinctive saddle-patch on

the loin. A pale streak runs from each ear down the side of the muzzle. Single pair of teat. Outer surface of horn rounded.

Distribution : Once ranged over the greater part of the Western Ghats. Present range is restricted to Tamil Nadu and Kerala, from Nilgiri Hills in the north to Ashambu hills in the South (11°30'N to 8°20'N).

Intraspecific variation : No subspecies. However, head of specimens from Nilgiris are smaller than those from southerly region (Prater 1980).

Habitat : Open terrain, cliffs and grass-covered hills which rise above forest level at an altitude from 1200 m to 2600 m.

Population : Found at least at 20 different locations, but its number has depleted to an alarming stage. Davidar (1978) gave a total estimate of 2230 animals. Daniel *et al.* (1998) recorded a slight increase in its population to about 2500 individuals, with highest concentration at Erivikulam National Park, Kerala.

Status : RDB-N (1994) : Vulnerable; IUCN : Endangered; IWPA-1972 : Schedule I.

Order RODENTIA
Family SCIURIDAE

27. *Ratufa indica* (Erxleben)
(Plate 3a)

1777. *Sciurus indicus* Erxleben, *Syst. Regn. Anim.*, 1 : 420.

Common names : Eng.-Indian Giant Squirrel, Malabar Squirrel; Hin.-Janglee Gilheri, Karrat; Guj.-Sekut; Kan.-Kesannalu; Mahr.-Shekru; Tam.-Betudata.

Diagnostic characters : Large-sized squirrel (Hb. 300-450), tail on average larger than head and body. General colour at least in part deep red with a white patch on the back of the neck. Ears heavily tufted and red in colour.

Distribution : Most parts of Peninsular India in the south of about 22°N, mainly in the Western Ghats with isolates in the northeast up to south Bihar.

Intraspecific variation : Variations in colour and pattern have been illustrated by Abdulali and Daniel (1952). Eight colour forms have been

