

THE
MAMMALS
OF ARUNACHAL PRADESH



Anwaruddin Choudhury

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by
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PREFACE

This is the first ever checklist and systematic review of the mammals of Arunachal Pradesh, a state having the highest mammalian diversity in India. However, this is not the first in the region. *The checklist of the mammals of Assam* (1994, revised second edition in 1997) was the first attempt to systematically document the mammals in north-eastern India. While many species are similar to both the states, there are high elevation forms, which are confined to Arunachal Pradesh only. It was surmised that perhaps Assam has the highest mammalian diversity in India with $189 \pm$ species (Choudhury, 1997e) but this checklist has already crossed 200 mark (206 species) with another 38 species likely to occur or are recorded in adjacent areas.

A checklist supported by accurate illustrations is useful both for casual nature-enthusiast as well as serious students of zoology and allied subjects. This work is intended to be like that. The present work is based upon both primary and secondary sources. The more than a decade-long field work (direct sightings in the wild, records of wild-caught animals held as captives, etc) in Arunachal Pradesh and examination of preserved specimens by me provided for the main primary data while published documents, such as books, journals, popular articles, research reports, etc., along with unpublished materials, reports by experienced hunters, Forest officials and other observers contributed for the secondary data.

Museum specimens have been examined at different collections, notably at the National Museum of Natural History (Smithsonians, Washington), American Museum of Natural History (New York), Field Museum of Natural History (Chicago), Museum of Vertebrate Zoology (University of California, Berkeley), Wildlife Conservation Society (New York), Zoological Survey of India (Kolkata [Calcutta] and Shillong), Natural History Museum (Darjeeling), Itanagar Museum, Forest department's Museum (Shillong and Guwahati), collections at the museums of Project Tiger at Miao (near Namdapha National Park), and many private collections spread across Arunachal Pradesh, especially in the tribal villages.

However, works on the bats and small mammals such as the rodents continued to be very scanty and the text in this checklist also indicates the same. The checklist is followed by an exhaustive bibliography on the mammals, especially pertaining to the region and includes almost all the original descriptions included or referred to in the text. Many of these works have also been consulted while preparing this book.

In most cases, the conservation status of different species according to CITES, IUCN (2002) and the Indian Wild Life (Protection) Act 1972 have been given. Explanatory notes on taxonomic status, wherever there is confusion, have been given in 'remarks' section accompanying the species notes.

The species have been serially numbered while the subspecies have been given the same serial with suffix a,b, etc. The serial numbers in *The checklist of the mammals of Assam* (1997e) are given in parenthesis for convenience of reference. It may be mentioned here that many of the subspecific classification are not concrete and need detailed review.

It is hoped that this book will be of use to a broad audience and also help in planning for conservation in this biodiversity-rich area.

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CONTENTS

<i>Preface</i>	v
<i>Acknowledgements</i>	vii
Introduction	1
Systematic List	9
Order Pholidota: Pangolins	9
Order Insectivora: Insectivores	10
Order Scandentia: Tree-shrews	15
Order Chiroptera: Bats	16
Order Primates: Primates	31
Order Carnivora: Carnivores	41
Order Cetacea: Whales, Dolphins and Porpoises	62
Order Proboscidea: Elephants	63
Order Perissodactyla: Odd-toed ungulates	65
Order Artiodactyla: Even-toed ungulates	67
Order Rodentia: Rodents	80
Order Lagomorpha: Hares, Rabbits and Pikas	97
<i>Appendix 1. Species not Recorded but Occur in</i>	101
<i>the Adjoining Areas</i>	
<i>Appendix 2. Protected Areas in Arunachal Pradesh</i>	103
<i>(Area in Km²)</i>	
<i>Appendix 3. Main Reserved Forests (Area in Km²)</i>	104
<i>Bibliography</i>	107
<i>Index</i>	133

