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EDITED BY W. T. BLANFORD.

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## MAMMALIA.

BY W. T. BLANFORD, F.R.S.

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# INTRODUCTION.

The present is the first part of a general work, compiled for the Government, and published under its authority, on the Fauna of British India and its dependencies. A few details respecting this larger work may serve as a preface to the introductory observations on the Mammalia.

The large additions made to our knowledge of Indian Zoology during the period, now about a quarter of a century, that has elapsed since the appearance of Jerdon's 'Birds' and 'Mammals' and Günther's 'Reptiles' have for some time rendered it desirable that a new series of descriptive manuals should be prepared. The Secretary of State for India in Council, upon the recommendation of the Government of India, gave his sanction, in 1883, to a plan for the preparation of the works most urgently required, and entrusted the editorship of the series to the present writer. From variant cause the appearance of the work has been delayed, but it is hoped that the principal difficulties, have now been overcome.

For the present, it is proposed to restrict the publication to the Vertebrata, and to complete the work in seven volumes of about 500 pages each. One of these volumes will contain the Mammäis (the present issue is only a half-volume), three will be required for the Birds, one for Reptiles and Batrachians, and two for Fishes.

The authorship of the volumes on Fishes has been undertaken by Mr. F. Day, C.I.E., Deputy Surgeon-General, author of the 'Fishes of India'; the Reptilia and Batrachia will be cescribed by Mr. G. A. Boulenger, author of the recently published British-Museum Catalogues of Batrachia and Lizards; whilst the Birds will, it is hoped, be taken in hand by Mr. E. W. Oates, author of the 'Birds of British Burnab.' The Mammals remain to be

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described by the Editor. The greater part of the second half-volume on Mammalia is written, and much progress has been made with all other parts of the work, so that there is every prospect of the whole being issued in the course of the next few years.

The limits adopted for the fauna are those of the dependencies of India, with the addition of Ceylon, which, although British, is not under the Indian Government. Within the limits thus defined are comprised all India proper and the Himalayas, the Punjab, Sind, Baluchistan, all the Kashmir territories, with Gilgit, Ladak, &c., Nepal, Sikhim, Bhutan, and other Cis-Himalayan States, Assam, the countries between Assam and Burma, such as the Khási and Naga hills and Manipur, the whole of Burma, with Karennee and, of course, Tenasserim and the Mergui Archipelago, and lastly, the Andaman and Nicobar Islands. Afghanistan, Kashgaria, Tibet, Yunnan, Siam, and the Malay Peninsula source of Tenasserim are excluded. A few States, such as Nepal and Bhutan, at present not accessible to Europeans, are comprised, because it would be difficult to leave them out; scarcely an animal occurs in either not found also in British territories or in protected States, such as Sikhim.

The whole of India and its dependencies, with the exception of the higher Himalayas and Trans-Himalayan tracts, is included in the Oriental Region, one of the six great zoological regions\* into which the terrestrial surface of the globe was divided by Solater, whose views have been adopted by Wallace and others. Several Etbiopian and Palæarctic genera are intermixed with forms characteristic of the Oriental Region in North-western India, and some of these forms range throughout the Peninsula, but not further to the eastward.

The division of the area into zoological subregions is somewhat difficult, the affinities of the different subdivisions being compli-

\* These six zoological regions are the following :---

I. Palearstic: Europe, Africa north of the Sahara, and Asia north of the Himalayas.

II. Ethiopian: Africa south of the Sahara.

III. Oriental: India and South-eastern Asia, with the Malay Archipelago, as far east as Java, Bali, Borneo, and the Philippines.

IV. Australian: Australia, Celebes, New Guinea, New Zealand, and the islands of the Pacific.

V. Nearctic: America north of the Tropic of Cancer.

VI. Neotropical: Central and South America.

For further particulars, see Wallace's 'Geographical Distribution of Animals.'

cated. The following subregions may be accepted as convenient and as approximately correct :---

I. Tibetan. The Upper Indus valley (Gilgit, Ladák, &c.) and the higher Himalaya above 12,000 or 14,000 feet.

11. Himalayan. The southern slopes of the Himalaya, from the base to about the limit of trees.

III. Indian. India from the base of the Himalaya to Cape Comorin, with the exception of the Malabar coast, but with the addition of Northern Ceylon.

1V. Malabar or Ceylonese. The Malabar coast and the neighbouring hills as far north as the Tapti river, together with Southern Ceylon.

V. Burmese. All Burma except South Tenasserim, and with the addition of Assam and the intervening countries.

VI. South Tenasserim. This is the northern extremity of the great Indo-Malayan subregion, comprising the Malay Peninsula and several of the islands.

Some of these may require further subdivision. Thus the fauna of the North-west Provinces and Punjab differs considerably from that of Southern India, and both areas exhibit zoological distinctions from the forest-clad tracts of South-western Bengal. There is also much difference between the animals of Pegu and Arakan, on the one hand, and those of the drier regions of Upper Burma on the other ; and even greater distinctions may be traced between those found in the subtropical and those inhabiting the temperate r-gions of the Himalaya. On the other hand, the subtropical Himalayas were united with the Burmere subregion by Wallace, and the two are, perhaps, zoologically more allied to each other than to any other subregion.

It is well to notice that the Tibetan subregion is Palearctic, whilst the other five subdivisions are included in the Oriental Region.

The preceding remarks apply to the 'Fauna of British India' in general; the following relate to the present volume. The classification of Mammals here adopted was proposed by Professor Flower in the Proceedings of the Zoological Society of London for 1883, pp. 178–186. The arrangement is but slightly modified from that employed by the same author in the last (ninth) edition of the 'Encyclopædia Britannica' (Article "Mammalia"). Although this classification is, so far as I am able to judge, the best hitherto published, there are, as will be mentioned in the proper places, several questions on which wide differences of opinion exist. Thus many excellent naturalists regard as of ordinal rank subdivisions such as, for instance, the *Lemuroidea* and *Proboscidea*, classed by Professor Flower as suborders.

The descriptions of the genera and species in the following pages have been taken from specimens, whenever any were accessible ; in the few cases in which, for want of available specimens, the characters are copied from descriptions by previous writers. the fact is stated. The measurements are taken from various sources, and, whenever possible, dimensions of freshly-killed animals, or, in the case of the smaller forms, of perfect examples preserved in spirit, have been selected. The length of the head and body from the tip of the nose to the insertion of the tail and the length of the tail are naturally of little value when taken from skins ; these two dimensions are given, when possible, in the following pages, the tail measurement being without the hair, if data are available. Other measurements often cited are those of the ear, usually from the crown of the head, sometimes from the external base or from the orifice, and of the pes or hind foot, including the tarsus, from the joint corresponding to the heel in man and the hock in a horse to the end of the longest toe, the claws not being included, unless their inclusion is specified. In particular cases other dimensions are added, for instance the forearm in bats.

Two measurements of the skull are generally given :---the basal length, from the anterior or lower margin of the foramen magnum to the anterior border of the premaxillaries, the incisor teeth not being included ; and the zygomatic breadth, across the widest part of the zygomatic arches. The extreme length of the skull sometimes recorded is either from the posterior surface or from the supraoccipital to the end of the premaxillaries, or, in some skulls, to the end of the nasals.

The notes on distribution and habits are compiled from various writers, especially from the works of Jerdon, Blyth, Hodgson (inclusive of the MS notes on his drawings in the Zoological Society's library), Elliot, Kelaart, Tickell (also including his MS notes), Sterndale, McMaster, Forsyth, Sanderson, and others, supplemented by my own observations during a residence of more than 20 years in India, in the course of which time, whilst employed in the Geological Survey of the country, I visited many parts of India and Burma, and became acquainted with most of the wild animals in their native haunts.



cd, caudal vertebra; cp, carpus; cr, coracoid; cv, cervical vertebra; d, dorsal vertebra; fb, fibula; fm, femur; h, humerus; il, filum; isch, ischium; l, humbar vertebra; m, metatarsus; mc, metacarpus; p, patella; pb, pubis; ph, phalanges; pv, pelvis; r, radius; s, sacral vertebra; sc, scapula; sk, skull; tb, tibia; ts, tarsus; u, ulna; zy, zygomatic arch.

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Upper and under surface of a Dog's crutium. (Flower's 'Introduction to the Osteology of the Mammalia,' fags. 46, 47.) ap, apf, anterior palatine foramen; AS, alisphenoid; as, posterior opening of alisphenoid caral; BO, basiceopital; BS, basichenoid; gf, condylar foramen; eau; external auditory meatus; ExO, exocepital; fm, foramen incerum medium; Pp, foramen lacerum posterius; in; foramen magnum; fp, foramen and exterior opening of alisphenoid caral; gf, glenoid fosa; gp, postglonoid process; in; foramen amagnum; fp, foramen ande; Fr, frontal; fr, foramen rotundum and arterior opening of alisphenoid canal; gf, glenoid fosa; gp, postglonoid process; in; foramen amagnum; fp, foramen ande; Fr, frontal; mal; Ma, malar or jugal; Mx, maxills; Na, nasal; oc, occipital condyle; op, optic foramen; Pa, parietal; Per, mestoid portion of periods; pdf, postglenoid fosa; Pl, palatine; FMx, premaxills; pdf, postcolital process of frontal bone; pp, parcecipital process; pdf, postglenoid fosane; fr, postglenoid casa; ff, postglenoid is process; pdf, postglenoid fosane; fr, postglenoid is pdf, postglenoid; PH, pierrgoid fosa is the hollow between the two ptergoid bones); d; sphenoidai fasure or foramen lacerum anterine; fr, st; hormescoil foramen; Sd, superscoil occipital; Sq, squamosal and its zygomatic process; Tg, tympanie or subitory huna; Ya, server

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The synonymy has been thoroughly revised, the original descriptions having been consulted in every case. A list of the principal works quoted, with their abbreviated titles, is appended. The British-Museum catalogues by Dr. Gray are referred to as seldom as possible, because of their inaccuracy. A considerable proportion of the mistakes made by Indian naturalists, in nomenclature especially, may be traced to these catalogues.

Space does not permit the addition of a sketch of mammalian anatomy. The accompanying woodcuts of a lion's skeleton and of a dog's skull will suffice to show the names and position of the principal bones. For further details with regard to the skeleton the student will do well to consult Flower's 'Introduction to the Osteology of the Mammalia,' from which, by permission of the author and publishers, the woodcuts of a dog's skull are taken. For the anatomy of the soft parts no similar compendium exists ; a sketch will be found in the article "Mammalia" in the ' Encyclopædia Britannica,' hut a general work on mammalian anatomy is still wanted. The teeth have been treated in separate works by Owen, Giebel, and others. Here it is only necessary to say that they are divided into incisors, canines, premolars, and molars; that the three first-named are, as a rule, preceded in the young mammal by milk or deciduous teeth; that the upper canine is the tooth behind the premaxillary suture or in contact with it, and the lower canine the tooth that, when the jaws are closed, comes immediately in front of the upper canine; the teeth in front of the canines are incisors, those behind premolars and molars.

It will be difficult within the limited space available for me to acknowledge the assistance of all who have aided me in preparing the present work. I am indebted particularly to General R. Strachey and Col. Yule, and equally so to Professor Flower and Dr. Günther for aid most liberally given on all occasions, also to Mr. P. L. Sclater, Dr. J. Anderson, Sir J. Fayrer, Prof. A. Newton, Mr. A. Hume, Prof. Mivart, Mr. J. Scully, Sir O. B. St. John, Col. J. Biddulph, Mr. Davison, Captain Bingham, Mr. W. Daly, Rev. S. Fairbank, Mr. Wood Mason, Mr. W. L. Sclater, Mr. H. E. Watson, the late Mr. L. Mandelli, and Mr. J. Murray, for assistance of various kinds. Above all I am under obligations to Mr. G. E. Dobson and Mr. Oldfield Thomas, not merely for the great extent to which this work has been facilitated by their writings, but also for advice and information of many kinds and on numerous occasions. But for Mr. Dobson's researches amongst the Chiroptera and Insectivora, the labour of preparing a work on Indian Mammalia would have been greater by at least one third.

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The majority of the cuts are copied, from drawings by Mr. R. E. Holding and Mr. P. J. Smit, by the Typographic Etching Company's process.



## LIST OF THE PRINCIPAL WORKS QUOTED IN THE SYNONYMY.

XL

A. M. N. H. Annals and Magazine of Natural History. London, 1838-1888.

Anderson, An. Zool. Res. Anatomical and Zoological Researches, comprising an account of the Zoological Results of the two Expeditions to Western Yunnan in 1868 and 1875, &c. By John Anderson, M.D. Edin. London, 1878.

Anderson, Cat. Catalogue of Mammalia in the Indian Museum, Calcutta. By John Anderson, M.D., F.R.S., &c. Calcutta, 1881.

As. Res. Asiatic Researches. Calcutta, 1783-1836.

Blyth, Cat. Catalogue of the Mammalia in the Museum of the Asiatic Society. By Edward Blyth, Curator. Galcutta, 1863.

Blyth, Mam. Birds Burma. Catalogue of Mammals and Birds of Burma. By the late E. Blyth. Hertford, 1875. Extra Number to the Journal of the Asiatic Society of Bengal, vol. xliv.

Calc. Jour. N. H. Calcutta Journal of Natural History. Calcutta, 1841-1848.

Dobson, Cat. Chir. B. M. Catalogue of the Chiropters in the Collection of the British Museum By G. E. Dobson. London, 1878.

Dobson, Mon. As. Chir. Monograph of the Asiatic Chiroptera. By G. E. Dobson, M.A., M.B., &c. London, 1876.

Dobson, Mon. Ins. A Monograph of the Insectivora, systematic and anatomical. By G. E. Dobson. London, Pt. I, 1882, Pt. II, 1883.

Ellict, Mon. Fel. A Monograph of the Felidæ, or family of the Cats. By Daniel Giraud Elliot London, 1883.

Erxl. Syst. Reg. An. Io. Christ. Polyc. Erxleben, Systema Regni Animalis per classes, ordines, &c. Classis I. Mammalia. Lipsiz, 1777.

Fischer, Syn. Mam. Synopsis Mammalium. Auctore Johanne Baptista Fischer, Stuttgardtia, 1829.

Gmelin, Syst. Nat. Caroli A. Linné &c. Systema Natura, editio decima tertia. Lipsia, 1788.

Gray & Hardw. Ill. Ind. Zool. Illustrations of Indian Zoology, chiefly selected from the collection of Major-General Hardwicke, by John Edward Gray. London, 1830.

Hist. Nat. Mam. Histoire Naturelle des Mammifères, avec des figures originales, coloriées, dessinées d'après des animaux vivans par M. Geoffroy Saint-Hilaire et par M. Frédéric Cuvier, Paris, 1819-1842.

Horsfield, Cat. A Catalogue of the Mammalia in the Museum of the Hon. East India Company. By Thomas Horsfield. London, 1851.

Horsfield, Res. Java. Zoological Researches in Java and the neighbouring islands. By Thomas Horsfield. London, 1824.