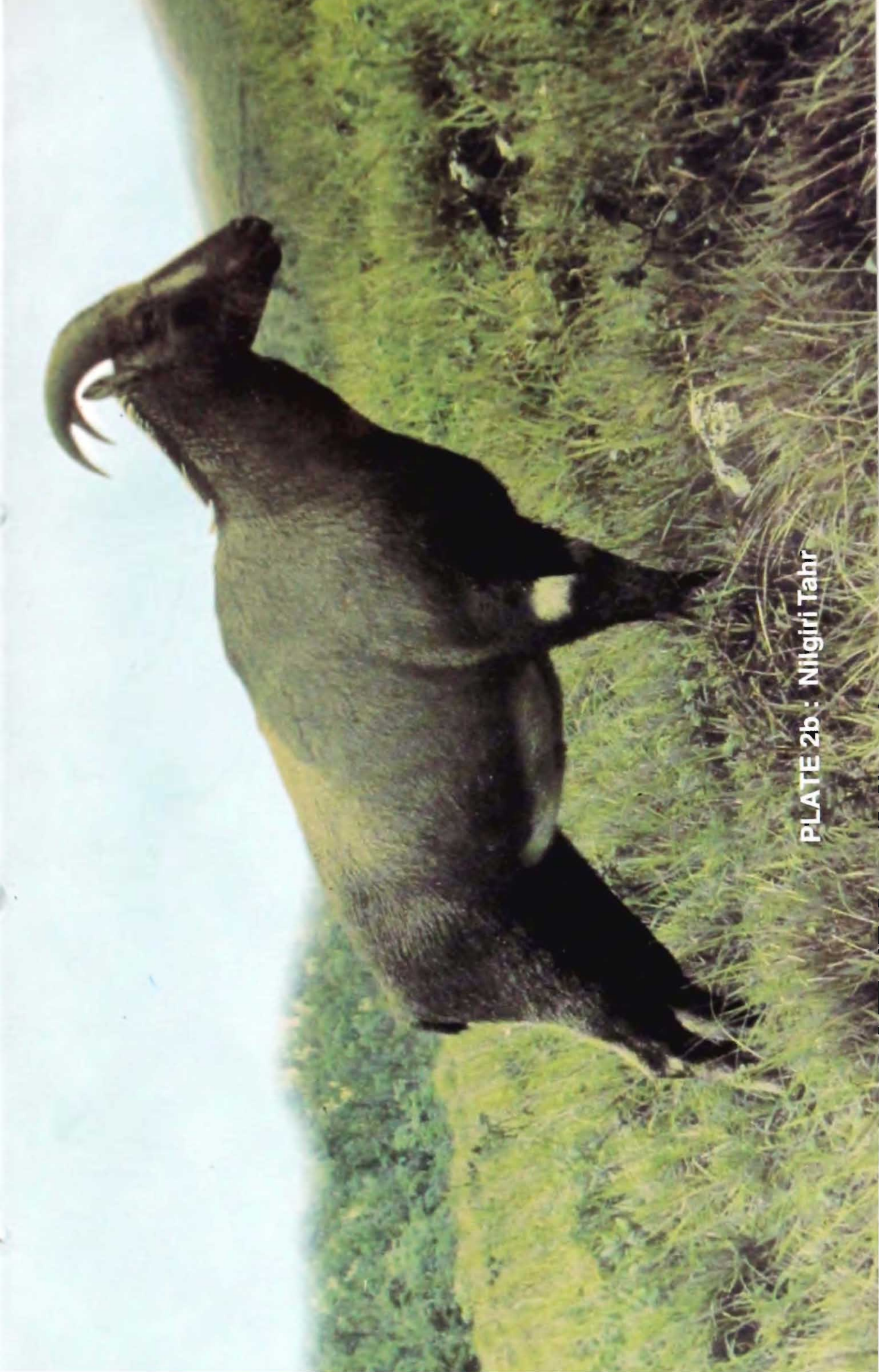


PLATE 2b : Nilgiri Tahr

recorded. There is a stepped cline in western India from an uniform pale buff or white from in the north through forms with increasing amount of reddish to forms with a considerable amount of black in the southwest. Moore and Tate (1965) grouped these colour-forms into following four subspecies, the three of which intergrade in the Nilgiri Region.

R. i. dealbata (Blanford) – Surat, N.W. India. Uniform pale creamy buff to almost white but ear red.

R. i. indica (Erxleben) – Western Ghats from about 18°30' to 10°N. Dorsum reddish brown; tail brown proximally, white distally in specimens from north, but all brown in the specimens from south.

R. i. maxima (Schreber) – South of 10°N. Nape, shoulder, rump and tail black.

R. i. centralis Ryley – Central and eastern Indian. Dorsum brown with black fore leg. Tail black with pale tip.

Habitat : Deciduous, mixed deciduous, and moist evergreen forests in plains as well as hills.

Population : Except for *dealbata*, all others are represented by a fairly good populations in their range. Subspecies *dealbata* has not been recorded for nearly 50 years and considered on the verge of extinction.

Status : IUCN : Considered *dealbata* as probably Extinct, and rest as Vulnerable; IWPA-1972 : Schedule II; CITES : Appendix II.

Remarks : Though *dealbata* has not been recorded for a long time, but recent survey of Dangs district, Gujarat revealed that its habitat is still maintained in certain pockets. In all probability detailed survey in the area may rediscover the population of this subspecies.

28. *Funambulus tristriatus* (Waterhouse)

1837. *Sciurus tristriatus*, *Mag. nat. Hist.* (Charlesworth's), 1 : 499.

Common names : Eng.–Jungle Stripped Squirrel; Kan.–Alalu; Mal.–Anam.

Diagnostic characters : Largest species of the genus (Hb 180), tail most often shorter than head and body. Back black or blackish brown, with three narrow subequal white to pale buff stripe which usually do not extend to

the root of the tail. Head rufous above, sides grayish brown. Belly whitish to grey; tail hairs deep rufous with black rings and white tips.