INTRODUCTION

The state of Arunachal Pradesh ($26^{\circ}40'-29^{\circ}27' N$, $91^{\circ}35'-97^{\circ}24' E$) covers an area of 83,700 km², and forms part of a rich biogeographic unit that represents one of the biodiversity 'Hotspots' (Myers, 1988, 1991). It also forms part of the Eastern Himalaya Endemic Bird Area (Collar *et al.*, 1994). The state is mostly hilly and mountainous being part of the Eastern Himalaya. The mountains towards east of the Siang River are known as Mishmi Hills. Farther eastern and south-eastern areas are dominated by the Dapha Bum and Patkai Ranges. Small areas of flat plain occur along the larger rivers such as the Siang, Dibang and the Lohit. The higher areas, especially the peaks of the Great Himalaya remain snow-capped throughout the year.

Arunachal Pradesh has 15 districts, namely, Tawang, W. Kameng, E. Kameng, Upper Subansiri, Lower Subansiri, Papum Pare, Upper Siang, W. Siang, E. Siang, Dibang Valley, Lohit, Changlang and Tirap (two have been added recently—Kurung Kamei and Upper Dibang Valley). The present state came into existence in 1987. Originally this tract was administered by the Governor of Assam and was divided into three large divisions, Balipara Frontier Tract (present Tawang, W. Kameng, E. Kameng, Upper Subansiri, Lower Subansiri and Papum Pare districts), Sadiya Frontier Tract (present Upper Siang, W. Siang, E. Siang, Dibang Valley and Lohit Districts) and Tirap Frontier Tract (present Changlang and Tirap Districts). Till 1972, it was known as NEFA (North-East Frontier Agency). In 1972 it was renamed as Arunachal Pradesh and was administered as a union territory till 1987.

Physiographically, the major parts of Arunachal Pradesh are hilly and mountainous. The Great Himalaya covers part of Tawang, W. Kameng, E. Kameng, Upper Subansiri, Lower Subansiri, W. Siang and Upper Siang districts. Lesser Himalayas cover parts of W. Kameng, E. Kameng, Upper Subansiri, Lower Subansiri, Papum Pare, W. Siang and E. Siang districts. The Mishmi Hills cover parts of E. Siang, Dibang Valley and Lohit districts. The Dapha Bum Range, often referred to as part of Mishmi Hills cover parts of