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- Illiger, Prod. Caroli Illigeri D., Prodromus Systematis Mammalium et Avium. Berolini, 1811.
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- Jerdon, Mam. The Mammals of India. A natural history of the animals known to inhabit Continental India. By T. C. Jerdon, Surgeon-Major, &c. Roorkee, 1867.
- Kelaart, Prod. Prodromus Fanne Zeylanice; being Contributions to the Zoology of Ceylon. By E. F. Kelaart, M.D. Ceylon, 1852.
- Kerr, An. King. The Animal Kingdom or Zoological System of the celebrated Sir Charles Linnaus. Class I. Mammalia. By Robert Kerr. London, 1792.
- L. Syst. Nat. Caroli A. Linné, Systema Naturæ, editio duodecima reformata. Holmiæ, 1766.
- Mad. Jour. L. S. Madras Journal of Literature and Science. Madras, 1833-1864.
- M.-Edw. Rech. Man. Recherches pour servir à l'histoire naturelle des Mammifères par H. Milne-Edwards et Alphonse Milne-Edwards. Paris, 1868-1874.
- Müller & Schleg. Verhandl. Verhandelingen over de natuurlijke Geschiedenis der Nederlandsche overseesche bezittingen. Salomon Müller and Hermann Schlegel. Leiden, 1839-1844.
- Pallas, Glires. Novæ species Quadrupedum e Glirium ordine, anctore Petro Sim. Pallas. Erlangæ, 1784.
- P. A. S. B. Proceedings of the Asiatic Society of Bengal. Calcutta, 1865-1887. (Before 1865, the Proceedings were incorporated in the Journal.)
- P. Z. S. Proceedings of the Zoological Society of London. London, 1830-1887.
- Schreb, Saugeth. Die Säugethiere in Abbildungen nach der Natur mit Beschreibungen von Dr. Johann Christian Daniel Schreber. Erlangen, 1775-1792. Vols. V. and VI., by Dr. Johann Andreas Wagner, 1835 and 1836.
- Temminck, Mon. Mam. Monographies de Mammalogie. Par C. J. Temminck. Paris, 1827-1841.
- Tr. Z. S. Transactions of the Zoological Society of London. London, 1833-1888.
- Wagner, Schreb. Saugeth. Supp. Die Säugethiere in Abbildungen &c. von Dr. J. C. D. von Schreber fortgesetzt von Dr. Johann Andreas Wagner. Erlangen, 1840-1855.
- Yark. Miss., Mam Scientific Results of the Second Yarkand Mission, based upon the Collections and Notes of the late Ferdinand Stoliczka,—Mammala. By W. T. Blanford. Calcutta, 1879.
- Zimm. Geog. Gesch. Geographische Geschichte der Menschen und der allgemein verbreiteten vierfüssigen Thiere, von E. A. W. Zimmermann. Leipzig, 1778.

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# MAMMALIA.

MAMMALS are warm-blooded Vertebrate animals that nourish their young with milk secreted by the females in glands situated in pairs on the under surface of the body. All, with a very few exceptions (chiefly *Cetacea*), are covered with hair. The great majority possess teeth, and the higher forms are heterodont, or furnished with teeth of different kinds, and diphyodont, or bearing two sets—the first, known as milk or decidnous teeth, generally coming into use at birth or soon after, and being subsequently replaced by a second or permanent set. Most mammals possess two pairs of limbs like other normal vertebrates, and the terminal extremities of these limbs, with but few exceptions, are furnished with nails, claws, or hoofs. The thoracic cavity, containing the lungs, is completely separated by the diaphragm from the abdomen.

The class Mammalia is divided into the following subclasses :---

A. Oviparous, both genito-urinary passage and anus opening into a cloaca.

## I. PROTOTHERIA, Ornithodelphia or Monotremata.

- B. Viviparous, genito-urinary orifice external and distinct from anal\*.
  - a. No allantoid placenta †.

## II. METATHERIA, Didelphia or Marsupialia.

b. An allantoid placenta.

## III. EUTHERIA, Monodelphia or Placentalia.

Of the subclasses the *Prototheria* or *Monotremata* are peculiar to the Australian region, whilst the *Metatheria* or *Marsupialia* are only found in the same region and in America (chiefly in South America). The *Eutheria* or *Placentalia* comprise, according to Professor Flower's latest classification, nine orders, all represented in India. These orders may be distinguished (so far, at all events, as Indian genera are concerned) by the characters shown in the

<sup>\*</sup> The two open on a common outlet in some genera of Insectivora.

<sup>&</sup>lt;sup>+</sup> For full details as to the significance of these characters in classification, consult Huxley's 'Introduction to the Classification of Animals,' p. 87, or Balfour's 'Comparative Embryology,' vol. ii. p. 176, or 'Encyclepiedia Britannica,' article "Mammalia," pp. 369, 371, &c.

#### MAMMALIA.

following table : these characters are not always those of the greatest importance, but only those most easily recognized :---

#### Subclass EUTHERIA.

- A. Posterior limbs present.
  - a. Animal not modified for flight.
    - a'. Incisors present in one or both jaws.
      - a". Incisors in front of the upper and lower jaw, either not two in number or not chisel-shaped.
        - a<sup>3</sup>. Feet terminating in distinct toes with claws or nails.
          - a<sup>\*</sup>. Hallux or pollex or both opposable to other digits .
          - b. Neither hallux nor pollex opposable.
            - aa. Upper lip in general not projecting far beyond lower; median pair smaller than other incisors.....
            - bb. Shout very pointed ; upper lip projecting far beyond lower ; median pair of incisors generally larger than the others
        - b<sup>3</sup>. Feet either not terminating in distinct toes or furnished with hoofs or hoof-shaped nails
      - b". Two chisel-shaped incisors in front of each jaw .....
    - b'. No incisors, except in certain Armadillos; Indian forms toothless.....
- b. Animal modified for flight; fingers enormously developed to support a membraneous wing......
   B. No external posterior limbs; body
- modified for swimming.
  - a. Homodont or toothless: breathingorifice generally on top of head; a back fin in most genera; mammæ inguinal.....
  - b. Indian form heterodont: breathingorifice at end of muzzle; no back fin; manmæ pectoral ......

1. PRIMATES.

2. CARNIVORA.

3. INSECTIVORA.

- 6. UNGULATA.
- 5. RODENTIA.
- 9. EDENTATA.
- 4. CHIROPTERA.

7. CETACEA.

8. SIRENIA.

# Order PRIMATES.

This Order comprises Man, Monkeys, and Lemurs, and therefore includes the most highly organized Mammalia. At the same time the Lemurs and some of the Monkeys are of comparatively low grade, and much inferior, at all events in development of brain, to Mammalia belonging to other orders.

The dentition throughout the order is heterodont (comprising incisors, canines, premolars, and molars) and diphyodont. There is a bony ring to the orbit, the clavicles are well developed, and the radius and ulna are distinct. There are usually 5 unguiculate digits to both the manus and pes, but the pollex may be radimentary or wanting. Either the pollex (thumb) or hallux (great toe) or both are opposable.

The members of this division are almost without exception arboreal.

The Primates are divided into two suborders. Many naturalists class the Lemurs as a distinct order, for reasons that will be noticed under Lemuroidea.

The suborders are thus distinguished :---

- A. Orbit completely enclosed by bone behind. Pollex (or thumb) short (wanting in a few instances); second digit of foot with a nail similar to those of other digits. Upper incisors not divided by a space in the middle . ANTHROPOIDEA.
- B. Orbit opening behind into temporal fossa beneath the postorbital arch. Pollex long, second digit with a long claw. Upper incisors (except in Chiromys) divided by a space in the middle ..... LEMUROIDEA.

# Suborder ANTHROPOIDEA.

- A. Premolars  $\frac{2}{5}$ , molars  $\frac{3}{5}$ ; thumb, if present, opposable ; internasal septum narrow. (Catarrhini.)
  - I. No tail; stature erect; great toe or hallux parallel with other toes, not opposable; arm shorter than leg; no interval be-tween upper canines and incisors; canines not longer than incisors ...... Hominidæ.

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#### SIMTIDE.

II. No tail; stature sometimes erect, sometimes not ; hallux opposable ; arm longer than leg; an interval between upper canines and incisors; canines in adults longer than incisors .....

III. A tail almost always present; stature never erect; hallux opposable; arm not longer than leg; an interval between upper canines and incisors; canines in adults longer than incisors ...... Cercopithecidæ.

Simiidæ.

- B. Premolars  $\frac{3}{3}$ , molars  $\frac{2}{3}$  or  $\frac{3}{3}$ ; thumb not opposable; hallux always opposable; internasal septum broad. (Platyrrhini, all American.)
  - IV. M. ;; tail in many cases prehensile .... Cebidze. V. M. 4; tail not prehensile ...... Hapalidæ.

The family Hominida comprises but one genus, and, according to the views usually accepted, but one species, Man. Naturalists have differed as to the physical relations of Man to other animals, but most modern writers have returned to the views of Linneus, and class Man with the Monkeys, but in a distinct family\*. No attempt will be made in the present work to enter into the anthropology of India ; the subject requires a volume to itself.

The Gebide and Hapalide are confined to America. Representatives of the Simiida and Cercopithecida are found within the Indian area.

## Family SIMIIDÆ.

The Simildæ, or anthropoid Apes, comprise the Gorilla, Chim-panzee, Orang-outang, and Gibbons. The first two are peculiar to Africa, the Orang-outang inhabits Sumatra and Borneo, whilst the Gibbons, forming the genus Hylobates, are found throughout South-eastern Asia and some of the neighbouring islands, but not west of the Bay of Bengal. They are the only members of the family occurring within our area.

In Pliocene times, however, it is probable that two large anthropoid Apes inhabited Northern India. One of these, Troglodytes sivalensis, was allied to the Chimpanzee, whilst a canine tooth indicates a form very closely approaching the Orang-outang. Remains of both have been found in the Siwalik beds of the Punjab.

\* On this subject the following works may be consulted :- Darwin, 'The Descent of Man;' Huxley, 'Man's Place in Nature;' Mivart, under the article "Ape," and Flower, under "Mammalia," in the 'Encyclopædia Britannica,' 9th edit.

#### HYLOBATES.



#### Genus HYLOBATES, Illiger (1811).

Size smaller than that of other anthropoid Apes; the largest species, *H. syndactylus*, not much exceeding three feet in height. Body and limbs slender; arms, hands, and feet exceedingly long, the arms being so much longer than the legs that the hands reach the ground when these animals stand upright on their feet—a position that is assumed habitually by this genus, and by this alone, amongst the *Simiidæ*, when walking. Thumb and great toe deeply separated from the next digits. Ischial callosities (naked thickened



Fig. 1.-Skull of Hylobates lar.

skin on each buttock) present, but small. There are generally 13 pairs of ribs, 5 lumbar, 3 sacral, and 3 or 4 caudal (coccygeal) vertebræ; so that there being, as usual, 7 cervical vertebræ, the vertebral formula is C. 7, D. 13, L. 5, S. 3, C. 3–4.

Dentition : i.  $\frac{4}{4}$ , c.  $\frac{1-1}{1-1}$ , pm.  $\frac{2-2}{3-2}$ , m.  $\frac{3-3}{3-3}$ .

## Synopsis of Indian and Burmese Species.

A white or grey band across the eyebrows, remainder of head and upper surface of feet and hands the same colour as the body .... H.

and hands the same colour as the body .... H. hoolock, p. 5. Hands, feet, and a ring of hair surrounding the

face white or whitish ..... H.

H. lar, p. 7.

## 1. Hylobates hoolock. The Hoolock or white-browed Gibbon.

Simia hoolock, Harlon, Trans. Am. Phil. Soc. iv, p. 52, pl. 2 (1834). Hylobates hoolock, Blyth, Cat. p. 4; Sclater, P. Z. S. 1870, pl. v, fig. 2; Blyth, Mam. Birds Eurma, p. 1; Anderson, An. Zool. Res. p. 1; id. Cat. p. 26.

Uluk, Hindi ; Myouk-lwei-gyan and Tuboung, Burmese of Arakan.

Colour. Generally black throughout, with the exception of a white or grey band across the eyebrows. This band is usually, but not always, interrupted in the middle. Many individuals, however, both males and females, vary in colour from brownish black to light yellowish grey, the frontal band being always conspicuously paler. The crown, back, and outside of the limbs are often paler-coloured than the lower parts of the body, the skin of the naked part of the face below the frontal band being almost always dark-coloured. Blyth thought that the males only were black, the females always paler ; but this is certainly not the case ; the females, however, are more frequently pale-coloured than the males.

Dimensions. From crown to rump about 20 inches, fore limb (including hand) 23, hand alone 6, leg and foot 19, foot 6; height from crown to heel about 32 inches. An adult male skull is 445 inches long from the occiput to the alveolar margin of the premaxillaries at the base of the middle upper incisors, 3:35 in basal length from the lower or anterior edge of the foramen magnum to the same, and 2.9 in breadth across the widest part of the zygomatic arches.

Distribution. The hill-ranges south of Assam; Sylhet, Cachar, Manipur, Irawadi valley near Bhamo, Chittagong, and Arakan in hill-forest. It is uncertain how far the species is found to the eastward. According to Anderson it inhabits Martaban. Pemberton's assertion that this species occurs at the base of the Himalayas in the lower ranges of Bhutan is probably a mistake. The type described by Dr. Harlan came from the Garo hills.

Habits. Good accounts of this animal are given by Burrough, in Harlan's original description, by Blyth and by Anderson. Like most other Gibbons, the Hoolock is usually found associating in flocks, often comprising fifty to a hundred individuals, or even more. An old male, however, is occasionally found solitary.

Gibbons are thoroughly arboreal, and Hoolocks are almost, if not entirely, confined to hill-forest. They move chieffy by means of their long arms, by which they swing themselves for prodigious distances from branch to branch and from tree to tree. They descend hill-sides at a surprising pace, their descent being accomplished by grasping bamboos or branches that bend beneath their weight, and allow them to drop until they can seize the ends of other bamboos or branches lower on the slope, and take another mighty swing downwards. They also ascend with great rapidity, swinging themselves from tree to tree.

When walking on the ground, the Hoolock rests on its hind feet alone, with the sole flat on the ground and the great toe widely separated from the other digits. The arms are usually held upwards, sometimes horizontally, their great length giving the animal a very peculiar aspect. Gibbons walk rather quickly, with a waddling gait, and can easily be overtaken by men when on the ground.

The food of these Apes consists of fruit, leaves, young shoots, spiders (of which they are very fond), insects, birds' eggs, and

#### HYLOBATES.





All species of *Hylobates* have a powerful voice, and the common name of the present form is taken from its peculiar double call, which is repeated several times. At a distance, the sound much resembles a human voice; it is a peculiar wailing note, audible from afar, and in the countries inhabited by these animals is one of the most familiar forest sounds. The calls commence at daybreak, and are continued till 9 or 10 A.M., several of the flock joining in the cry, like hounds giving tongue. After 9 or 10 o'clock in the morning the animals feed or rest, and remain silent throughout the middle of the day, but recommence calling towards evening, though to a less extent than in the earlier part of the day.