Distribution : Western Ghats north to Bombay.

Intraspecific variation : Geographic variations in the skull length and nature of stripe have been recorded, but with much overlapping. Northern population recognised as nominate subspecies is distinguished from the southern subspecies, *F. p. wroughtoni* Ryley by being small and pale stripe of the back wider and lighter.

Habitat : Semi-evergreen, evergreen, moist deciduous forests, also in shrubs and tea gardens.

Population : Exact population is not known, but could frequently be met within the forested tracts of Western Ghats.

Status : IUCN : Lower Risk – Near Threatened.

29. *Biswamoypterus biswasi* Saha (Plate 3b)

1981. *Biswamoypterus biswasi* Saha, *Bull. zool. Surv. India*, 4 : 333.

Common name : Eng.–Namdhapha Flying Squirrel.

Diagnostic characters : Large-sized flying squirrel (Hb 405), tail 605. Pelage soft and thick. Above Morocco Red, grizzled with white; blob of Pale violet Gray on crown; venter mostly white.

Distribution : Namdhapha, Tirap district, Arunachal Pradesh.

Intraspecific variation : Not known.

Habitat : Tropical rain forest in hill slopes.

Population : Not known. Apart from the holotype there is no second record.

Status : IUCN : Critically Endangered.

Family MURIDAE

Species : 30. *Cremnomys elvira* (Ellerman)

1946. *Rattus (Cremnomys) elvira* Ellerman, *Ann. Mag. nat. Hist.*, ser. 11, 13 : 207.

PLATE 3b : Namdhapha Flying Squirrel



Common name : Not available.

Diagnostic characters : Like house rat (Hb 126-149). Fur soft. Colour above brownish grey, underparts greyish white; tail bicolor. Palate less than half of the occipitonasal length.

Distribution : Salem district, Eastern Ghats, Tamil Nadu.

Intraspecific variations : Description of only two specimens available. In one tail poorly bicolored and in other tail clearly bicolored (Ellerman, 1961).

Habitat : Semiarid zone with thorny scrub.

Population : Not known.

Status : IUCN : Vulnerable.

31. *Cremnomys cutchicus* Wroughton

1912. *Rattus cutchicus* Wroughton, *J. Bombay nat. Hist. Soc.*, 21 : 340.

Common name : Eng.-Cutch Rat.

Diagnostic characters : Very similar to the previous species, but smaller on average both in head and body and skull lengths. Above drab grey to drab brown; belly varying from white to dull greyish. Tail wholly dark or poorly bicolor.

Distribution : Gujarat in the north to Bihar and Orissa in the east and south to Karnataka.

Intraspecific variation : Much geographical variation in respect of body colour and external measurements have been reported with considerable overlap. In general, specimens from south tend to be larger (Hb. 130) and paler below than those in the north (Corbet and Hill 1992). Five subspecies have been recognised viz., *C. cutchicus cutchicus* Wroughton, *C. cutchicus siva* Thomas, *C. cutchicus australis* Thomas, and *C. cutchicus rajput* Thomas, *C. cutchicus medius* Thomas by Ellerman (1961). However, Agrawal (2000) found that all the differentiating colour characters are overlapping and as such synonymised all of them with the nominate one.

Habitat : Rocky areas with dense or sparse vegetation, grasslands on hill slopes and also crop fields.

Population : Exact population not known. However, recent surveys in Rajasthan, Gujarat and Karnataka have recorded very good populations in the various habitats.

Status : IUCN : Lower Risk-Least concern.

32. *Alticola albicauda* (True)

1894. *Arvicola albicauda* True, *Proc. U. S. Natl. Mus.*, 17 : 12.

Common name : Not available.

Diagnostic characters : According to Hinton (1926), head and body 107-108, tail 32. Fur moderately dense, about 15 mm long upon the back. Upper part pale reddish grey to dark yellowish grey. Individual hair dark plumbeous at the base, with a subterminal ring of pale yellow and brown tip. Underparts together with upper lip pure white, but hairs grey at bases. Tail pure white above and below. Third upper molar with three outer and three inner salient angles; third outer infold is so reduced that the third triangle broadly confluent with somewhat shortened posterior loop.