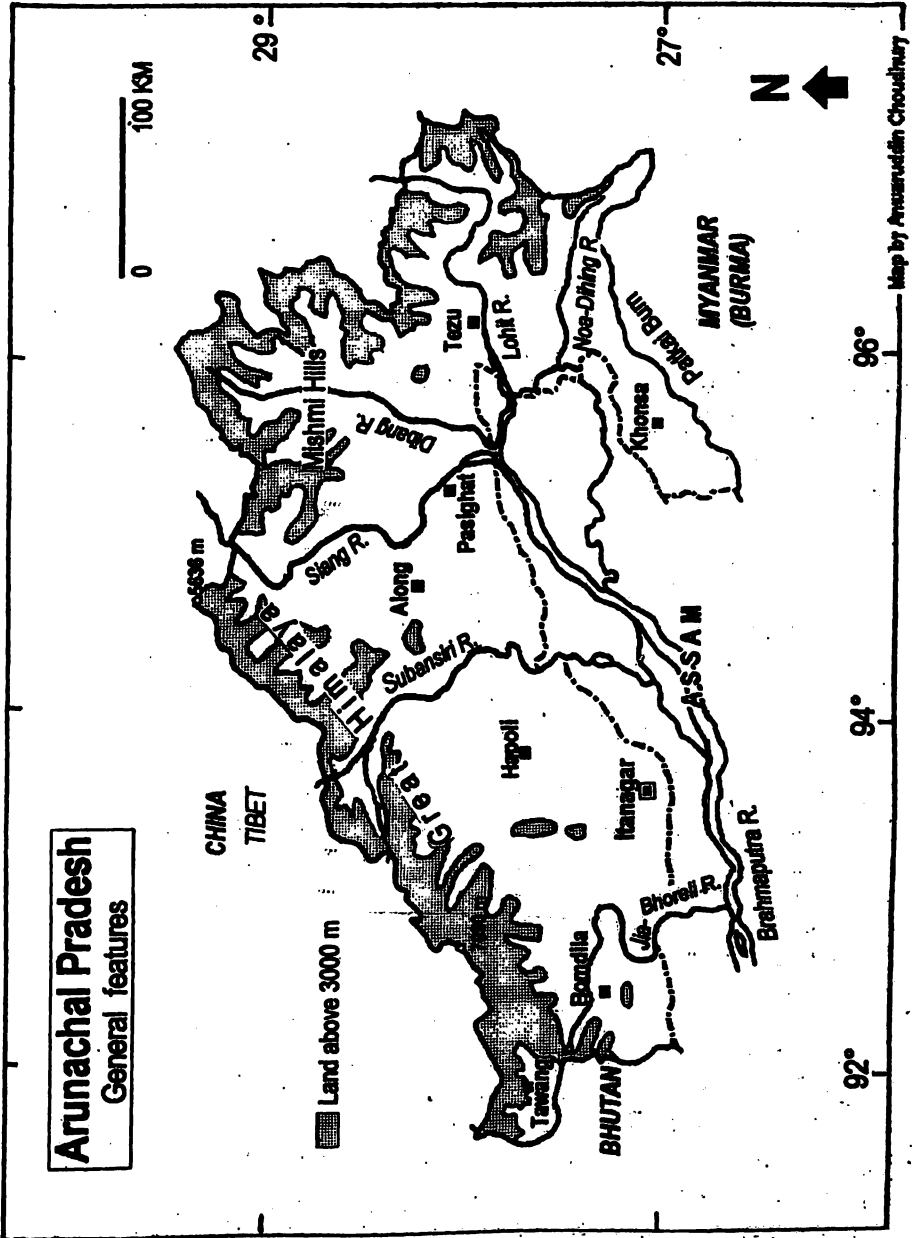
Lohit and Changlang districts while Patkai Range covers Tirap and Changlang districts. The highest peak is Kangto, 7090 m (23,260 ft). Other high peaks include Nyegi Kangtsang, 7047 m (23,120 ft.), Chomo, 6937 m (22,760 ft.) and Gorichen, 6538 m (21,450 ft.), all in the Great Himalaya.

The climate of Arunachal Pradesh (except for the Great Himalaya and higher areas of Lesser Himalaya, which may be termed as 'mountain type') is tropical 'monsoon' type with a hot wet summer and a cool dry winter. Winter rains are also not uncommon. Annual rainfall of the state varies from less than 1500 mm to more than 4000 mm. The south-facing slopes of the Himalaya and Mishmi Hills, and the north-facing slopes of the Patkai Range receive very heavy rainfall. At places such as Dambuk and Khonsa, there are records of more than 10,000 mm in a year. The temperature generally ranges from -0° C in winter (minimum) to 35° C in summer (maximum). The main features of mountain climate are sharp contrast between sun and shade temperature, high diurnal range of temperature, inversion of temperature and variability of rainfall depending upon exposure and elevation (Singh, 1976). Breathing is difficult above 3050 m due to low percentage of oxygen.

Arunachal Pradesh has widely differing habitats. Tropical wet evergreen forests occur mainly in the eastern areas covering parts of Tirap, Changlang, Lohit and Dibang Valley districts. A linear strip of such forest occurs all along the Lesser Himalayan ranges from W. Kameng to E. Siang districts. Some important tree species found in such forests are the Hollong *Dipterocarpus macrocarpus* (confined to the eastern areas, south of the Lohit R.), Sia-nahor *Kayea assamica* (confined to the lower hills of Papum Pare, Lower Subansiri and West Siang districts), Mekai *Shorea assamica*, Nahor *Mesua ferrea*, Hollock *Terminalia myriocarpa*, Khokan *Duabanga sonneratioides* and Cham-kothal *Artocarpus chaplasha*. Altitudinally, such type of forest occurs from plains (c. 100 m) to 900 m.