When captured young the Hoolock is easily tamed, and is, as a general rule, very gentle, docile, and good-tempered, exceedingly intelligent, and very cleanly in its habits. Some instances of savageness on the part of male animals have, however, been noticed. All the Gibbons are very delicate, and rarely live long in captivity.

But a single young is born at a time. Neither the period of gestation nor the age at which these animals become adult appears to have been ascertained.

#### 2. Hylobates lar. The white-handed Gibbon.

Homo lar, L. Mantissa, App. p. 521 (1771).

Hylobates Iar, Illiger, Prod. p. 68 (1811); Blyth, Cat. p. 5; id.
 Mam. Birds Burma, p. 1; Tickell, J. A. S. B. xxxiii, p. 196; Sciater,
 P. Z. S. 1870, pl. v, f. 1; Anderson, An. Zool. Res. p. 5; id. Cat.
 p. 28.

#### Myouk-Iwai-gyau, Burmese; Ungka étam, Malay.

The skull is shorter in proportion to its length than that of H. hoolock. The orbital ridges in H. lar are more prominent, the muzzle shorter, the nasal orifice less elongated, the teeth smaller, and the palate shorter.

Colour. Black to fulvous or yellowish white, the back sometimes lighter than the lower parts, occasionally much variegated. Hands and feet always pale-coloured, usually white or yellowish white above. There is generally around the nude face a white ring of hair, comprising frontal band, whiskers, and beard; but the development of the ring varies, and in some specimens it is almost

\* The dexterity of an allied species, *H. agilis*, in capturing birds on the wing had previously been observed (Martin, 'Man and Monkeys,' p. 430).



obsolete. Naked skin of the face black. According to all accounts, this species is much more variable in colour than *H. hoolock*, and pale-coloured specimens are far commoner, in some localities predominating.



Fig. 2.- Hylobates lar. (From a drawing by Col. Tickell.)

Dimensions. An adult male, according to Tickell, measures from crown to rump 19.6 inches, fore limb 25 (humerus 9.5, radius 9.5, hand 6), hind limb 19.5 (femur 7.5, tibia 7.5, foot 4.5). The height, when standing crect, is about 30 inches; some are said to be larger. Females are smaller than males. An adult skull is 4.15 inches long from the occiput, 3.05 from the foramen magnum, 2.95 broad.

Distribution. The white-handed Gibbon is found in Tenasserim in the forests shirting the hills up to an elevation of 3000 or 3500 feet above the sea, and throughout the Malayan peninsula. Tickell

#### HYLOBATES.

This is that it ranges as far north as the northern limit of Pegu, but not west of the dividing range between Pegu and Arakan; whilst Anderson states that it is found both in Arakan and Lower Pegu. I doubt the occurrence of this species in the latter countries, and I can find no satisfactory evidence of its existence in the Irawady or Sittoung valleys, although it very probably inhabits the hills east of the Sittoung. Further information as to the range of H. *lar* and H. *hoolock* in Burma is desirable.

Habits. The white-handed Gibbon is said by Tickell, who observed both species in their native forests as well as in captivity, not to be nearly so light and active as the Hoolock, and to walk less readily. The voice, too, is quite distinct, according to the same observer, in the two species. The cry of H. lar has been rendered in musical notation by Tickell, who has given, in the paper quoted above, an admirable account of the animal's habits. It is usually found in parties of from 6 to 20, composed of individuals of all ages.

The present species is said to drink by scooping up water in its hand, and not as the Hoolock does. So entirely does it depend on its hands for locomotion amongst trees, that it carries anything in its feet. Tickell, from whom I take these details, says that he has seen a party of *H. lar* escape thus with their plunder from a Karen garden in the forest.

In all other respects the habits of this species, so far as they are known, resemble those of *H. hoolock*. The young, almost always one in number,—twins being as rare as amongst human beings, are born in the early part of the cold season, and each sticks to the body of its mother for about seven months, after which it begins gradually to shift for itself.

According to Helfer (J. A. S. B. vii, p. 858), the Siamang (Hylobates syndactylus) is found in Southern Tenasserim; but several of Helfer's identifications were incorrect, and as no one has since heard of the animal in the Tenasserim provinces, I agree with Blyth in believing that Helfer must have been mistaken. The Siamang is larger than the other species of Gibbon, standing about 3 feet 2 inches in height, and is perfectly black in colour throughout. It is doubtful if the Siamang occurs elsewhere than in Sumatra, though Wallace states that it is found in the Malay Peninsula, where the only species, except H. lar, noted by Cantor (J. A. S. B. xv, p. 173) is H. agilis. In Siam H. leucogenys (figured P. Z. S. 1877, pl. lxx) is said to occur.

At the same time there appears to be a large, not yet identified, Ape in the mountains of Tenasserim, but whether it belongs to the anthropoid Apes, or is a large tailless or nearly tailless *Macacus*, it is impossible to say. The only observers who have seen this animal, so far as I am aware, are Mr. W. Davison and Captain C. F. Bingham. The former writes to me that when collecting birds for Mr. Hume, on Muleyit, a mountain about 7000 feet high, east of Moulmain, he came suddenly on a number of Monkeys feeding on the ground in a very dense part of the forest. He had a good

#### CERCOPITHEOIDÆ.

look at one standing erect about 10 feet away, and considered it too large for a *Hylobates*, as its height was about 4 feet. It was, in front, of a deep ferruginous colour, and as it moved away it was distinctly seen to be tailless. Mr. Davison does not remember the colour of the back, but thinks it was the same as that of the underparts. He had only a half-charge of the smallest shot in his gun, so did not fire, and he never saw any of these animals again.

Captain Bingham informs me that a specimen was brought to him in the flesh (but unfortunately so decomposed that only the skeleton could be preserved) of a tailless female Ape, with long grizzled red hair on the outside of the limbs, and standing about 3 feet 6 inches high. This was near the place, Muleyit, where the animals above mentioned were seen by Mr. Davison. The skeleton was subsequently lost or mislaid. The same observer once saw a party of four or five large tailless monkeys at the foot of Muleyit, but these appeared to be black in colour. None of the animals resembled Gibbons.

Both Mr. Davison and Captain Bingham are excellent observers. The only known animal corresponding with their descriptions is the Ourang-outang, but so well-known a form would have been recognized by others. It is perhaps more probable that the animal seen may have been a tailless, or nearly tailless, *Macacus*.

# Family CERCOPITHECIDÆ.

This family comprises all the Old-World Apes, Monkeys, and Baboons, with the exception of the anthropoid Apes. It is divided into two subfamilies, both represented in India.

| Che | ek-pouches<br>variable | present,   | stomach  | simple,  | tail | Cercopithecina. |
|-----|------------------------|------------|----------|----------|------|-----------------|
| No  | cheek-pou              | iches, sto | mach sac | culated, | tail | Semnopithecing. |

## Subfamily CERCOPITHECINÆ.

In this subfamily are included not only all the common Indian Monkeys except those belonging to the Hanumán cr Langur group, but also the closely allied African forms belonging to the genera *Cercopithecus* and *Cercocebus*. The African Baboons (*Cymocephalus*), distinguished by having the nostrils quite at the end of the muzzle, are also included by many writers.

By Blyth, Jerdon, and others, the short-tailed Indian Monkeys were classed in the genus *Inuus*, the long-tailed Macaques in *Macacus*. But the type of Lacépède's original genus *Macaca*\*

\* Mém. de l'Inst. iii. p. 490 (1801).

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(subsequently modified by F. Cuvier and Desmarest into *Macacus*) and of *Inuus* of Cuvier was the same animal, the Magot or Barbary Ape (Simia inuus, L.).

The length of the tail is certainly, by itself, not a sufficient generic distinction amongst these monkeys, for there is a complete gradation from the tailless *M. innus*, through the stump-tailed *M. arctoides*, to the pig-tailed *M. nemestrinus*, and thence to *M. rhesus*, which leads to the long-tailed Macaques. The most peculiar of the Indian forms is *M. silenus*, which has by some naturalists been made the type of a distinct genus, *Silenus*. Even in this case, however, the only difference of any importance, the presence of a ruff of long hair round the face, is scarcely of generic rank. In the present work, all the Indian, Burmese, and Ceylonese species are comprised under *Macacus*.

A species of *Macacus* and two of *Cynocephalus* (the latter, as already noticed, now peculiar to Africa) have been discovered fossil in the Pliocene Siwalik beds of the Punjab. A tooth of *Cynocephalus* has also been found in the Pleistocene deposits of the Kurnool caves.

## Genus MACACUS, Lacépède (1801).

#### Syn. Inuus, Cuv.; Silenus, Gray.

Body and limbs stout, tail variable. Males larger than females and with larger canines. Isochial callosities well developed. Cheek-pouches large. Muzzle considerably produced; nostrils opening obliquely some distance short of the end of the muzzle. Last molar of lower jaw with five tubercles. Dentition, as throughout the family, i.  $\frac{4}{1}$ , c.  $\frac{1-4}{1-1}$ , pm.  $\frac{2-2}{2-2}$ , m.  $\frac{3-3}{3-3}$ . Vertebral formula C. 7, D. 12 (occasionally 13), L. 7 (or 6), S. 3, C. 10-22.

The Macaques are much more compactly built than the Semnopitheci, and have shorter limbs and a considerably longer muzzle. The species of the present genus resemble each other in their habits; they are found in flocks, often of considerable size, and generally composed of both sexes and of all ages. They are active animals, though less rapid in their movements, whether on trees or on the ground, than the Semnopitheci. Their food is varied, most of the species, if not all, eating insects as well as seeds, fruits, &c., and one kind feeding partly on crustacea. They have occasionally been known to devour lizards, and, it is said, frogs also. All have the habit of cramming food into their cheekpouches for mastication at leisure, a practice that must be familiar to any one who has fed monkeys in confinement.

The voice and gestures of all \* the species are similar and differ entirely from those of both the Gibbons and Semnopitheci. Tickell notices this in his MS. notes, and gives the following details, which are worthy of extraction :---" Anger is generally silent, or, at most,

\* M. silenus may be an exception, as it is said to have a peculiar call. I have had no opportunities of observing this species in the wild state.



expressed by a low hoarse monotone 'heu,' not so gular or guttural as a growl. Ennui and a desire for company by a whining 'hom.' Invitation, deprecation, entreaty, by a smacking of the lips and a



Fig. 3.-Skull of Macacus rhesus: 1 dian. (Copied from Anderson, 'An. Zool. Res.')



Fig. 4.-Skull of Macaous rhesus : diam. (From Anderson.)

display of the incisors into a regular broad grin, accompanied with a subdued grunting chuckle, highly expressive, but not to be rendered on paper. Fear and alarm by a loud harsh shriek, '*kra*' or '*kraouk*,' which serves also as a warning to the others who may be heedless of danger. Unlike the *Freebytes* (*Semnopitheci*) and Gibbons, they have no voice if calling to one another.<sup>27</sup>

The majority of the species are very docile when young. They thrive well, and several of them have bred in confinement. The period of gestation is about seven months, only a single young one, as a rule, being produced at a birth. They become adult at the age of 4 or 5 years, but breed earlier.

#### Synopsis of Indian, Ceylonese, and Burmese Species.

| <ul> <li>A. Tail less than 2 of head and body together.</li> <li>a. Colour black, a grey beard and ruff round face</li> <li>b. Colour brown, no beard or ruff.</li> <li>a'. Tail about half as long as the head and</li> </ul> | M. silenus, p. 16.  |
|--|---|
| body.<br>a". Hair straight, buttocks naked around<br>callosities<br>b". Hair wavy or woolly, buttocks clad   | M. rhesus, p. 13.   |
| up to edge of callosities<br>b'. Tail about is as long as the head and<br>body, and very slender.  | M. assamensis, p. 15.   |
| <ul> <li>b". No distinct crest</li></ul>   | M. leoninus, p. 18.<br>M. nemestrinus, p. 20.   |
| B. Tail more than 3 of head and body together.<br>a. Hair of crown lengthened and distinctly<br>radiating from middle.<br>a'. General colour grevish brown, not  | M. arctoides, p. 17.  |
| rufous   | M. sinicus, p. 23.<br>M. pileatus, p. 24.<br>M. cunomolaus, p. 21   |
|  | a second s |

#### 3. Macacus rhesus. The Bengal Monkey.

Simia rhesus, Audebert, Hist. Nat. Singes, 2<sup>e</sup> fam. p. 5, pl. i (1797).
Simia erythræa, Schreber, teste Shaw, Gen. Zool. i, p. 33 (1800).
Macacus (Pithex) oinops, Hodgs. J. A. S. B. 1840, ix, p. 1212.
Inuus rhesus, Blyth, Cat. p. 8; Jerdon, Mam. p. 11.
Macacus rhesus, Anderson, An. Zool. Res. p. 55; id. Cat. p. 67.

Bandar, H.; Markat, Beng.; Wándar, Puriz, Púnj, or Ponj, Kashmir; Gye, Ho Kol.

Fur of moderate length (rather long in Himalayan specimens) and straight, not wavy or woolly. Hair of crown not radiating from centre. Tail two fifths to one half the length of the head and body, tapering, not tufted at the end. Caudal vertebræ usually 17 or 18. Ears naked. Buttocks naked for some distance around the callosities.

Colour. General colour hair-brown with a greyish tinge, the hinder quarters being generally rufous or yellowish, especially in adults. The hair is ashy towards the base, and more or less annulated and tipped with light brown throughout the upper parts, giving a minutely speckled appearance. Lower parts scarcely paler.



Face and callosities flesh-coloured, being bright red in adults at all times.

Dimensions. Head and body 22 inches, tail 10 without the hairs, 11 with, hand 4½, foot 6. These are the measurements (by Hodgson) of a very large individual, doubtless a male. Females measure much less, body 16 to 18 inches, tail about 6 to 7. Skull of a male 5 inches long from occiput, 3.5 from foramen, breadth across zygomatic arches 3.55; of a female 4.3 and 3 inches long, 3.1 broad.

Distribution. The Rhesus is the common monkey of Northern India from the Himalayas to the Godavari river. It is found in Kashmir up to an elevation of 5000 feet (10,000 according to some authorities), and there is a colony, I believe of this species, on the top of Jako hill, about 8500 feet high, at Simla. Specimens have also been sent from Nepal by Hodgson (as M. oinops) and by Mandelli from Sikhim, but from low elevations. M. rhesus is found close to the west coast near Bombay, but not much further south ; it is common throughout Guzerat and the Central Provinces, in Bengal, Orissa, and parts of the Northern Circars. There is a specimen in the Calcutta Museum from Samaguting, in Assam, and Anderson met with a form not distinguishable from this in Upper Burma and Yunnan. All the specimens obtained, however, were in captivity, but he saw a colony of wild monkeys that appeared to belong to this species on the Irawadi below Yenankhyoung. Closely allied forms (M. lasiotis and M. cyclopis) occur in China.