Distribution : Baltistan, Jammu and Kashmir. At present, known only from Braldu Valley and Nahr Nullah, Skardu, at an altitude of 3658 m.

Intraspecific variation : Back of specimens from Nahr Nullah, Skardu collected in August dull yellowish.

Habitat : Steep rocky areas.

Population : Not known. So far known by four specimens.

Status : IUCN : Data Deficient.

Remarks : Ellerman and Morrison-Scott (1951) included *albicauda* in *A. roylei* Gray. However, Gromov and Polyakov (1977), Corbet (1978), Musser and Carleton (in Wilson and Reeder, 1993) kept it as a distinct species on the basis of diagnostic traits pointed out by Hinton (1926).

33. *Alticola montosa* (True)

1894. *Arvicola montosa* True, *Proc. U. S. Natl. Mus.*, 17 : 111.

Common name : Not available.

Diagnostic characters : Small (Hb little more than 100), mouse like vole

with thick fur. Tail averages more than 40% of head and body and ear usually more than 13. Colour above rich dark brown, pale brown below.

Distribution : Known only from Jammu and Kashmir at an elevation from 2438 to 3962 m (Hinton 1926).

Intraspecific variation : Not known.

Habitat : High altitude scrub forest, rocky areas, snows, also in and around human habitation.

Population : Not known, but recorded from many localities (Ellerman 1961).

Status : IUCN : Data Deficient.

Remarks : Ellerman and Morrison-Scott (1951) considered *montosa* as a subspecies of *A. roylei* Gray. Musser and Carleton (in Wilson and Reeder 1993) maintained *montosa* as a distinct species and confined its range to Kashmir only. However, Ellerman (1961) included Afghanistan and Pakistan within the range of *montosa*. As such, endemic status of the present species needs further verification alongwith the revision of the group.

34. *Alticola roylei* (Gray)

1842. *Arvicola roylei* Gray, *Ann. Mag. nat. Hist.*, (Ser. I), 10 : 265.

Common name : Eng.—Royle's High Mountain Vole.

Diagnostic characters : Head and body well over 100, tail on average one-third of head and body. Ear on average about one-tenth of head and body. Colour rich dark brown above, pale brown below. Tail bicolor, dark above, pale below.

Distribution : Himalaya, from Kullu Valley in Himachal Pradesh to Kumaon in Uttaranchal at an altitude from 2600 to 3900 m.

Intraspecific variation : Population from Kulu Valley, Himachal Pradesh is recognised as a distinct subspecies, viz., *A. r. cautus* Hinton, in which ear slightly longer and underparts on average grayer.

Habitat : Open uplands and rocky grounds covered with coarse grass, often also near human habitation.

Population : Exact population not known, but from the available collection in the different museums, appears to be common in suitable habitats.

Status : IUCN : Data Deficient.

Remarks : Once considered as the broadest ranging species of *Alticola* in central Asia (Ellerman and Morrison-Scott 1951, Corbet 1978), but Musser and Carleton (1993) considered only India as its range because the geographic and morphological definition of *roylei* conforms to that given by Hinton (1926).

35. *Millardia kondana* Mishra and Dhanda

1975. *Millardia kondana* Mishra and Dhanda, *J. Mammal.*, 56 : 75.

Common name : Not available.

Diagnostic characters : Large-sized field rat (Hb. 168 to 201), tail shorter than head and body. Above dark brown, greyish white below; tail fairly bicolored, dark above, greyish below. Planter pads six in number.

Distribution : Known only from type locality; Sinhgarh Plateau, Pune, Maharashtra.

Intraspecific variation : Not known.

Habitat : Scrub, bushes, marshy forest and rocky areas near human habitation.

Population : Not known.

Status : IUCN : Vulnerable.