Tropical semi-evergreen forests occur along the *bhabar* tract in the *duars*, all along from W. Kameng to E. Siang districts. In the south bank region, such forests are found wherever human interference was there. Besides the main evergreen species mentioned earlier, a large number of deciduous trees are also found, these include Bhelu *Tetrameles nudiflora*, Udal *Sterculia villosa* and Simul or Silk cotton *Bombax ceiba*. This type of forest occurs from plains to up to 600 m.

The higher altitudes of the Himalaya, Mishmi Hills and Patkai Range have subtropical forest having both broadleaf as well as



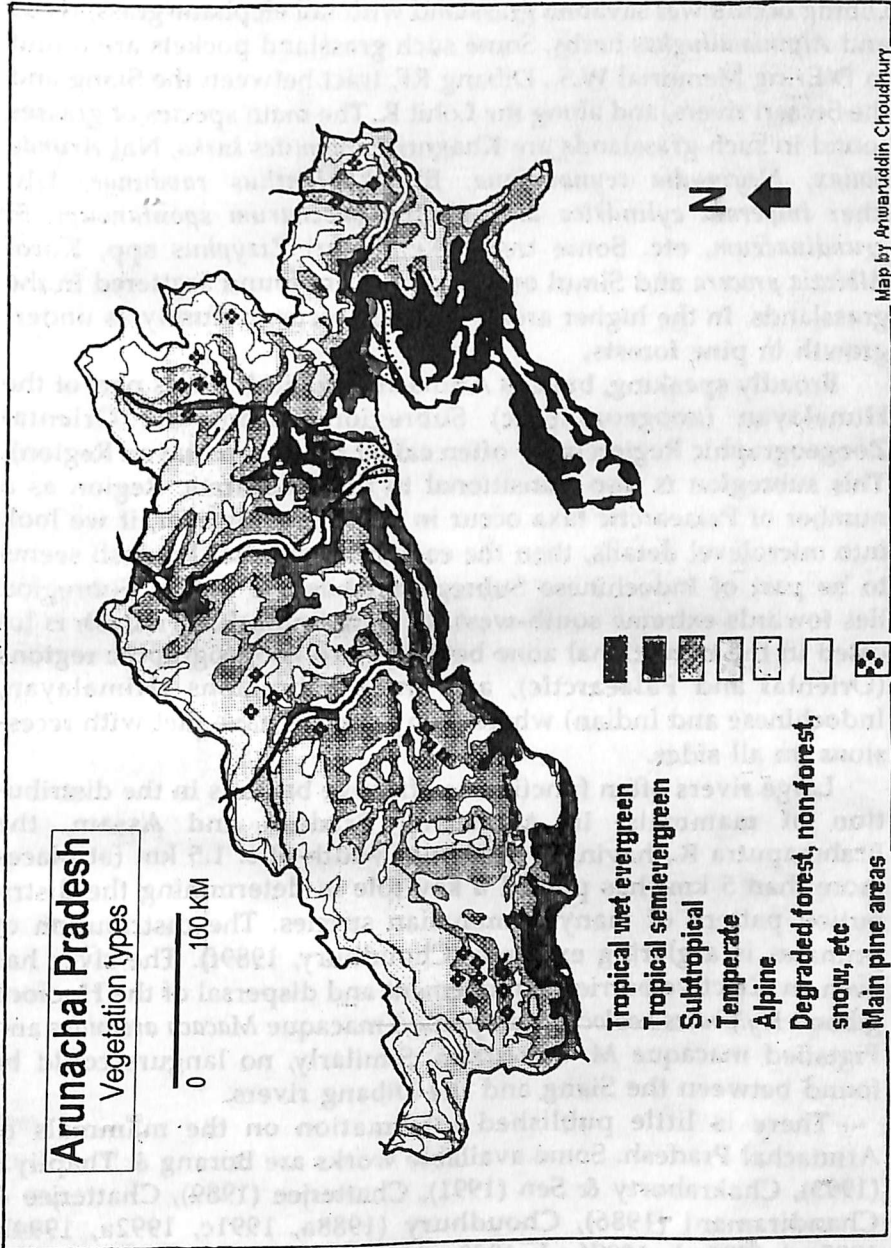
conifers. While the broadleaf forest generally occurs between 800 and 1900 m elevation, the conifers, usually between 1000 and 1800 m, especially in areas receiving less amount of rainfall. Various species of oaks dominate the broadleaf species. Some major species found in such forest type are *Acer oblongum*, *Castanopsis armata*, *C. hystrix*, *C. lidica*, *Manglietia insignis*, *Michelia oblonga*, *Ostodes paniculata*, *Quercus fenestrata*, *Q. griffithii*, *Q. lamellosa*, *Q. semiserrata*, *Q. spicata*, *Schima khasiana*, *S. wallichii* and *Ulnus lancifolium*. Except Tirap, such type of forest occurs in all the other districts. Three species of pines dominate the subtropical pine forests. These are *Pinus merkusii* in Lohit dist, *P. roxburghii* in W. Kameng dist, and *P. wallichiana* widespread all over, especially in W. Kameng (Dirang and Rupa), Lower Subansiri (Ziro and Hapoli), W. Siang (Mechuka), Dibang Valley (Anini) and Lohit (Melinja) districts.