Habits. Although this monkey is not regarded as sacred by Hindus, it is never molested by them, and in many parts of the country it is as impudent as the Hanumán and even more mischievous. Very intelligent, and, when young, fairly docile, it is one of the commonest animals kept tame, and throughout Northern India it is the monkey carried about by itinerant showmen, and taught to perform tricks of various kinds. It is a most amusing creature, the incarnation of mischief and curiosity, but frequently rather ill-tempered. Older individuals are usually savage.

In the wild state it is found in herds, often of considerable size. It has generally but little fear of man, and may occasionally be found in native villages, though less commonly than the Hanumán. It is very frequently seen on the ground searching for food, and it eats spiders and many kinds of insects, especially Lepidoptera and Orthoptera, besides fruits and seeds. Flocks of this monkey are more frequently seen near cultivation, especially around tanks or amongst trees on the banks of streams, than in forest jungle. These animals are very quarrelsome, perpetually screaming and fighting, or teasing each other—in fact, they behave very much like unruly children.

M. rhesus swims well and takes readily to water.



#### The Himalayan Monkey. 4. Macacus assamensis.

Macacus assamensis, McClelland, Horsfield, P. Z. S. 1839, p. 148; Anderson, An. Zool. Res. p. 64; id. Cat. p. 70. Macacus (Pithex) pelops, Hodgson, J. A. S. B. ix, p. 1213 (1840).

Innus pelops, Jerdon, Mam. p. 11.

- ? Macacus problematicus, Gray, Cat. Monkeys &c. B. M. 1870, p. 128.
- ? Macacus rheso-similis, Sclater, P. Z. S. 1872, p. 495, pl. xxv; ib. 1875, p. 418.

Fur of moderate length, wavy, and, in Himalayan specimens, distinctly woolly in texture. Hair of crown often indistinctly radiating, not lengthened. Tail nearly half as long as the head and body, not tufted. Buttocks well covered with hair, except on the callosities.

The skull differs but little from that of M. rhesus, except in being larger, but appears higher, with a deeper lower jaw.

Colour. Above uniform dark brown, without any grey tinge ; hinder parts the same, not rufescent, as in M. rhesus; lower parts distinctly paler. Fur destitute or nearly destitute of annulation, and, in general, of pale tips, slightly lighter in colour, but not ashy, at the base. Face dusky (perhaps variable).

Dimensions. Adults apparently are considerably larger than M. rhesus. Head and body (probably of an average specimen) 20 inches, tail 91; of another, a female, 17.2 and 7.6. A male, nearly adult, skull from Upper Burma measures 5:54 inches in extreme length from occiput to premaxillaries, and 3.63 broad, according to An adult female skull from Nepal measures 4.7 inches Anderson. in extreme, and 3.2 in basal length, 3.3 broad.

Distribution. The Himalayan range as far west as Masuri, or perhaps further, from near the base of the hills to a considerable elevation; also Assam, the Mishmi hills, and Upper Burma near Bhamo, whence obtained by Anderson. The same species appears also to be found in the Sandarbans east of Calcutta \*, and there is in the British Museum a specimen very probably of the same animal from the Laos country in Upper Siam. In Sikhim this species is generally seen between 3000 and 6000 feet above the sea. McClelland's original type was from Assam, possibly from the hills to the northward. The type of M. problematicus of Gray was from Dhalimkot in Bhutan.

Habits. This species much resembles M. rhesus, but is, whether wild or tame, more sluggish in all its movements. Its voice, too, is different, though the difference is small.

I was at first disposed to consider the Himalayan form, M. pelops, distinct from M. assamensis, but after going over all the evidence

<sup>\*</sup> Anderson, P. Z. S. 1872, p. 529, and An. Zool. Res. p. 64. In his last work, the 'Catalogue of Mammalia in the Indian Museum,' Calcutta, p. 68, And erson has referred the Sandarban specimens to *M. rhesus*, on account of certain oranial characters, and especially the size of the skull. The description, however, agrees with that of M. assamensis in what I believe to be the characteristic peculiarities of that species.

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I am inclined to agree with Anderson, who unites them, and who fortunately was able to examine and describe the type of the lastnamed form, now no longer to be found. That the Sikhim monkey is perfectly distinct from M. *rhesus* 1 am certain, and I have seen several young specimens of the former tame. They appear stouter, and differ in fur, coloration, visage, and habits, and I think the limbs are proportionally shorter.

#### 5. Macacus silenus. The lion-tailed Monkey.

Simia silenus, Schreb. Säugethiere, i, p. 87, pl. xi, partim (nec Linn.). Simia ferox, Shaw, Mus. Levenamum, p. 60, pl. (1792).

Innus silenus, Blyth, Cat. p. 7; Jerdon, Mam. p. 10.

Silenus veter, Gray, Cat. Monkeys Sc. B. M. 1870, p. 32 (nec Simia veter, Linn.).

Macacus silenus, Anderson, An. Zool. Res. p. 93; id. Cat. p. 66.

Shia bandar, H.; Nil bandar, Beng.; Chingala, Nella manthi, Mal.; Singatka, Can.; Karingode, Kurg.; Kondamachu, Tel.; Kurankarangu, Tamul.



Fig. 5.- Macacus silenus.

Fur long. A ruff of longer light-coloured hair on chin, throat, cheeks, and temples, encircling the head, except on the forehead, and concealing the ears, which are naked. Hair radiating from centre of crown. Tail slender, about one half to three quarters the length of the head and body, and tufted at the tip; caudal veztebræ 17.

Colour. Black throughout, except the beard and ruff, which are grey. In some young specimens the abdomen is brown. Face and hands black, the callosities of a fleshy tinge.

Dimensions. Head and body of a male 21 inches, tail  $13\frac{1}{2}$ ; of another 20 and 15: of a female, head and body 18, tail  $12\frac{1}{2}$ ; of



another specimen 18 and 10. These are from Travancore specimens measured by Mr. F. W. Bourdillon, and show much variation in the length of the tail. A female skull measures :--Length to occiput 4.4 inches, basal length 3.1, breadth 2.9.

Distribution. The forests of the Syhadri range or Western Ghats near the Malabar coast from about 14° north to Cape Comorin, and at a considerable elevation above the sea. Most common in Cochin and Travancore.

Habits. The lion-tailed Monkey, according to Jerdon, to whom we are indebted for the only authentic account of this animal i a wild state, inhabits the most dense and unfrequented forests of the hills near the Malabar coast in herds of from twelve to twenty or more. It is shy and wary. In captivity it is sulky and savage, and not easily taught. The call of the male is said (J. A. S. B. xxviii, p. 283) to resemble the voice of a man.

As I have shown elsewhere (P.Z. S. 1887, p. 620), this monkey is not Simia silenus of Linnæus, nor is it S. veter of the same author. As, however, the specific name silenus has been used generally for this species for more than a century, naturalists are unwilling to change it. The name Wanderoo, usually applied to M. silenus by European naturalists, is also a mistake, being the Ceylon name of the Semnopitheci, erroneously given to the present species by Buffon. The "lion-tailed Monkey" is a name of Pennant's.

## 6. Macacus arctoides. The brown stump-tailed Monkey.

Macaeus arctoides, Is. Geoffr. Mag. Zool. 1883, Cl. i, pl. 11; Murie, P. Z. S. 1872, p. 770; Anderson, An. Zool. Res. p. 45, pls. i, ii; id. Cat. p. 74.

Papio melanotus, Ogilby, P.Z. S. 1839, p. 31.

Macacus brunneus, Anderson, P. Z. S. 1871, p. 628; id. 1872, p. 203, pl. xii (juv.).

Inuus speciosus, Blyth, Mam. Birds Burma, p. 6.

Hair on head and shoulders very long, as much as 4½ inches in adults. Tail very short, almost rudimentary, sparsely clad with hair or naked in old animals; buttocks naked for some distance around callosities. Caudal vertebre 11 (probably fewer in some individuals).

Colour. Dark brown; in some specimens blackish brown above, paler below. In the young the hairs are the same tint throughout, in older individuals the terminal portion of each hair is very closely and minutely annulated with several alternating rings of golden yellow and dark brown. Face and buttocks bright red.

Dimensions. Probably about 2 feet in length, the tail only one to two inches. No trustworthy measurements of adults are recorded. An adult male skull measures 5.3 inches in extreme length, 3.7 in basal length, and 3.5 in zygomatic breadth.

Distribution. Not very well ascertained. Apparently this monkey is found in some of the hill-ranges south of Assam, and

there is a specimen in the Calcutta Museum said to have been brought from Tipperah. To the eastward this form is found in the Kakhyen hills of Upper Burma and also in Cochin China.

Habits. Nothing is definitely known of this monkey in the wild state. It is said to be a hill species.

Blyth refers the present form to *M. speciosus* of F. Cuvier, a name generally applied to a Japanese species, and Anderson is disposed to concur. *M. speciosus* is said by Temminck ('Fauna Japonica') to have been founded on a drawing by Diard or Duvaucel of a monkey living at Barrackpur near Calcutta. The figure resembles a pig-tailed Monkey (*M. nemestrinus*) with most of its tail cut off as much as it does either *M. arctoides* or the Japanese species. I agree with Anderson that the name *M. speciosus* should be dropped.

A stump-tailed monkey of rufous-brown coloration, said to be from the Malay Peninsula, has been named M. rufescens by Anderson (P. Z. S. 1872, pp. 204, 495, pl. xxiv); and two other forms, M. maurus and M. ocreatus, inhabit some of the Malay islands. A very large form, M. tibetanus, has been described from Moupin, in Eastern Tibet, by A. M.-Edwards. In his latest work Anderson has united this form to M. arctoides.

I am informed by Mr. W. Davison that he had for some time alive a monkey of a kind apparently allied to *M. arctoides*, which had been captured by a shikari near Bankasún in the extreme south of Tenasserim. Mr. Davison has also seen a second specimen, a female, his own being a male. Unfortunately the first specimen was subsequently lost. These animals were of a pale cream-colour throughout, slightly tinged with rusty on the shoulders and back; face and hands flesh-coloured. The tail was quite rudimentary, less than an inch long, and turned on one side in both specimens, so that at the first glance both appeared to be tailless. Both were very small, although shown to be adults by the teeth, each being not above 15 inches high when it stood erect. They had a sharp piercing voice, and exhaled a peculiar fetid odour. The one kept by Mr. Davison was excessively insectivorous, and preferred insects to fruit or bread. These monkeys apparently belonged to an undescribed species.

It is quite possible, too, that the large tailless ape seen by Mr. Davison and Captain Bingham in the Tenasserim mountains, and described in the notes on Hylobates lar (ante, p. 9), may be an ally of M. arctoides, though apparently much larger than that species.

# 7. Macacus leoninus. The Burmese pig-tailed Monkey.

Inuus leoninus, Blyth, Cat. p. 7 (1863); id. Mam. Birds Burma, p. 4.
Macacus andamanensis, Bartlett, P. Z. S. 1869, p. 467.
Macacus leoninus, Sclater, P. Z. S. 1870, p. 663, pl. xxxv; Anderson, An. Zool. Res. p. 52; id. Cat. p. 71.

Myouk-mai, Burm. ; Myouk-la-haing, Arakan.



A somewhat short-limbed, stout form. The hairs on the shoulders and fore part of back very long, 4 to 5 inches in males, but rather short on the lower back and rump. Head broad, rather flat; hair radiating in the centre of the crown and surrounded in front and



Fig. 6.-Macacus leoninus. (P.Z.S. 1870, pl. xxxv.)

on both sides by a horseshoe-shaped crest, the anterior or supraorbital portion of which consists of very stiff hairs. Tail about one third the length of the head and body, slender, well clad with hair. Caudal vertebræ 17 to 18.

The skull is distinguished from that of *M. nemestrinus* by having the muzzle much shorter.

Colour. Males are dark brown above, the horseshoe-shaped crest, the lower back, and the upper surface of the tail black; sides of head and buttocks grey; lower parts, including lower surface of tail, light greyish brown. The tail is somewhat tufted, and has sometimes a bright ferruginous tuft at the end. Females are greyer and rather paler, and have no black on the head or back, though the tail is blackish above. The fur is finely annulated, except on the head, loins, tail, and buttocks, with yellow and blackish brown above, and with dusky and whitish below. On the long hair of the shoulders there are as many as ten to twelve rings, five or six of each colour, on each hair. Base of hair greyish brown. Face dusky flesh-colour.

Dimensions. Length of male: head and body 23 inches; tail without hair at end 8, with hair 10. Females considerably less. Skull of adult male 5.3 inches long from occiput, 4 from foramen, and 4 broad across the zygomatic arches; of a female 4.45 and 3.1 inches long and 2.95 broad. 20



Distribution. Originally described from specimens collected by Sir A. P. Phayre in Arakan. Anderson has since referred to this species specimens from Upper Burma, and a young animal from Perak. Malacca. The latter identification is very questionable, as the Malay peninsula is inhabited by the true pig-tailed Monkey, *M. nemestrinus*. A few individuals have been introduced into the Andaman Islands, but the species is not indigenous.

*Habits.* Scarcely anything is known, except that the young and females are docile in captivity, old males fierce. In this, as probably in most other respects, this species is very similar to the next.

#### 8. Macacus nemestrinus. The pig-tailed Monkey.

Simia nemestrina, *Linn. Syst. Nat.* i, p. 35 (1766). Inuus nemestrinus, *Blyth, Cat.* p. 7.

Macacus nemestrinus, Anderson, An. Zool. Res. p. 77; id. Cat. p. 72.

#### Myouk-padi, Burmese; Ta-o-ti, Burmese of Tavoy; Bruh, Malay.

Body stout; limbs long and powerful; muzzle in adults much produced. Fur slightly lengthened over shoulders, and short generally. Hair radiating in centre of crown, but not surrounded by the distinct horseshoe-crest of *M. leoninus* (there is, however, an approximation to it in some specimens). Tail very slender, rather more than one third the length of the head and body. Caudal vertebræ 18.

The muzzle, in old male skulls especially, is greatly produced, and much resembles that of the Baboons (*Cynocephalus*) in form. The orbits are nearly as high as broad.

Colour. Crown of the head dark brown or black, except at the sides; a broad black stripe extends throughout the middle of the back in many specimens, becoming broader on the rump; but in young animals and in some adults the back is brown throughout. Fur of upper surface generally yellowish brown, but varying from pale orange-brown to blackish brown in different specimens; lower parts greyer brown or albescent; hands and feet sometimes darker than the limbe. Tail black above, light yellowish brown below. The fur on the upper parts and the outside of the limbs is closely annulated with yellow and brown; basal portion of hair grey.