36. *Rattus palmarum* (Zelevor)

1869. *Mus palmarum* Zelevor, *Reise Oesterr. Fregatte Novara. Zool.*, (Wirbelthiere), *Säugeth.*, p. 26.

Common name : Not available.

Diagnostic characters : A very large-sized rat (Hb. 275) with tail much shorter being only 215. Hindfoot 50. Tail wholly dark, belly yellowish white.

Distribution : Nicobar Islands, probably Great Nicobar.

Intraspecific variation : Not known.

Habitat : Mangrove and tropical rain forest.

Population : Not known.

Status : IUCN : Vulnerable.

Remarks : Needs taxonomic revision, as this species may actually belong to *R. mulleri* Group (Ellerman 1961).

37. *Rattus ranjiniae* Agrawal and Ghosal

1969. *Rattus ranjiniae* Agrawal and Ghosal, *Proc. zool. Soc. Calcutta*, 22 : 41.

Common name : Not available.

Diagnostic characters : Medium-sized field rat (Hb 160-261), tail longer than head & body in young adults but shorter in fully adult specimens. Hindfoot over 40. Dorsal fur long with admixture soft spines. Dorsal colour Bistre, hinder parts darker. Ventral fur dense, woolly and dirty white. Tail unicoloured. Palate does not extend posteriorly beyond the third molar; cheek tooth-row more than 8 in length and more than 2.5 in width (Agrawal, 2000).

Distribution : Kerala.

Intraspecific variation : Not known.

Habitat : Cultivated fields, also goes to water at the time of emergency.

Population : Exactly not known, but from the collection of specimens appears to be not so rare.

Status : IUCN : Vulnerable.

38. *Rattus stoicus* (Miller)

1902. *Mus stoicus* Miller, *Proc. U. S. Natl. Mus.*, 24 : 759.

Common name : Not available.

Diagnostic characters : Large, heavily built rat (Hb 266), tail much shorter being up to 228. Hindfoot around 50. Tail unicolored, undersurface bluish grey. Diastema very long, over 18.

Distribution : South Andaman, Little Andaman, Henry Lawrence Islands.

Intraspecific variation : Differences in the body size have been recorded

for different island populations. Musser and Heaney (1985) synonymised '*Mus tacitunus*' Miller and '*Mus rogersi*' Thomas from South Andaman with *stoicus*.

Habitat : Not known.

Population : Not known.

Status : IUCN : Vulnerable.

39. *Rattus burrus* (Miller)

1902. *Mus burrus* Miller, *Proc. U.S. Natl. Mus.*, 24 : 768.

Common name : Not available.

Diagnostic characters : Medium-sized rat, head and body and tail subequal being around 215. Hindfoot 43. Dorsal fur spineless, slightly grizzled; belly light buff. Diastema 14.

Distribution : Islands of Trinkat, Little Nicobar and Great Nicobar.

Intraspecific variation : Not known.

Habitat : Not known.

Population : Not known.

Status : Not known.

40. *Mus famulus* Bonhote

1898. *Mus famulus* Bonhote, *J. Bombay nat. Hist. Soc.*, 12 : 99.

Common name : Not available.

Diagnostic characters : Small-sized mouse (Hb about 81), tail little shorter. Dorsum deep rich almost dark chocolate brown, belly somewhat reddish yellowish. Mammary 1+2.

Distribution : Around 1500 m elevations in Nilgiri, Anaimalai and Palni Hills in South India.

Intraspecific variation : Not known.

Population : Not known.

Status : IUCN : Endangered.

Remarks : *Mus cookii* Ryley from mountains of Nepal, Myanmar, Thailand,

Vietnam was considered as a subspecies of *M. famulus* by Ellerman (1961). However, Marshall (1977) considered *M. cookii* as a distinct species, and *M. famulus* as monotypic species restricted to southern India.

41. *Mus phillipsi* Wroughton

1912. *Mus phillipsi* Wroughton, *J. Bombay nat. Hist. Soc.*, 21 : 772.

Common name : Not available.