Farther up the Himalaya, and Mishmi Hills occur the temperate forest, both broadleaf and conifers. Former generally between 1800 and 2800 m while the latter between 2800 and 3500 m. The temperate forest occurs in most of the districts except for Tirap, Papum Pare and bulk of Changlang. Various species of oaks, magnolias and rhododendrons dominate the broadleaf species, especially *Acer oblongum*, *Castanopsis armata*, *C. hystrix*, *C. lidica*, *Michelia oblonga*, *Populus gamblei*, *Quercus fenestrata*, *Q. griffithii*, *Q. lamellosa*, *Q. semiserrata*, *Q. spicata* and *Rhododendron* spp. The main conifers are *Pinus wallichiana*, *Tsuga* spp., *Cupressus torulosa*, *Abies spectabilis*, *A. delavayi*, *Taxus baccata*, *Juniperus recurva*, etc.

Between 4000 and 5500 m elevation, above the timber line, occurs alpine vegetation. These areas remain snow covered for greater part of the year and hence, no tall trees could grow. Shrubs, bushes and herbs with deep roots and cushioned leaves and branches are found. Some noteworthy species found are *Rhododendron anthopogon*, *R. nivale*, *R. thomsonii*, *Arenaria* spp., *Festuca* spp., *Rhodiola* spp., *Rheum* spp., *Saussurea* spp., *Saxifraga* spp., *Sedum* spp., etc.

Small areas scattered here and there are covered by tropical moist deciduous forest, mainly plantations by the forest department with species such as the teak tree *Tectona grandis*.

Along the banks of most of the larger hilly rivers and streams occur the riverine or riparian fringing forest. A few large trees with a large number of shrubs, both evergreen and deciduous with grass on the ground characterise this type of forest. The Sissoo *Dalbergia sissoo* and Khair *Acacia catechu* are the characteristic trees of such type. On the *chars* and *chapories* (sandy islets and tracts) of the