Dimensions. Tickell gives as the measurements of an old male from Yé:—Head and body  $18\frac{1}{4}$  inches, tail  $7\frac{3}{4}$ , hand  $3\frac{3}{4}$ , foot 6, height at shoulder 16; the size, however, varies much, and many individuals attain a much greater development, rivalling, as Anderson remarks, a good-sized mastiff both in height and strength. Of two skulls of adult males in the British Museum one measures 6.5 inches long from the occiput and 5 from the foramen, by 4.2 broad across the zygomatic arches : whilst another male adult skull is only 5.78 and 4.4 long and 3.8 broad ; and a third from Mergui 5, 3.6, and 3.5. Females must be very nearly as large as males ; the skull of a very old specimen from Tenasserim is 6.2 and 4.2 inches long and 4.25 broad. It is just possible that two distinguishable forms, a larger and a smaller, are indicated by these measurements.

Distribution. The pig-tailed Monkey is found throughout a great part of Tenasserim, although apparently not common, except in the extreme south of the province—a circumstance that probably explains why the occurrence of M. nemestrinus in Southern Burma has been generally overlooked. There is, however, a skeleton in the British Museum (the old female of which the skull-measurements are given above) sent by Major Bingham from Meplay valley, Thoungyeen river, and a skull presented by Dr. Oldham from Mergui. Tickell, too, in his MS. notes, records and describes specimens from Yé; and Mr. W. Davison tells me that the species is common about Malewún and Bankasún. The pig-tailed Monkey is not found north of Tenasserim, but extends south into the Malay Peninsula, Sumatra, and Borneo.

Habits. The pig-tailed Monkey in Tenasserim, according to Tickell, frequents thick jungle about the base of the hills. The voice and manners are similar to those of *M. rhesus*. When the animal is excited the tail is held in the form of an S. In Sumatra *M. nemestrinus* is said by Sir S. Raffles to be peculiarly docile, and to be trained to climb the cocoa-nut trees and gather nuts for its master. This can only apply to females and young animals; old males are very savage, and they are formidable animals from their size and strength.

The period of gestation in this species has been ascertained to be 7 months and 20 days.

#### 9. Macacus cynomolgus. Macaque, or crab-eating Monkey.

Simia cynomolgus, Schreb. Säugth. i, p. 91, pl. xiii (fig. Buffon), neo Linn.

Macacus irus, F. Cuv. Mém. Mus. iv, p. 120 (1818).

Macacus carbonarius, F. Cuv. Hist. Nat. Mam. pl. xxxii (1825); Blyth, Cat. p. 9.

Macacus aureus, Is. Geoffr. Voy. Bél., Zool. p. 58.

Macacus cynomolgus, Elyth, Cat. p. 9; id. Mam. Birds Burma, p. 7; Anderson, An. Zool. Res. p. 73; id. Cat. p. 61.

Myouk-ta-nga, Burmese; Ta-o-tan, Tavoy and Arakan; Kamui-awut, Talain; Da-ouk, Sha-ok-li, Karen; Krá, Malay.

Fur of moderate length and nearly straight. Hair of the crown not lengthened, and usually directed backwards, but occasionally radiating somewhat irregularly from one or more centres, or forming a rudimentary crest. Tail nearly as long as the head and body. Caudal vertebre 22.

Skull long and low, with the muzzle produced, and the orbits much broader than high.

Colour. The general tint of the upper surface varies from dusky or grevish brown to rufous or golden brown in different individuals; lower parts light grevish brown to nearly white. The hair of the



upper parts varies from light brown to almost black at the base, the terminal portion being annulated with yellow and brown or black; on the shoulders there are usually three rings of each colour, fewer behind. In young specimens there is no annulation. Face, ears, and callosities varying from flesh-colour to dusky. Eyelids white or blaish white in many cases.

Varieties. There are two prominent varieties of this well-known monkey—a dark-coloured form with dusky face (M. carbonarius), and a golden-rufous race (M. aureus). Both of these, as well as the normal yellowish-brown type, are found in Burma. The colour of the face varies greatly, some dark-furred individuals having a pale face, and vice versa.

Dimensions. An old male measures :---head and body 22 inches, tail 19, hand 3.9, foot 5.5. In another the head and body are about 21 inches, tail 20. Females are smaller. A large adult male skull measures 5.3 inches in extreme length, 4.1 from anterior margin of foramen magnum, and 3.6 in breadth across the zygomatic arches; a female skull 4.35, 3, and 2.9 in the three dimensions.

Distribution. The crab-eating Monkey is found throughout a great part of Burma, including Arakan, especially along tidal creeks near the coast, and in the deltas of rivers. It is not known to occur on hills, nor has it been recorded with certainty from Upper Burma. It is found in the Nicobar Islands (?introduced), but not in the Andamans. Beyond our area it has a wide range throughout Siam and the Malayan peninsula and islands.

Habits. Tickell, in his MS. notes, gives an excellent description of this animal, from which most of the following details are derived. He says that these monkeys are usually met with in small parties of five to fifteen, consisting of one old male, four or five females, and their young. They are especially common on the banks of tidal creeks, where they live amongst the mangroves, and feed upon seeds, Crustacea, and insects. The claws and body of a crab were found in the cheek-pouch of a female shot in Arakan by Captain (afterwards Sir A.) Phayre. The tidal creeks are, in Tenasserim and Arakan, and in the delta of the Irawadi, the only highroads of the country ; the monkeys, consequently, become familiarized with the sight of men, and will allow of a near approach and even pick up rice or fruit thrown to them. This I can confirm from my own observation ; I have even known them, in Pegu, follow a boat for some distance.

They swim and dive well. Tickell mentions an instance of a wounded male, that had been shot and placed in a boat, jumping overboard and diving repeatedly, once to a distance of 50 yards, in order to avoid recapture.

There is no particular season for breeding. The young clings tenaciously to the mother for the first month, after which it ventures out little by little, and, to quote Tickell, "it is exceedingly amusing to watch the rough tenderness with which the latter [the mother] checks at first the over-venturesome sallies of the little

#### MACACUS.

animal, which is often pulled back by the tail, chastised with a cuff on the head, and then gravely huddled up to the breast, where the shrieks and chattering of the delinquent, which is just as fractious as a child under such circumstances, are soon appeased."

Like the rest of the genus, this monkey is easily tamed if taken young; it is intelligent and full of antics. The females continue gentle, but the males become morose and savage as they grow old.

This species is the Macaque of Buffon, but is not the Simia cynomologs of Linneus, which is an African baboon. F. Cuvier called attention to these facts in 1818, but his remarks appear to have been generally overlooked. As in the case of *M. silenus*, the name has been used too long to be altered now with a probability of a less familiar term being generally accepted.

#### 10. Macacus sinicus. The Bonnet Monkey.

Simia sinica, Linn. Mantissa, p. 521 (1771). Cercocebus radiatus, Geoffr. Ann. du Mus. xix, p. 98 (1812). Macacus radiatus, Blyth, Cat. p. 8; Jerdon, Mam. p. 12. Macacus sinicus, Anderson, An. Zool. Res. p. 90; id. Cat. p. 59.

Bandar, H.; Makadu, Wónar, Kerda, Mahr.; Manga, Kodaga, Can.; Koti, Tel.; Koranga, Vella manthi, Mal.; Kurangu, Tamul; Mucha, Kúrg; Kodan, Toda.

Fur of moderate length, generally straight and smooth. Hair of the crown lengthened and radiating from the vertex, but not usually extending over the forehead, where the shorter hair is parted, as a rule, down the middle. Tail nearly or quite as long as the head and body. Caudal vertebræ 22.

The skull is long, flattened over the brows, with the orbits much broader than high and nearly vertical. Compared with the skull of M. rhesus, that of M. sinicus is vertically much lower; thus the skull of which the measurements are given below is 3.05 inches in height, the mandible included, whilst a skull of M. rhesus one tenth of an inch shorter is, with its mandible, 3.5 inches high.

Colour. Hair-brown to greyish brown above, pale brown or whitish below. Fur annulated towards the ends in some specimens. Face and ears flesh-coloured.

Dimensions. Head and body of an adult male 19½ inches, tail 22; weight 16 lbs. The tail, however, is generally rather longer in proportion. An adult male skull is 48 inches long from occiput, 3.5 from foramen, and 3.5 broad across the zygomatic arches.

Distribution. Southern India, extending on the West Coast to the neighbourhood of Bombay, but on the East not further than the Godavari; it is doubtful indeed if this species is found so far north as that river.

This monkey is replaced in Ceylon by the next, which appears only to differ in colour. In general *M. sinicus* has shorter and smoother fur, and the radiating hair on the crown is shorter, not



extending to the forehead, but a specimen from Travancore in the British Museum has rough hair like *M. pileatus* devoid of annulation, and an unusually long topknot.

Habits. Very similar to those of other members of the genus. This is the common monkey, tame or wild, of Southern India, found both in wild jungles and in populous towns, where it pillages the shops of the dealers in fruit and grain. Jerdon says "it is the most inquisitive and mischievous of its tribe, and its powers of mimicry are surpassed by none." I do not think that it can excel *M. rhesus* in inquisitiveness and mischief, but I believe that it is, on the whole, more docile.

#### 11. Macacus pileatus. Toque Monkey.

Simia pileata, Shaw, Gen. Zool. i, pt. 1, p. 53 (1800). Macacus sinicus, Kelcart, Prod. p. 8, nec Linn.

Macacus pileatus, Blyth, Cat. p. 9; Anderson, An. Zool. Res. p. 91; id. Cat. p. 61.

#### Raláwa, Cingalese.

Hair rather long, wavy and rough, that of the crown forming a topknot radiating from the vertex, and considerably lengthened, extending in front nearly to the eyebrows. Tail nearly as long as head and body. Caudal vertebræ 24. The skull is similar to that of *M. sinicus*.

Colour. Rufous or yellowish brown above, white or whitish below. The upper surface of the tail, hands, and feet sometimes more dusky. Fur hair-brown at base, tipped and sometimes annulated with rufous or yellow. Face and callosities flesh-coloured. Ears, palms, and soles dusky.

<sup>1</sup> Dimensions. Head and body of an adult male 21 inches, tail 18 (*Kelaart*). Schlegel gives 20 and 23 inches, probably from skins. A male adult skull is 4.9 inches in extreme length, 3.5 in zygomatic breadth.

According to Kelaart the present form is of less robust make and smaller size than the Southern Indian form, but it is very doubtful if there is any constant difference. For my own part, I doubt if the two are entitled to specific distinction.

Distribution. Ceylon, throughout the island.

Habits. Precisely the same as those of *M. sinicus*. Kelaart says that the latter is more intelligent and less mischievous; but, as already remarked, the two are probably mere varieties of the same species. *M. pileatus* is the monkey commonly kept tame in Ceylon, and carried about by jugglers and itimerant mountebanks for the amusement of children, exactly as *M. rhesus* is in Northern and *M. sinicus* in Southern India. It may be mentioned here that those who have only seen monkeys in Europe, and especially in cages, have in general a very imperfect idea of the intelligence, love of fun, and power of mimicry that these animals possess.

#### SEMMNOPITHECUS.



## Subfamily SEMNOPITHECINÆ.

The members of this subfamily are easily distinguished by their slender form, and by the absence of check-pouches. They are more purely herbivorous than the Macaque monkeys, and a considerable portion of their food consists of leaves and young shoots. Their digestive organs are much modified, and the stomach bears some resemblance to that of ruminant ungulates, being large in size and divided into three portions. In consequence probably of the more restricted nature of their food, these monkeys are far more delicate than the species of *Macacus*, and are less easily kept alive in confinement. They are consequently not nearly so well represented in European museums, and they have been less studied by European naturalists. Very little is known of their breedinghabits or of their life-history in general.

The only Indian genus is *Semnopithecus*, which is found almost throughout the Oriental region. The corresponding African genus *Colobus* is distinguished by having the thumb of the hand rudimentary.

For descriptions of the anatomy, see Otto, Acad. Cas. Leop. Nova Acta, xii, 1825, p. 505 (a partial translation of this appeared in the 'Zoological Journal,' vol. iii, p. 249); Owen, Trans. Zool. Soc. i, p. 65; and Murie, P. Z. S. 1865, p. 740.

#### Genus SEMNOPITHECUS \*, F. Cuvier, 1821.

#### Syn. Presbytis, Eschscholtz.

Body and limbs slender. Tail long, exceeding in length the head and body together in all Indian, Ceylonese, and Burmese species. Thumb short, but well developed. A row of long stiff black hairs across the eyebrows. Vertebræ: C. 7, D. 12, L. 7, S. 3, C. 25-30.

Dentition : i.  $\frac{4}{4}$ , c.  $\frac{1-1}{1-1}$ , pm.  $\frac{2-2}{2-2}$ , m.  $\frac{3-3}{3-3}$ .

The skull is rounder than in the Macaques, the breadth of the brain-case being relatively greater and the development of the muzzle less. The facial angle is consequently higher, although the intelligence is certainly not superior, and is apparently lower.

\* Both the genera Semnopithecus and Presbytis were proposed in the same year, 1821, the former, in the French form Semnopithèque, for S. entellus and S. melatophos (Hist. Nat. des Mammifères), the latter for S. mitratus (Kotzebue's 'Entdeckungs Reise,' iii, p. 196). The latter species is somewhat aberrant. The name Semnopithecus has been more widely used than Presbytis, and is accordingly adopted here.

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Fig. 7 .--- Skull of Semnopitheous entellus.

# Synopsis of Indian, Ceylonese, and Burmese Species.

| A. Hair of crown radiating from a point on the |                         |
|--|-------------------------|
| forehead.                                      |                         |
| a. Head scarcely paler or not paler than back. |                         |
| a' Hands and feet black. No crest              | S. entellus, p. 27.     |
| k' Hands and feet same colour as limbs.        |                         |
| A avest  | S miamore n 31          |
| I Thend distingthe value than healt            | S. Preunces, p. cr.     |
| o. nead distinctly pater than back.            |                         |
| a. Hands and feet black, lower parts yer-      | St 1                    |
| lowish   | S. nypoteucus, p. 55.   |
| b'. Hands and feet scarcely darker than        |                         |
| limbs, lower parts greyish                     | S. schistaceus, p. 30.  |
| B. Hair of crown radiating from two frontal    |                         |
| points, one on each side.                      |                         |
| a. Nearly black above, inside of thighs white  | S. femoralis, p. 42.    |
| C. Hair of crown directed backwards through-   | A CONTRACTOR OF THE     |
| ont, not radiating,                            |                         |
| " No crest : hair of crown not longer than on  |                         |
| tomples and name                               |                         |
| et Body black or dusky brown shove and         |                         |
| halow  |                         |
| II II al black throughout like hody            | S hanhai n 20           |
| a. Head black throughout, like body            | 5. our oci, p. 50.      |
| o". riead pale brown, cheeks same colour       | St 1.1                  |
| as crown                                       | S. Jonni, p. 55.        |
| c". Cheeks paler than crown, sacral            |                         |
| region grey                                    | S. cephalopterus, p. 34 |
| d''. Cheeks paler than crown, sacral           |                         |
| region black                                   | S. ursinus, p. 36.      |
| b'. Body yellowish white throughout            | S. senex, p. 35.        |
|  | CONTRACT OF AND         |

#### SEMNOPITHECUS.



| <ul> <li>b. No crest. Hairs of crown longer than tho</li></ul>   | se                               |
|--|----------------------------------|
| of temples and occiput, and forming a ca   | p.                               |
| Body dark grey above, yellow below <li>c. A crest of longer hairs.</li>  | S. pileatus, p. 37.              |
| a'. A pointed crest on occiput. Adu<br>ashy to blackish brown, young yellowi<br>brown<br>b'. Crest compressed and longitudin | sh<br>S. obscurus, p. 41.<br>nal |
| on crown of head; body dark gr   | ey                               |
| above, whitish below   | <i>S. phayrei</i> , p. 39.       |
| neck white; young rufescent whi  | ite                              |
| throughout   | S. chrysogaster, p. 38           |

The remains of a single species of Semnopithecus have been found in the Siwalik beds, and those of another in the Pleistocene Cavedeposits of Kurnool.