Diagnostic characters : Small-sized mouse (Hb. less than 90), tail smaller than head and body being about 70. Fur spiny. Dorsum light brown to dark brown, underparts white. Supra orbital ridge present. Mammae 3+2.

Distribution : From southern parts of Rajasthan to Tamil Nadu.

Intraspecific variation : Populations from southern part of the range slightly paler than the northern populations, but with much overlapping.

Habitat : Lives in grass beneath wood land (Marshall 1977).

Population : Not known, but fairly common and found in many localities.

Status : IUCN : Lower Risk-Least Concern.

Remarks : Abe (1977) recorded *Mus cervicolor phillipsi* = *M. phillipsi* from the foot hills (800 m) of Nepal. Marshall (1977), Musser and Carleton (in Wilson and Reeder 1993) did not include Nepal within the range of the present species. However, further examination of material collected from Nepal and identified as *M. cervicolor phillipsi* is required.

42. *Mus platythrix* Bennett

1832. *Mus platythrix* Bennett, *Proc. zool. Soc. Lond.*, 1832 : 121.

Common name : Eng.-Indian Brown Spiny Mouse.

Diagnostic characters : Head and body on average 95, tail always shorter than head and body. Dorsum dark brown but ranging sometimes to pale brown; underparts normally white with a clear line of demarcation. A dark stripe on foot. Fur spiny. Supraorbital ridge present.

Distribution : Bihar and Maharashtra to the south up to Tamil Nadu.

Intraspecific variation : Individual variations in colour irrespective of localities could be marked. Populations from Coorg and Kanara have palatal

foramina distinctly shortened being up to 22% as compared to more than 23% in other and considered as a separate subspecies, *viz.*, *M. p. bahadur* (Wroughton and Ryley).

Habitat : Hedge, cultivated fields, dry river beds in hilly countries.

Population : Not known, but from the trap success during the different field surveys it appears to be fairly common.

Status : IUCN : Lower Risk-Least Concern.

43. *Apodemus rusiges* Miller

1913. *Apodemus flavicollis rusiges* Miller, *Proc. Biol. Soc. Washington*, 26 : 81.

Common name : Eng. Himalayan Wood Mouse.

Diagnostic characters : Tail much longer than head and body being on average 105 against 95. Dorsum cold gray. Ear relatively small, rarely as much as 19 percent of head and body.

Distribution : Himachal Pradesh, Jammu and Kashmir, Uttaranchal.

Intraspecific variation : Not known.

Habitat : Rocks, meadows, cultivated fields in hills, generally below 2440 m.

Population : Fairly common. Reported to cause certain amount of damage to the field crops.

Status : Not determined.

Remarks : Ellerman and Morrison-Scott (1951) treated *rusiges* as a subspecies of *A. flavicollis* (Melchior), while Corbet and Hill (1922) considered it as subspecies of *A. sylvaticus* (Linnaeus). However, Musser and Carleton (in Wilson and Reeder 1993) opined that 'the long-tailed and distinctly patterned *rusiges* appears to be a separate species endemic to India'.

44. *Platacanthomys lasiurus* Blyth

1859. *Platacanthomys lasiurus* Blyth, *J. Asiat. Soc. Bengal*, 28 : 289.

Common name : Eng.-Malabar Spiny Mouse.

Diagnostic characters : Rat like in appearance, but thickly haired, like squirrel. Pollex and hallux short, clawless. Fur on the upper part mixed with

broad, flat spines. Tail hairs coarse but not spiny, short near the body, increasing in length towards the tip. Above reddish brown, below nearly white.

***Distribution* :** South of Shimoga district in Western Ghats between 900 to 2500 m.

***Intraspecific variation* :** Not known.

***Habitat* :** Moist deciduous and rain forests.

***Population* :** Not known, but quite a good number of individuals have been recorded at different localities during recent surveys.