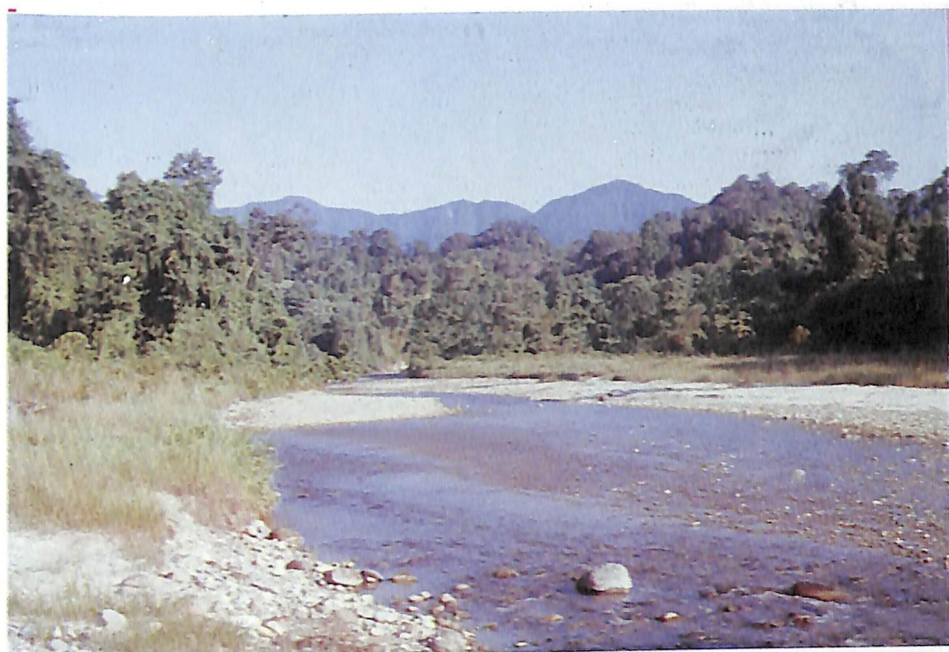
Siang, Dibang, Lohit and their larger tributaries, pine-like Jhau *Tamarix dioica* shrub occurs abundantly.

In the floodplain zone of the Siang, Dibang, Lohit and the Noa-Dihing occurs wet savanna grassland with tall elephant-grass, reeds and *Alpinia allughas* herbs. Some such grassland pockets are found in D'Ering Memorial W.S., Dibang RF, tract between the Siang and the Sesserri rivers, and along the Lohit R. The main species of grasses found in such grasslands are Khagori *Phragmites karka*, Nal *Arundo donax*, *Neyraudia reynaudiana*, Ekra *Erianthus ravannae*, Ulu kher *Imperata cylindrica* and Thatch *Saccharum spontaneum*, *S. arundinaceum*, etc. Some trees like Bogori *Zizyphus* spp, Koroi *Albizia procera* and Simul or Silk cotton are found scattered in the grasslands. In the higher areas, grasses occur profusely as undergrowth in pine forests.

Broadly speaking, bulk of Arunachal Pradesh forms part of the Himalayan (zoogeographic) Subregion within the Oriental Zoogeographic Region (now often called the Indomalayan Region). This subregion is also transitional to the Palaearctic Region as a number of Palaearctic taxa occur in the area. However, if we look into microlevel details, then the eastern Arunachal Pradesh seems to be part of Indochinese Subregion while the Indian Subregion lies towards extreme south-west. In fact, Arunachal Pradesh is located in the transitional zone between two zoogeographic regions (Oriental and Palaearctic), and three subregions (Himalayan, Indochinese and Indian) where many species have met with recessions on all sides.

Large rivers often function as effective barriers in the distribution of mammals. In Arunachal Pradesh and Assam, the Brahmaputra R., having a minimum width of c. 1.5 km (at places more than 5 km) has played a key role in determining the distribution pattern of many mammalian species. The distribution of primates is a glaring example (Choudhury, 1989f). The river has been an effective barrier to movement and dispersal of the Hoolock gibbon *Hylobates hoolock*, Stumptailed macaque *Macaca arctoides* and Pigtailed macaque *M. nemestrina*. Similarly, no langurs could be found between the Siang and the Dibang rivers.