## 12. Seminopithecus entellus. The Langur or Hanuman Monkey.

Sinfia entellus, Dufresne, Bull. Soc. Phil. 1797, p. 49. Semnopithecus entellus, Blyth, J. A. S. B. xii, p. 169, xiii, p. 470; Hutton, P. Z. S. 1867, p. 944; Anderson, An. Zool. Res. p. 15; id. Cat. p. 35.

? S. anchises, Elliot, Blyth, J. A. S. B. xiii, p. 470, xvi, p. 733. Presbytis entellus, Blyth, J. A. S. B. xvi, pp. 372, 1271, pl. liv, fig. 1; id. Cat. p. 11; Jerdon, Mam. p. 4.

Langúr and Hanúmán, Hindi; Wánar, Maráthi; Musya\*, Canarese; Kode, Kúrg; Sárá, Korku (Sátpura Hills) and Ho (Kol).

No crest. Hair on the crown of the head radiating in all directions from a point about one-third the distance back from the eyebrows to the occiput. Ears large, not covered by the hair of the cheeks. Hair of the body of the same colour throughout, and generally somewhat wavy.

Colour. Head, body, limbs, and tail pale earthy or greyish brown, or pale isabelline throughout ; hands and feet always black above. The back and the outside of the limbs are sometimes darker, and the lower parts paler; the head too is said to be occasionally lighter in colour, but the difference is not great. Face, ears, and soles of hands and feet black.

Dimensions. Average size of an adult male :-- head and body about 2 feet long; tail, without hair at end, 38 inches. Females are rather less. Large males measure considerably more; head and body 30 inches, or even more according to Jerdon. Weight of a male 22 lbs., of a female 18 lbs. An adult male skull measures : extreme length from alveolar border of premaxillaries to back of head 5.05 inches, to foramen (basal length) 3.6, width across the zygomatic arches 4.

\* This and the next name may belong to S. priamus.

#### CERCOPITHEOID.E.

Distribution. The northern portion of the Indian Peninsula, including South-western Bengal, Orissa, the Central Provinces, Bombay, Guzerat, Southern Rajputana and part of the N.W. Provinces, extending to Kattywar and probably to Cutch (J. A. S. B. xli, pt. 2, p. 220), but not to Sind or the Punjab. Hutton states that this species is not indigenous east of the Hugli or north of the Ganges, and of a line drawn westward from Allahabad to near Bundi on the Chambal, and that colonies found near certain Hindu shrines, as Muttra in the North-west Provinces and Kishnagurh in Bengal, have been introduced. The latter is probable, but it is certain that Langurs occur in the Oudh Terai, and generally along the base of the Himalaya (Jerdon mentions their occurrence near Pankabari, in Sikhim), and they are more likely to be this species than S. schistaceus. It is remarkable that the range of so well-known an animal should be so imperfectly ascertained. The southern limit of S. entellus also needs verification. This is certainly the species inhabiting the Bombay Deccan; but Blyth mentions (J. A. S. B. xiii, p. 471) an immature black-handed specimen from Coimbatore, well within the range of the palehanded P. priamus, and Lydekker has referred to S. entellus the remains from the Kurnool caves. The range of this Langur on the Eastern coast extends, I believe, south of the Godavery.

Habits. Few, if any, wild animals afford better opportunities for observation than the Hanumán Monkey of Northern and Central India. Generally protected, and looked upon as sacred by many of the Hindu inhabitants, it has no fear of man and may be found in groves near villages, or even in the village trees, as commonly as in the depths of the forest. In many parts of India it is a common occurrence to see these monkeys on the roofs of houses. They frequently pilfer food from the grain-dealers' shops, whilst the damage they inflict on gardens and fields renders them so great a nuisance that the inhabitants of the country, although they will not as a rule kill the monkeys themselves, sometimes beg Europeans to shoot the intruders.

S. entellus feeds on fruit and grain, seed, seed-pods (for instance gram), leaves and young shoots, the last two forming a large portion of its food. Certain vegetable poisons are said to be taken by this monkey with impunity, doses of 5 and even 10 grains of strychnine having been given to one without effect, although the same drug killed *Macacus rhesus* quickly.

The Hanúmán is usually found in smaller or larger communities, composed of individuals of both sexes and of all ages, the youngest clinging to their mothers and being carried by them, especially when alarmed. An old male is occasionally found solitary, as with so many other mammals. The story that males and females live in separate troups, though apparently believed by Blyth and quoted by Jerdon, I agree with Hutton in regarding as fictitious, though, as the latter observer justly remarks, females with very young offspring may keep together and temporarily apart from the remainder of the troup to which they belong. I also doubt the details of the story, quoted, like the last, from the 'Bengal Sporting Magazine' for 1836, of combats between the males for the possession of the females. But the occurrence of fights amongst these animals rests on good evidence. Mr. T. H. Hughes (Proc. A. S. B. 1884, p. 147) described a combat, witnessed by himself in April, between two communities of Hanúmáns, apparently for the possession of a mango-grove. Only the champion males of each flock engaged at first, two from the larger flock, one from the smaller; but after one of the former had been killed, his throat being torn open by his adversary's teeth, two females came to the assistance of the survivor, and the single champion of the opposite side was mortally wounded, whereupon several of the weaker flock appeared to be taken prisoners by the others. The whole account is very interesting.

Away from villages, the high trees on the banks of streams or of tanks, and, in parts of Central India, rocky hills are the favourite haunts of these monkeys. They are never found at a great distance from water. Whether on trees, on rocks, or on the ground they are exceedingly active. "They leap with surprising agility and precision from branch to branch, and when pressed take most astonishing jumps. I have seen them cross from tree to tree, a space of 20 to 30 feet wide, with perhaps 40 or 50 feet in descent. They can run on all fours with considerable rapidity, taking long strides or rather bounds" (Jerdon). They leap from rock to rock as readily as from tree to tree. But great as their apparent speed is, McMaster found that on horseback he easily ran down a large male in a very short distance ; indeed, it is their power of bounding and the remarkable appearance they present whilst leaping, with their long tails turned over their backs, that convey the idea of speed, rather than the actual rapidity of their motions.

Their voice is loud and is often heard, especially in the morning and evening. The two commonest sounds emitted by them are a loud, joyous, rather musical call, a kind of whoop, generally uttered when they are bounding from tree to tree, and a barsh guttural note, denoting alarm or anger. The latter is the cry familiar to the tiger-hunter, amongst whose best friends is the Hanúmán. Safely esconced in a lofty tree, or jumping from one tree to another as the tiger moves, the monkey by gesture and cry points out the position of his deadly enemy in the bushes or grass beneath, and swears at him heartily. It is marvellous to observe how these monkeys, even in the wildest forests, where human beings are rarely seen, appear to recognize the men as their friends. at least as allies against the tiger. It is a common but erroneous notion of sportsmen that this guttural cry is a sure indication of a tiger or leopard having been seen, whereas the monkeys quite as often utter it merely as an expression of surprise; I have heard it caused by the sight of deer running away, and I believe that it is frequently due to the monkeys catching sight of men.

In confinement the Hanúmán is, as Jerdon says, quite sedate

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and indolent. Older animals are not unfrequently morose and savage. None of this group are so docile or so amusing as the *Macaci*, and even in the wild state the Hanúmán appears quieter, less possessed by an insatiable curiosity, less sportive, and also less quarrelsome. His behaviour is more in accordance with the extreme gravity of his appearance.

The female Hanúmán is-said not unfrequently to have twins, although one young at a time is the rule, as throughout the order. The period of gestation does not appear to have been ascertained, nor the age at which these monkeys become adult.

#### 13. Semnopithecus schistaceus. The Himalayan Langur.

Semnopithecus schistaceus, Hodgson, J. A. S. B. ix, p. 1212 (1841); Anderson, An. Zool. Res. p. 16; id. Cat. p. 37.

Presbytis schistaceus, Blyth, Cat. p. 11; Jerdon, Mam. p. 6.

#### Lángúr, Hindi.

No crest. Fur long. The hair of the crown radiates from a point some distance behind the eyebrows, as in *S. entellus*. The ears are smaller than in that species, and concealed by the long hair of the cheeks. Tail slightly but distinctly tufted at the end.

Colour. Back, tail, and outside of limbs earthy or greyish brown, frequently with a slight purplish tinge. Shoulders and a band down the fore limbs often darker. Crown and sides of head and the lower parts whitish. Feet and hands externally the same colour as the limbs, or very little darker. Face and ears black; a little black hair on parts of the face.

Dimensions. A moderate-sized individual measures 30 inches from muzzle to rump, tail 36. An adult male skull is 5.7 inches in extreme, 4.15 in basal length, 4.35 broad. This species is the largest of the Indian and Burmese forms, and probably of the whole genus.

Distribution. Throughout the greater portion of the Himalayas from Kashmir to Bhutan, the most western authenticated locality being the Wurdwan valley above Kishtwar (J. A. S. B. xlvi, pt. 2, p. 284). In Sikhim S. schistaceus is confined to the interior at elevations of from 7000 to 12,000 feet. It is found at similar elevations in the Western Himalayas, but it is also said to occur at the base of the Himalayas. As stated under the last species, it remains to be seen whether the Langurs of the Terai and lower Himalayan slopes are not S. entellus. I can find no record, by a competent naturalist, of S. schistaceus below 5000 or 6000 feet.

This monkey is included in a list of mammals found in the Naga hills (J. A. S. B. xliv, pt. 1, p. 332), but probably some other species has been mistaken for it. The statement that large monkeys are found in Kafiristan (J. A. S. B. xxviii, p. 332) requires confirmation.

Habits. Except in inhabiting a much cooler climate, this Langur differs but little from the Hanúmán monkey in habits. Hutton



has observed S. schistaceus near Simla, sporting amongst fir trees that were loaded with snow-wreaths.

According to a MS. note of Hodgson's these monkeys pair in February and have young in April or May, the period of gestation being apparently only two months. Further information is desirable.

S. schistaceus is distinguished from S. entellus (1) by being somewhat larger, though there is probably no great difference between large individuals of both species; (2) by the head being much paler in colour than the back, and by the feet being but little, if at all, darker than the limbs; (3) by the smaller ears, and by their being concealed by the long hair of the cheeks; (4) by the form of the skull. Dr. Anderson has shown that the skull of S. schistaceus is longer in proportion to the breadth, and the face is relatively longer than in S. entellus. If a straight edge be applied to the face, it will be found that in S. entellus the nasal bones do not project beyond a line drawn from the middle of the supraorbital ridge to the anterior border of the premaxillaries, whilst in S. schistaceus the nasals do project beyond that line. These characters appear quite constant in adults. Anderson in his last work, the ' Catalogue of Mammalia in the Indian Museum,' classes S. schistaceus as merely a variety of S. entellus, but I cannot agree.

## 14. Semnopithecus priamus. The Madras Langur.

Semnopithecus priam, Elliot, Blyth, J. A. S. B. xiii, p. 470 (1844).
Presbytis priamus, Blyth, J. A. S. B. xvi, p. 732, pl. liv (p. 1271);
xx, p. 153; id. Cat. p. 12; Kelaart, Prod. p. 3; Jerdon, Man. p. 7.
Semnopithecus albipes, Is. Geoff. Cat. Méth. Mam. (1851) p. 14;
Gray, Cat. Monkeys &c. B. M. p. 15; Anderson, An. Zool. Res.
p. 18.

Semnopithecus priamus, Anderson, An. Zool. Res. p. 19; id. Cat. p. 38.

Konda-músal, Muskaunthi, Tam.; Gandangi, Tel.; Musia, Can.; Kunde Wandary, Cing.

The radiation of the hairs on the front part of the crown is less conspicuous than in *S. entellus* and *S. schwataceus*; the hairs on the hinder part of the crown are elongated along the middle line so as to form a distinct longitudinal compressed crest<sup>\*</sup>. Black supraorbital fringe very long. Ears large, not covered by the hair of the cheeks. Hair of the body long, with scattered longer piles of the same colour.

\* The existence of this crest was mentioned by Blyth, Jerdon, and Kelaart, and figured by Sir Emerson Tennant, but doubted by Anderson. It is, however, distinctly shown in three dried skins from Ceylon in the British Museum, and as these skins have never been mounted the character is clearly natural. I have also seen it in skins from Southern India, and am assured by Mr. W. Davison and others that it is constantly present.

#### CERCOFITHECIDE.



Colour. Back, outside of limbs, and tail greyish or earthy brown, sometimes with a slight pinkish tinge; head paler brown above; feet the same colour as the limbs, or a little darker, not black.



Fig. 8.-Head of Semnopitheous priamus.

Lower parts pale brown. Face, palms of hands, and soles of feet black.

Dimensions. Head and body 21 inches, tail 28 (a Ceylon specimen); a large Wynaad example, however, measured 23 and 37 inches. Madras specimens are probably larger than Ceylonese. An adult male Ceylon skull is 4.23 inches in extreme, 3 in basal length, and 3.35 in zygomatic breadth. Another has for corresponding dimensions 4.6, 3.28, and 3.63 inches.

Distribution. Coromandel coast and the Carnatic as far north as Nellore, also Mysore, the Wynaad, and Northern Ceylon, extending south as far as Trincomali and the skirts of the Kandyan hills. The limits of range of this species and of *S. entellus* are not exactly known. *S. prizmus*, I learn from Mr. W. Davison, ascends the eastern slopes of the Nilgiri hills to an elevation of 6000 feet.

Habits. Precisely similar to those of its near ally S. entellus.

This species may be distinguished from *S. entellus* by having a crest, and by the feet and hands not being black above. The form of the skull is quite different, as Anderson has shown: the facial portion being much shorter and more concave. The distance from the alveolar border of the premaxillaries to the supraorbital ridge in an adult skull of *S. priamus* is 1.7, in *S. entellus* 2.25, and in *S. schistaceus* 2.7 inches. Several other differences in the cranium and mandible are noticed by Anderson.

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## 15. Semnopithecus hypoleucus. The Malabar Langur.