***Status* :** Lower Risk-Least Concern.

DISCUSSION

From the above account it is obvious that about 11% of the Indian mammalian species are endemic to the country. However for majority of the endemic mammalian species very little information is available as regard to their biology and population status. Many of the species are known only by the type series or even by single type specimen and not been recorded since the original description. Further, taxonomic status of some of the species are still controversial and requires detail study with fresh series of specimens.

Distribution of the Indian endemic species in the different biogeographic zones are shown in Table-I. It has been found that Western Ghats harbour maximum number of endemic species followed by Deccan Peninsula and Islands. It is important to mentioned that Western Ghats and Islands are only 4.03% and 0.25% respectively of the total area of country. Thus, two biogeographic zones deserve high priority from the conservation point of view. As such, while 4.66% of the country's total geographical area have been brought under protected area network, for Western Ghats and Islands this figure becomes 10.12% and 18.54% respectively. However, diversion of forests for large irrigation, power and mining projects, extension of roads, etc., particularly in the Western Ghats have resulted not only the loss of habitat but also opened up previously inaccessible areas to human beings. Further, low elevation habitats are steadily decreasing under pressure from

local inhabitants for fuelwood, live-stock grazing, excessive collection of leaf-litter, *etc.*, and the evergreen forests at higher elevation are subject to pressures from logging to produce plywood, matchwood and railway sleepers. Steep increase in the market value of forest produce in recent years has also resulted in excessive exploitation of forest resources. Vast areas of Decan Peninsula and different Islands have brought under extensive cultivation which is supported by random use of pesticides and fertilizers. These might have also taken a huge toll of mammalian species particularly of rodents, insectivores and small carnivores. Thus, for the conservation of mammalian species in general and particularly of endemic ones, more areas as identified by Rodgers *et al.* (2000) to be brought under protected area network. Moreover, awareness of the local people towards identification and conservation of endemic species is another important aspect to be addressed.

SUMMARY

Forty-four endemic mammalian species of India have been listed. Common names, diagnostic characters, distribution, intraspecific variations, habitat, population and status of each species were given. It has been found that opinions vary as regard to the taxonomic status of some of the species. Population status and biology of most of the species are not known. Of the different biogeographical zones of the country, Western Ghats harbour highest number of mammalian endemic species, followed by Deccan Peninsula and Islands.

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Table-1. Distribution of the endemic mammalian species of India in the different biogeographic zones

Species	ZONES												
	Trans-Himalaya	Himalaya				Desert	North East	Semi Arid	Western Ghats	Deccan Peninsula	Gangetic Plain	Coasts	Islands
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)			
		NW Himalaya (A)	West Himalaya (B)	Central Himalaya (C)	East Himalaya (D)								
<i>Hemiechinus nudiventris</i>	-	-	-	-	-	-	-	-	+	+	-	-	-
<i>Crocidura andamanensis</i>	-	-	-	-	-	-	-	-	-	-	-	-	+
<i>Crocidura nicobarica</i>	-	-	-	-	-	-	-	-	-	-	-	-	+
<i>Crocidura jenkinsi</i>	-	-	-	-	-	-	-	-	-	-	-	-	+
<i>Crocidura hispida</i>	-	-	-	-	-	-	-	-	-	-	-	-	+
<i>Suncus dayi</i>	-	-	-	-	-	-	-	-	+	+	-	-	-
<i>Anthana ellioti</i>	-	-	-	-	-	-	-	+	+	+	-	-	-
<i>Tupaia nicobarica</i>	-	-	-	-	-	-	-	-	-	-	-	-	+
<i>Latidens salimalii</i>	-	-	-	-	-	-	-	-	+	-	-	-	-
<i>Pteropus faunulus</i>	-	-	-	-	-	-	-	-	-	-	-	-	+
<i>Rhinolophus mitratus</i>	-	-	-	-	-	-	-	-	-	+	-	-	-
<i>Rhinolophus congnotus</i>	-	-	-	-	-	-	-	-	-	-	-	-	+
<i>Hipposideros schistaceus</i>	-	-	-	-	-	-	-	-	-	+	-	-	-
<i>Hipposideros hypophyllus</i>	-	-	-	-	-	-	-	-	+	-	-	-	-
<i>Otomops wroughtoni</i>	-	-	-	-	-	-	-	-	+	-	-	-	-
<i>Eptesicus tatei</i>	-	-	-	+	-	-	-	-	-	-	-	-	-

Table-1. Contd.