There is little published information on the mammals of Arunachal Pradesh. Some available works are Borang & Thapliyal (1993), Chakraborty & Sen (1991), Chatterjee (1989), Chatterjee & Chandiramani (1986), Choudhury (1988a, 1991c, 1992a, 1994b, 1995a,d, 1996g,h, 1997f,g,h, 1998a, 1998b, 1999a,b,c,d), Ghosh (1987), Katti *et al.*, (1990), Saha (1984, 1985), Singh (1991), Singh *et al.*,



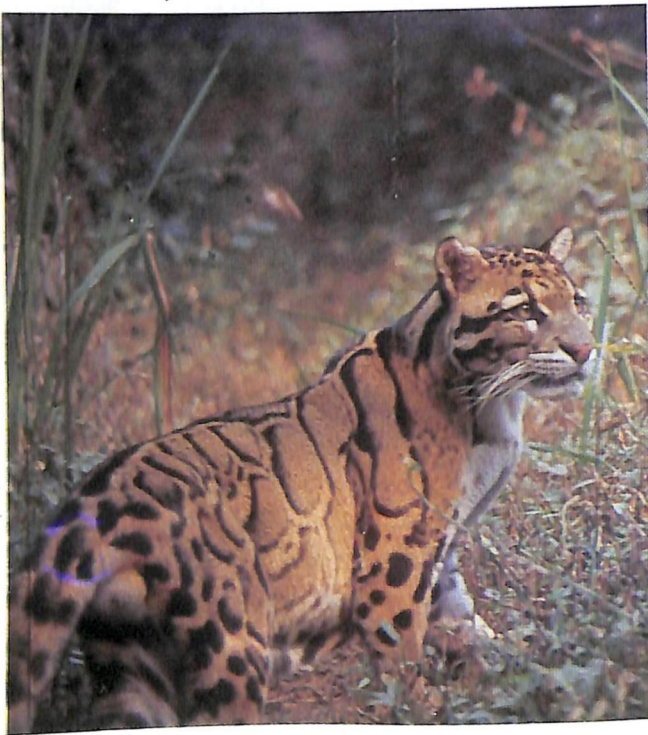
Tropical forests in Pakke sanctuary—a major habitat for elephant, tiger and gaur



Great Himalaya—high elevation species such as the snow leopard and bharal one found in such habitat



Tiger *Panthera tigris*



Clouded leopard
Neofelis nebulosa



Red Panda *Ailurus fulgens*



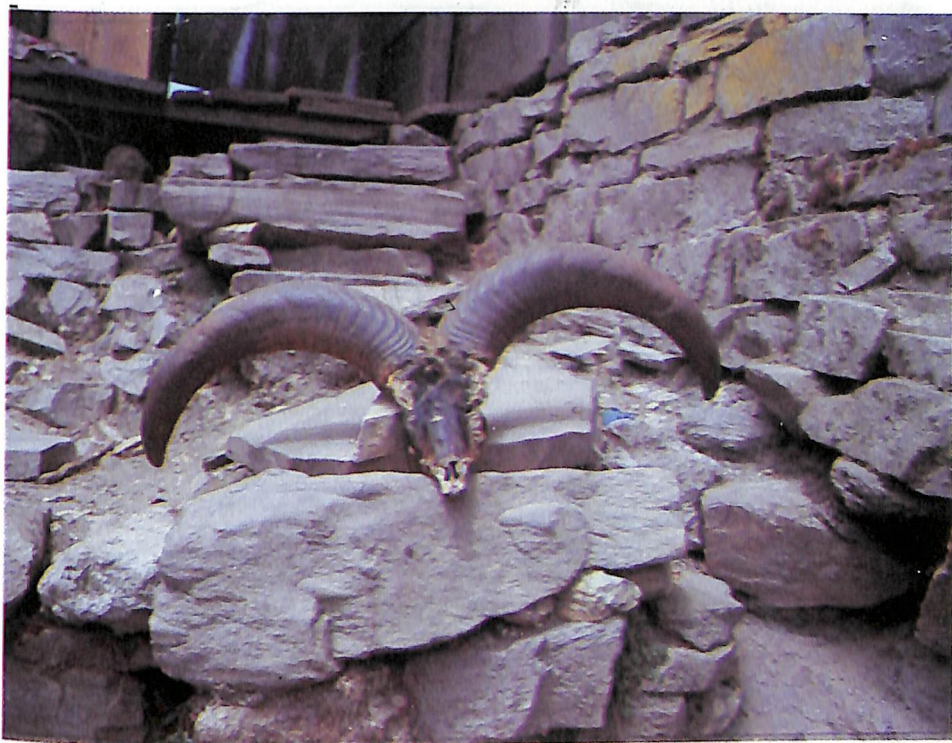
Red Serow *Capricornis sumatraensis rubidus*