 Somnopithecus hypoleucos, Blyth, J. A. S. B. x, p. 839 (1841), xiii, p. 470; Anderson, An. Zool. Res. p. 20; id. Cat. p. 40.
 Somnopithecus dussumieri, Is. Geoffr. Comptes Rendus, xv, p. 719

(1842); id. Deser. An. Nouv., Fum. des Singes, p. 54, pl. xxx. Presbytis hypoleucos, Blyth, J. A. S. B. xvi, p. 733.

Presbytis johnii, Blyth, Cat. p. 12; Jerdon, Mam. p. 7, nec Fischer.

#### Vella Manthi, Malayalim.

No crest. The hair on the crown of the head radiates as in S. entellus.

Colour. Above dusky brown, varying somewhat in tint, sometimes not much darker than S. entellus, but always darker in the middle of the back than on the sides. Head falvous to dirty yellow, the crown being rather darker. Supraorbital hairs black as usual, and some black hairs before the ears. Limbs dark brown, hands and feet black; tail dark brown, the terminal portion paler. Lower parts yellow or yellowish white. Face black. Young animals are said by Jerdon to be sooty brown throughout.

Dimensions. Smaller than those of S. entellus. Head and body of a full-grown male 21 inches, tail 32. An adult male skull measures 4.26 inches in extreme length by 3.30 in breadth across the zygomatic arches (Anderson).

Distribution. The Malabar coast, especially in evergreen forests, from about 14° or 15° North lat. to Cape Comorin, ascending the hills to an elevation of about 1200 or 1300 feet. It is not confined to the forests, but frequents gardens and the belt of cultivated wooded land that extends all along the sea-coast of Malabar.

Habits. Similar to those of S. entellus, except that, although it is found in trees near houses, it is not familiar and rather shuns observation. It has the usual loud call of the genus, and the same kind of alarm-note when it sees tigers or other beasts of prey. It is frequently taken young and tamed.

## 16. Semnopithecus johni. The Nilgiri Langúr.

Simia johnii, Fischer, Syn. Mam. p. 25 (1829).

Semnopithecus cucultatus, Is. Geoffr. Zool. Bel. Voy. p. 38, pl. 1 (1834).

Semnopithecus jubatus, Wagner, Schreb. Säugeth. Supp. i, p. 305.

Presbytis johnii, Blyth, J. A. S. B. xvi, p. 734.

Presbytis eucullatus, Blyth, J.A. S. B. xxviii, p. 283; id. Cat. p. 14. Presbytis jubatus, Jerdon, Mam. p. 8.

Semnopithecus johnii, Anderson, An. Zool. Res. p. 21; id. Cat. p. 45.

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Turuni, Kodan, Pershk, Toda; Korangu, Baduga and Kurumba; Karing Korangu, Mal.

Hair of the crown and sides of the head very long; no radiating centre to the crown. Fur of the body long, fine, and glossy.

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Colour. Glossy black to blackish brown except the head, which is some tint of brownish yellow, and the rump and base of the tail, which are generally ashy grey in adults and occasionally in the young. In the female there is always a yellowish-white patch inside each thigh (Davison). The very young animal is black throughout.

Dimensions. Head and body 21 to 23 inches, tail 32 to 35; weight 23 lbs. In a very large male the head and body measured 29 inches, tail 37. Females are rather smaller than males. The above measurements are from Travancore and Animalé specimens by Mr. F. Bourdillon and Mr. T. Hornaday. The skull of a female barely adult measures 2.45 inches in basal, 3.7 in extreme length, and 2.65 in zygomatic breadth, but this is doubtless a small specimen.

Distribution. Found throughout the higher portions of the Southern Syhádri or Western Gháts from the Wynaad to Cape Comorin, not descending below 2500 or 3000 feet elevation. Common on the Nilgiri, Palnai, and Animals hills. Not known on the Shevrai (Shevaroy) or other ranges east of the Syhádri.

Habits. This animal is shy and wary, the result of human persecution. It inhabits the sholas or dense but abruptly-limited woods of the Nilgiris and other high ranges of Southern India, and is also found in the forests on the slopes of the hills, usually in small troops of from five to ten individuals. It is very noisy, having a loud guttural alarm cry, used also to express anger, and a long Jerdon relates that when the sholas of the Nilgiri loud call. range were beaten for game, these monkeys made their way rapidly and with loud cries to the lowest portion and thence to a neighbouring wood at a lower level.

In consequence of the beauty of their skins, and the circumstance that certain castes eat their flesh, these monkeys are more frequently shot than most of the Indian species, hence their shyness.

#### 17. Semnopithecus cephalopterus. The purple-faced Monkey.

Cercopithecus vetulus, Erxl. Syst. Reg. An., Mam. p. 25 (1777), partim.

Cercopithecus kephalopterus, Zimm. Geog. Gesch. ii, p. 185 (1780).

Cercopithecus leucoprymnus, Otto, Acad. Cas. Leop. Nova Acta, xii, p. 505, pl. xlvi bis (1825).

Presbytis cephalopterus, Blyth, J. A. S. B. xvi, pp. 734, 1271; Kelaart, Prod. p. 1; Blyth, Cat. p. 13.
Presbytis thersites, Elliot, Blyth, J. A. S. B. xvi, p. 1271, pl. liv, f. 3; Blanford, P. Z. S. 1887, p. 626.

Semnopithecus cephalopterus, Schlegel, Mon. Singes Mus. P.-B. p. 51; Anderson, An. Zool. Res. p. 22; id. Cat. p. 43.

Semnopithecus kelaarti, Schlegel, l. c. p. 52.

Kallu Wanderu (and Elli Wanderu ?), Cingalese.

Hair of crown directed backward, not radiating. Whiskers



very long, concealing the lower part of the ears. Black supraorbital hairs but moderately developed. Hair of body of moderate length.

Colour. Body and limbs dusky or smoky brown to black, more or less tinged with ashy grey above and below; sacral region, comprising the lower back, posterior upper portion of thighs, and base of tail, ashy grey to greyish white, greater portion of tail darker grey, tip again paler. Hair uniformly coloured, sometimes paler towards the base, and frequently with pale tips on the back. Crown of head and nape hair-brown, much paler than the back; sides of head and chin ashy grey or white, the long whitish whiskers contrasting strongly with the brown crown, and serving at all ages to distinguish this species from *S. johni*.

Dimensions. Head and body 20 inches, tail  $24\frac{1}{2}$ . A female skull scarcely adult is 2.5 inches in basal, 3.5 in extreme length, and 2.6 broad.

Varieties. The prevalent coloration, in adults at all events, is nearly black on the body, with the sacral region silvery grey. But in the form named S. kelaarti by Schlegel, which appears to be far from uncommon, the whole animal is hair-brown except the lower back, upper portion of thighs, whiskers, and chin, which are light brown or whitish. It is not known whether, specimens thus coloured are ever fully adult, but many immature specimens have the normal coloration. Examples intermediate in coloration between the black and brown forms are also met with. It is probable that the S. thersites of Blyth and Kelaart may have been founded on such brown examples of the present species.

It is clear that this monkey varies greatly in coloration, and although at present I am disposed, chiefly for want of accurate information, to keep the two next species, *S. senex* and *S. ursinus*, distinct, it is quite possible that Anderson (Cat. Mam. I. M. pp. 44, 45) may be right in classing all as varieties of *S. cephalopterus*.

The skulls of this species, of S. johni, and S. ursinus are said by Anderson to be very similar to each other.

Distribution. Found throughout most parts of Ceylon at low or moderate elevations, not above 1300 feet according to Kelaart. According to Layard it is the common monkey of the maritime provinces and is also found in the Kandyan districts.

Habits. Very similar to those of other species, found usually in troops of ten to fifteen individuals. In confinement it is said to be very gentle.

#### 18. Semnopithecus senex. The white Monkey.

? Simia veter, L. Syst. Nat. ed. xii, i, p. 36 (1766).

Cercopithecus senex, Erxl. Syst. Reg. An., Mam. p. 24 (1777).

Presbytis albinus, Kelaart, Prod. p. 7; id. J. A. S. B. xx, p. 182.

Semnopithecus senex, Schleg. Mus. Pays-Bas, i. p. 53.

Semnopithecus cephalopterus, var., Anderson, An. Zool. Res. p. 23, note; id. Cat. p. 45.



Fur dense and wavy, whiskers full. Long white hairs over the toes.

Colour. Yellowish white, faintly marked with brownish on the bead, dusky over the shoulders and on the middle of the back. Face and ears black. Soles and palms flesh-coloured.

Dimensions. Apparently the same as those of S. ursinus.

Distribution. Mountains of Southern Ceylon at considerable elevations.

Habits. This species or variety is said to be rare, but to be found occasionally on the Ceylonese mountains in parties of three or four, always apart from the other monkeys. Its occurrence was mentioned more than two centuries ago by Captain Robert Knox.

Although it is very possible that S. senex is simply a white variety of S. ursinus or S. cephalopterus, it appears equally probable that the present species may be an allied but distinct form now verging on extinction. The only specimen I have seen, a young animal in the Leyden Museum, looked somewhat different from both. I have not been able to compare the skull.

## 19. Semnopithecus ursinus. The bear Monkey.

Presbytis ursinus, Biyth, J. A. S. B. xx, pp. 155, 182; id. Cat. p. 13; Kelaart, Prod. p. 2.

Semnopithecus ursinus, Anderson, An. Zool. Res. p. 24.

#### Maha Wanderu, Cing.

Hair very long, 4 to 5 inches in length on the sides. Supraorbital black hairs scarcely longer than those of erown, but coarser.

The skull is said by Anderson to be shorter, with a greater zygomatic breadth than that of *S. cephalopterus*; the face shorter, and the nasals somewhat longer, besides other distinctions; but it would be necessary to examine more specimens before concluding that these distinctions are constant.

Colour. Dusky brown almost throughout; hair on sides of face and chin paler, greyish brown to white. Hands and feet dark or black; head above in some specimens more rufous than back, and occiput grey. No grey tinge in the sacral region.

Dimensions. Larger than S. cephalopterus. Head and body 21 inches, tail 26, hand 5, foot  $6\frac{1}{2}$ .

Distribution. Mountains of Southern Ceylon, especially near Newera Ellia.

Habits. According to Kelaart, these monkeys are usually seen in large numbers jumping on the trees, and when disturbed make a short howling noise. Sir E. Tennant says that "at early morning, ere the day begins to dawn, their loud and peculiar howl, which consists of quick repetition of the sound how-how, may be frequently heard in the mountain jungles." One of these animals has been known to attack a coolie carrying a rice-bag. The flesh of this monkey, as of S. johni, is eaten by certain castes of natives.



20. Semnopithecus pileatus. The capped Monkey.

Semnopithecus pileatus, Blyth, J. A. S. B. xii, p. 174 (1843), xiii, p. 467; Anderson, An. Zool. Res. p. 13; id. Cat. p. 40.
Presbytis pileatus, Blyth, J. A. S. B. xvi, p. 735; id. Cat. p. 12; id. Mam. Birds Eurma, p. 11.



Fig. 9.---Head of Semnopithecus pileatus.

The crown of the head thickly covered with hair of equal length, rather longer than that of the occiput and temples and harsher than that of the back, all directed backwards and forming a distinct cap. There is no frontal radiation. Hair of cheeks long, partially covering the ears. Black supraorbital hairs well developed.

Colour. Upper parts dusky grey to brownish ashy grey, darker on the upper part of the back and sometimes on the crown of the head; the hands and feet dark brown or black above, the fingers or some of them occasionally yellow; tail dark brown or black towards the tip. Sometimes the upper parts have a ferruginous tint. Lower parts and sides of head and neck golden brown or orange to pale yellow or yellowish white. The yellow or whitish colour of the cheeks extends to a line drawn just above the ears, and the sides of the neck behind the ears are also pale, so that the dark cap is well defined. Face black.

Blyth states that females and young have the lower parts white or but faintly tinged with ferruginous and the upper parts pure grey, whilst old males are of a deep rust-colour below and on the cheeks. In most specimens, however, the lower parts are of some shade of yellow, more or less pure.

Dimensions. Less than S. entellus. An immature female measured :--head and body 18 inches, tail without the tuft of hair at

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the end 28.5, with the tuft 31 (*Blyth*). According to Anderson the skull is of about the same size as that of *S. priamus*, but the supraorbital ridge is less developed.

Distribution. Throughout Assam and the hills to the south of the valley, Sylhet, Tipperah, Chittagong, Northern Arakan, and part of Upper Burma. Neither this nor any other species appears yet to have been recorded from the Himalayas north of Assam. Anderson gives Tenasserim also as a locality, but this is due to his uniting S. chrysogaster with this species.

*Habits.* Nothing is known of the habits of this species in particular, though it doubtless resembles its allies in most respects. In captivity it is said to be gentle when young; but older animals, especially males, are sometimes savage.

## 21. Semnopithecus chrysogaster. The red-bellied Monkey.

Semnopithecus potenziani, Bonaparte, Comptes Rendus, xliii, p. 412, note (1856), description insufficient.

Semnopithecus chrysogaster, Licht., Peters, P. Z. S. 1866, p. 429, footnote; id. M.B. Akad. Berlin, 1879, p. 830, footnote, pl. iv b (no description, but a good figure).

Presbytes chrysogaster, Blyth, Mam. Birds Burma, p. 10.

In the only specimen known there is a slight compressed crest extending from the vertex to the nape, but there is some doubt as to whether this crest is natural; probably it is. No distinct whisker-tufts. Chin thinly covered with short white hairs and a few on the upper lip. Fur of body rather long.

Colour. Upper parts, limbs, and tail jet-black, the basal half of the dorsal hairs ferruginous, the extreme base white; the frontal band, the cheeks to behind the ears, sides and front of neck, with chin and upper breast, white; rest of lower parts deep and bright ferruginous, which tinges the inner side of the limbs.

Young wholly rufous white or pale isabelline.

Dimensions of stuffed adult specimen (a female): head and body 20 inches long, tail 23.

Two specimens, an adult female and a young one, are preserved in the Berlin Museum. According to Blyth, these were obtained by Helfer in Tenasserim. Peters says nothing of Helfer, nor could I learn anything in Berlin of the original collector of the specimens, although on the stand, besides the locality, is the name Prof. Strempel. The circumstance that so beautifully coloured and conspicuous a species has not been noticed again tends to raise some doubt as to the species really occurring in Tenasserim. At the same time, *Sciurus piccus*, said by Peters (P. Z. S. 1866, p. 429, note) to have been received with *Semnopithecus chrysogaster*, appears to be identical with a variety of *Sciurus erythrœus* that occurs in Cachar.



#### 22. Semnopithecus barbei. Barbe's Leaf-Monkey.

Presbytis barbei, Blyth, J. A. S. B. xvi, p. 734; id. Cat. p. 14; id. Mam. Birds Burma, p. 11.

Semnopithecus harbei, Anderson, An. Zool. Res. p. 12; id. Cat. p. 48.

No crest. Hair on the crown not radiating. Whiskers long. Beard short. Hair on the vertex slightly lengthened, but not so distinctly as in S. obscurus.

*Colour.* Blackish brown to black above and below, with a silvery greyish wash on the upper parts and outside of limbs. Eyebrows and whisters black. Naked face bluish black.