Species	ZONES												
	Trans-Himalaya	Himalaya				Desert	North East	Semi Arid	Western Ghats	Decan Parinsula	Gangetic Plain	Coasts	Islands
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)			
	NW Himalaya (A)	West Himalaya (B)	Central Himalaya (C)	East Himalaya (D)									
<i>Murina grisea</i>	-	-	+	-	-	-	+	-	-	-	-	-	-
<i>Scotomanes emarginatus</i>	NOT SPECIFICALLY KNOWN												
<i>Macaca silenus</i>	-	-	-	-	-	-	-	-	+	+	-	-	-
<i>Macaca radiata</i>	-	-	-	-	-	-	-	-	+	+	-	-	-
<i>Trachypithecus johnii</i>	-	-	-	-	-	-	-	-	+	-	-	-	-
<i>Paradoxurus jerdoni</i>	-	-	-	-	-	-	-	-	+	-	-	-	-
<i>Viverra civettina</i>	-	-	-	-	-	-	-	-	+	-	-	-	-
<i>Herpestes palustris</i>	-	-	-	-	-	-	-	-	-	-	+	+	-
<i>Martes gwatkinsii</i>	-	-	-	-	-	-	-	-	+	-	-	-	-
<i>Henitragus hylacrius</i>	-	-	-	-	-	-	-	-	+	-	-	-	-
<i>Ratufa indica</i>	-	-	-	-	-	-	-	+	+	+	+	+	-
<i>Funumbulus tristriatus</i>	-	-	-	-	-	-	-	-	+	-	-	-	-
<i>Biswamoypterus biswasi</i>	-	-	-	-	+	-	-	-	-	-	-	-	-
<i>Cremnomys elvira</i>	-	-	-	-	-	-	-	-	-	+	-	-	-
<i>Crermnomys cutchicus</i>	-	-	-	-	-	+	-	+	+	+	-	-	-
<i>Alticola albicauda</i>	+	-	-	-	-	-	-	-	-	-	-	-	-

Table-1. Contd.

Species	ZONES												
	Trans-Himalaya	Himalaya				Desert	North East	Semi Arid	Western Ghats	Decan Peninsula	Gangetic Plain	Coasts	Islands
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)			
		NW Hima laya (A)	West Hima laya (B)	Central Hima laya (C)	East Hima laya (D)								
<i>Alticola montosa</i>	+	+	-	-	-	-	-	-	-	-	-	-	-
<i>Alticola roylei</i>	+	+	+	-	-	-	-	-	-	-	-	-	-
<i>Millardia kondana</i>	-	-	-	-	-	-	-	+	-	-	-	-	-
<i>Rattus palmarum</i>	-	-	-	-	-	-	-	-	-	-	-	-	+
<i>Rattus ranjinae</i>	-	-	-	-	-	-	-	+	-	-	-	-	-
<i>Rattus stoicus</i>	-	-	-	-	-	-	-	-	-	-	-	-	+
<i>Rattus burrus</i>	-	-	-	-	-	-	-	-	-	-	-	-	+
<i>Mus famulus</i>	-	-	-	-	-	-	-	+	-	-	-	-	-
<i>Mus phillipsi</i>	-	-	-	-	-	-	+	-	-	+	-	-	-
<i>Mus platythrix</i>	-	-	-	-	-	-	-	+	+	-	-	-	-
<i>Apodemus rusiges</i>	+	+	+	-	-	-	-	-	-	-	-	-	-
<i>Platacanthomys lasiurus</i>	-	-	-	-	-	-	-	+	-	-	-	-	-
TOTAL	4	3	3	1	1	1	1	3	21	12	2	2	10