Elephants *Elephas maximus*



A Hoolock gibbon male
Hylobates hoolock



Bharal or Blue Sheep horn



Takin *Budorcas taxicolor*



Assamese macaque *Macaca assamensis*



Forrest's Pika *Ochotona forresti*

(1994, 1995, 1996), Thomas (1914a,b), and Vanak & Goyal (1996). General information on different species of mammals found in Arunachal Pradesh (often referred to as Assam or NEFA) are found in some synoptic works, notably those of Agrawal (1975), Blanford (1888, 1891), Blyth (1863), Choudhury (1986b, 1987a, 1989f, 1997a, 1997e, 2000), Corbett & Hill (1992), Ellerman & Morrison-Scott (1951), Gee (1964), McClelland (1839), Pocock (1939, 1941), and Prater (1948).

The systematics and nomenclature, including sequence of orders and families in this work largely follow Corbet & Hill (1992). Ellerman & Morrison-Scott (1951) and Wilson & Reeder (1993) were also taken into account wherever necessary. Departures from Corbet & Hill (1992) are relatively few, mostly at subspecies level with some at genus level. Attempt have been made to justify all such deviations with explanations given in 'Remarks' section that has accompanied most of the species accounts.

Altogether 241 forms including species and subspecies have been included in this edition. The total number of species listed here is 206, which includes two recently extinct forms. However, occurrence of at least 10 species is not beyond doubt. Another 38 species are suspected to occur. Presence of such a diverse mammalian species in a relatively small area is quite significant (c. 65% of the total mammalian species found in India). This is perhaps the highest diversity of mammals for any of the Indian states.

In the text, the *duars* have been referred to on a number of occasions. The alluvial, often undulating and also marshy (at places) strip of land stretching along the southern edge of the Himalaya, composed of grassland (*terai*) and forest (*bhabar*), now interspersed with cultivation and tea plantation, from Jalpaiguri dist of West Bengal to about Sonitpur dist of Assam is called the *Duars*. There is hardly any *terai* grassland inside Arunachal Pradesh but *bhabar* tract is conspicuous. The districts (part) covered inside Arunachal Pradesh are West and East Kameng, and Papum Pare. Southern part of Pakhui W.S. and Papum RF are typical examples of *bhabar* tract.

Conservation problems. Deforestation through commercial felling and *jhum* cultivation, and poaching for items of international trade such as musk, ivory, bear biles, tiger-bone and skins of various species, and of course for the pot are the main conservation issues. Demand for firewood in the high altitude areas in winter for room-heating, and road construction are also responsible for degradation

of habitat. Between 1993 and 1995 (assessment years), Arunachal Pradesh has lost 334 km² of dense forest (*Source: State of Forest Report, 1995*).

The following abbreviations have been used in the text:

- A = Assamese.
 AUC = Reference to unpublished materials of author.
 BS = Bird Sanctuary.
 CITES = Convention on International Trade in Endangered Species.
 Dist. = District.
 E = East, eastern.
 IUCN = World Conservation Union (formerly International Union for Conservation of Nature & Natural Resources); CR: Critically endangered; EN: Endangered; VU: Vulnerable; LR: Lower risk; CD: Conservation dependent; NT: Near threatened; LC: Least concerned; DD: Data deficient.
 WPA = Wild Life (Protection) Act.
 N = North, northern.
 NE = North-east, north-eastern.
 NP = National Park.
 NW = North-west, north-western.
 pc = Personal communication.
 R = River.
 RF = Reserve Forest.
 S = South, southern.
 SE = South-east, south-eastern.
 Sp., sp. = Species (plural: spp.).
 Ssp, ssp. = Subspecies.
 Syn = Synonym.
 SW = South-west, south-western.
 W = West, western.
 WS = Wildlife Sanctuary.