Dimensions. Head and body 19.5 inches, tail 29.

Distribution. The types were from the interior of the Tipperah hills. This species has also been obtained by Anderson on the Irawadi just above Mandalay in Upper Burma, and further north in the Kakhyen Hills, and by Mr. Ossian Limborg on Muleyit mountain west of Moulmain in Tenasserim. Mr. Limborg's specimens have been identified by Dr. Anderson, but require comparison with the monkey from the same neighbourhood identified as S. phaurei by Colonel Tickell.

*Habits.* Similar to those of other members of the genus. Anderson observed this monkey in parties of from thirty to fifty. They were not shy.

It is possible that this species, of which I have not been able to examine specimens, is only a variety of *S. obscurus*. This was Blyth's view at one time (J. A. S. B. xxiv, p. 711), and Anderson (l. c.) has shown that there is much similarity in the skulls of these two forms. Both have rounded orbits and a comparatively elongate interorbital region. Blyth, in his Catalogue and in his list of Burmese Mammals, however, classed *S. barbei* as closely allied to *S. femoralis*, if not identical. This scarcely appears to me borne out by the description.

23. Semnopithecus phayrei. Phayre's Leaf-Monkey.

Semnopithecus obscurus, Blyth, J. A. S. B. xiii, p. 466, nec Reid. Presbytis phayrei, Blyth, J. A. S. B. xvi, p. 733 (1847); id. Cat. p. 15.

Semnopithecus argentatus, Blyth, Horsfield, Cat. p. 7.

Presbytis cristatus, Raffles, apud Blyth, Mam. Birds Burma, p. 9, nec Raffles.

Semnopithecus phayrei, Anderson, An. Zool. Res. p. 34; id. Cat. p. 49.

Myouk-myek-kweng-hpyu (monkey with white orbits), Burm. ; Myoukhgnyo, Arakan and Tavoy; Geng, Talain; Dáthwa and Shawa me, Karen.

A somewhat peaked, longitudinal median crest on the vertex. Hair of crown elongated, directed backwards, not radiating. Whiskers long, partly covering the ears. In the skull the supraorbital ridges are but little developed, and the orbits are less



rounded than in S. barbei and S. obscurus. The occipital region is nearly vertical.

Colour. Above dark ashy brown, darkest on the head and extremities, including the tip of the tail, the basal portion of which is albescent. Back from shoulders to loin silvery, or glistening. Whiskers same colour as crown. Underparts whitish or white, this colour not extending on to the limbs. Eyelids and a broad area above the eyes whitish or white; an area including the mouth



Fig. 10.-Semnopithecus phayrei. (From a drawing by Col. Tickell.)

and lips, and extending from the nostrils to the chin, flesh-colour ; hairs around mouth white ; remainder of face leaden black.

Young the same colour as adults ; the very young are, however, straw-coloured according to Tickell.

Dimensions. An adult female, according to Tickell, measured: head and body 23 inches, tail 30, hand  $4\frac{3}{4}$ , foot 6. Anderson gives much smaller measurements: head and body 18.2 inches, tail 21.2.



Distribution. Arakan, the Bassein district of Pegu west of the Bassein river, where I shot this monkey myself, and Northern Tenasserim, near Monlmain, where the same species apparently was obtained by Tickell (J. A. S. B. xxviii, p. 428, and MS. notes) and by Mr. W. Davison.

In Tickell's unpublished notes there is an excellent coloured drawing and description with several details of anatomy &c., taken from an adult female that he obtained east of Moulmain. The drawing, from which the accompanying cut is taken, represents an animal greyer in colour than Arakan specimens, and the hands and feet are blackish above, contrasting strongly with the colour of the limbs. The lower parts are white on the lower abdomen and inside the thighs only; elsewhere they are ashy grey. This animal may have been an example of *S. albocinereus*, Desm. (*S. siamensis*, Müll. & Schl.), but I am rather disposed to refer that species to *S. femoralis*.

Habits. Phayre's Leaf-Monkey is found in dense high forests, or amongst bamboos on the hill-sides and on the banks of streams. usually in flocks of twenty or thirty individuals. It is very shy and wary, and is consequently more often heard than seen, the whole flock when alarmed rushing through the forest, shaking the branches violently and leaping from tree to tree. But occasionally, as Tickell observes, an old male stays behind in a safe post of vantage on the top of one of the highest trees, where he may be heard uttering his short deep alarm-cry at frequent intervals. This cry is an angry bark not unlike that of the Hanúmán. I was once well scolded from a tree by an old monkey, I believe of this species, on the edge of a half-deserted clearing in Southern Arakan. I had done nothing to offend his monkeyship, but he evidently considered me as something unusual and suspicious. Blyth observes that the young of this species, besides making a whining noise to express their wants, emit a cry that might be mistaken for the mew of a cat.

#### 24. Semnopithecus obscurus. The dusky Leaf-Monkey.

Semnopithecus obscurus, Reid, P. Z. S. 1837, p. 14 (no description); Anderson, An. Zool. Res. p. 25; id. Cat. p. 46; Thomas, P. Z. S. 1886, p. 66.

Presbytis obscurus, Blyth, Cat. p. 14; id. Mam. Birds Burma, p. 10. Lotong or Lotong-itam, Malay.

Hair of crown directed backwards, not radiating, becoming lengthened at the back, so as to form a pointed projecting tuft on the occiput. Whiskers long.

Colour. As a rule dark ashy grey on the head, body, and limbs, varying, however, to blackish brown; feet and hands black; lower parts rather paler; tail as a rule lighter than the body. The lengthened hair on the occiput conspicuously paler, sometimes

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whitish. The nape and sometimes the middle of the back often brownish. Mouth and eyelids whitish, remainder of face black.

A female obtained by Mr. Davison at Bánkasún, in the extreme south of Tenasserim, has the crown of the head and middle of the back hair-brown, sides almost black; long hair of occiput, limbs, tail, and underparts brownish grey; feet black above, as usual.

The young are of a vivid golden ferruginous colour, which soon changes to dusky ash, the rufous colouring remaining longer on parts of the head, throat, flanks, and thighs, and longest of all on the terminal portion of the tail. Probably the female described above retained the coloration of the young on the limbs and tail.

Dimensions. In an adult male the head and body measured 21 inches, tail 32. An adult male skull from Tenasserim \* in the British Museum measures in extreme length 4.25, basal length 3, and zygomatic breadth 3.5. In an adult female skull the corresponding dimensions are 3.8, 2.7, and 2.85 inches.

Distribution. Malayan Peninsula, Siam, and the Tenasserim provinces.

## 25. Semnopithecus femoralis. The banded Leaf-Monkey.

Semnopithecus femoralis, Horsfield, Appendix Life Sir T. S. Raffles, p. 642 (1830) (no description); Martin, Charlesworth's Mag. N. H. ii, p. 436 (1838); Cantor, J. A. S. B. xv, p. 175; Horsf. Cat. p. 10; Anderson, An. Zool. Res. p. 30; id. Cat. p. 52; Thomas, P. Z. S. 1886, p. 66.

Two distinct radiating centres, one on each side of the forehead behind the supraorbital ridge. Hair of the occiput elongate, forming a crest as in *S. obscurus*.

Colour. Blackish brown to black, except upon a varying portion of the under surface, which is white, and always includes the lower abdomen and inside of the thighs. Sometimes the latter colour extends only to the knee, in other specimens it passes down the inside of the leg to the heel, and also occupies the centre of the chest, the inside of the arm, and the lower surface of the tail except near the tip.

Dimensions. Anderson gives head and body 19 inches, tail 22; but no measurements from fresh individuals are available.

Distribution. Borneo, Sumatra, and the Malay Peninsula, extending north into Tenasserim. A specimen was obtained by Mr. Davison at Bánkasún in South Tenasserim.

Nothing is recorded of the habits of this species.

I am strongly disposed to suspect that S. siamensis, Müll. & Schleg. (S. albocinercus apud Cantor), is a grey form of this species.

\* This is one of a large collection of Indian skulls in the British Museum labelled as presented by the late Dr. Oldham. The collection was made by Mr. W. Theobald, and entrusted by him to Dr. Oldham for presentation to the Museum.



## Suborder LEMUROIDEA.

The Lemurs or Half-Apes, Prosimia of some authors, differ so widely from the Monkeys, both externally and anatomically, as to have been classed by many naturalists in a distinct order. The principal distinctions are the form of the skull and teeth, the greater extent to which the cerebellum is uncovered by the cerebrum, the greater development of the pollex, and the long clawshaped nail on the second digit of the foot in Lemurs, and the presence in these animals of a perforate clitoris, a two-horned uterus, and a bell-shaped, diffuse, and non-deciduate placenta. The skull in Lemurs has a long narrow muzzle; the orbits are not surrounded by bone behind, as in Monkeys, but open freely beneath the bony orbit into the temporal forsa; and the lachrymal foramen, instead of being internal, opens on the outside of the skull. The upper incisors are, in nearly all Lemurs, divided by a toothless interspace in the middle of the upper jaw; and the lower incisors are long, narrow, and projecting; whilst the lower canines are, in most of the forms, only distinguished from the incisors by greater depth, and have been, by several writers, counted as incisors. In most species, too, the anterior or first lower premolar is larger than the second and third, and resembles a canine, whilst the other premolars and molars are very different in shape from those in all the Old-World Monkeys (those of the Marmosets are intermediate in form), being more or less ovate in section instead of rectangular. Most of the characters enumerated as distinguishing the Lemurs are found also in other and lower orders of Mammalia. (For additional details on the Lemuroidea, see Mivart, P. Z. S. 1873, p. 503, and 'Encyclopædia Britannica.' article " Lemur.")

The Lemuroidea are divided into three families—Lemuridæ, comprising the greater number of the genera; Tarsiidæ, consisting of a single genus and species, Tarsius spectrum, found in the Malay Archipelago, but not known to occur on the continent of Asia; and Chiromyidæ, also comprising a solitary representative only, the Aye-Aye of Madagascar. The first family is alone represented in South-eastern Asia.

## Family LEMURIDÆ.

Two genera occur within our area, all the others are restricted to Africa and Madagascar, the majority being peculiar to the lastnamed island. The two found in India, Ceylon, and Burma are thus distinguished :---



il. Four small upper incisors of equal size. Tail none. Limbs very siender..... Lours.

The lemurs of the Oriental region afford one of the most remarkable and interesting examples of geographical distribution known. The nearest allies of *Nycticebus* and *Loris* are two genera, *Perodicticus* and *Arctocebus*, found only in West Africa. *Nycticebus* has an extensive range east of the Bay of Bengal, but has not been recorded from the Himalayas; *Loris* is peculiar to Southern India and Ceylon.

## Genus NYCTICEBUS, Geoffroy, 1812.

#### Syn. Stenops, v. d. Hoeven.

Head short; limbs moderately stout; body slender; tail very short; ears short, rounded, and covered with hair; eyes large and approximate; second digit of both hand and foot very short, that of the foot with a long claw, all the other digits with a broad nail.



Fig. 11.-Skull of Nycticebus tardigradus.

The skull is globular behind; the muzzle produced, but not very narrow anteriorly; orbits large. The greatest breadth of the skull is across the zygomatic arches. Vertebral formula: C. 7, D. 16–17, L. 6–8, S. 3, C. 11–12.

Dentition: i.  $\frac{1-1}{4}$  or  $\frac{2-2}{4}$ , c.  $\frac{1-1}{1-1}$ , pm.  $\frac{3-3}{3-3}$ , m.  $\frac{2-3}{3-3}$ . When there are two pairs of upper incisors, the inner are much larger than the outer. The last upper molar has but three well-developed tubercles, two outer and one inner.

# 26. Nycticebus tardigradus. The slow Loris.

Lemur tardigradus, L. Syst. Nat. p. 44 (1766), excl. syn. Nycticebus bengalensis, Geoffr. Ann. Mus. xix, p. 164 (1812).



Nycticehus tardigradus, Elyth, Cat. p. 18; Jerdon, Mam. p. 14; Anderson, Cat. p. 94.

Nycticebus cinereus, A. Milne-Edw. Nouv. Arch. du Mus. iii, 1867, Bull. p. 11, pl. 3; Anderson, An. Zool. Res. p. 103; id. Cat. p. 94.

Sharmindi billi (bashful cat), H.; Lajjar or lajjawoti bánar (bashful monkey), Bengali; Myouk-moung-ma (monkey's concubine), Burmese; Myouk hlioung, Tavoy; Kasyng, Talain; Tacheng, Karen; Kúkany and Bruh-samundi, Malay.

Fur very close and woolly, covering the whole body and face with the exception of the nose and lips. The short hairy ears and the short tail are almost concealed beneath the fur. As a rule, there are four incisors in the upper jaw, but one or both of the outer pair may be wanting.



Fig. 12.—Nycticebus tardigradus, Tenasserim variety. (From a drawing by Col. Tickell.)

Colour. There are two principal varieties, differing in colour and somewhat in size, found in the countries east of the Bay of Bengal. The more common and larger of the two is that called N. bengalensis by Geoffroy, and N. cinereus by A. Milne-Edwards, and is the var. A of Blyth's Catalogue. This is ashy grey above, and rather paler below, more or less silvery on the back, and often rufescent on the rump, the fur being dark ashy at the base. A chestnut-brown stripe runs down the back from the crown to the toms, but does not expand into a broad patch on the crown. Each eye is surrounded by a dark brown circle, broadest above; a narrow space in front between the two orbital rings is whitish or white. A small oval patch, including each ear, is also brown. Nose and soles of feet flesh-coloured where naked.

The other variety is, as a rule, smaller and rufescent grey above, paler below; the dorsal stripe is broader, and often deep rich brown; it usually expands into a broad rufous expanse on the crown, including the ears but not the eyes, which are always surrounded by a brown ring.

A third form is figured from Tenasserim by Tickell, from whose drawing the accompanying cut is taken. In this, which is pale rufescent, the dorsal stripe simply bifurcates on the forehead, one band running to the circle round each eye.

This leads to the type known as *N. javanicus*, in which there are four brown bands running down the head and face from the crown, one to each eye and one to each ear; the interspaces pale, and those between the eyes white. This variety, or race, is said to be peculiar to Java, and rather smaller in size than the others, and to have almost constantly only two upper incisors. Schlegel, too, states that it has eight lumbar vertebræ instead of six. It is very doubtful, however, if any of these distinctions are constant.

Dimensions. An adult male from Upper Burma, according to Anderson, measured : head and body  $13^{\circ}2$  inches long, tail 0.75, fore limb and foot 7.2, hind limb 9. Jerdon gives a greater length, 14.5to 16 inches. All these are taken from the large northern variety. A Tenasserim adult male, measured by Tickell, was 12.75 inches long. Two adult skulls measure 2.5 and 2.65 inches in extreme length, 2.2 and 2.3 in basal length, 1.7 and 1.8 broad across the zygomatic arches. A Javanese skull is only 2.15, 1.85, and 1.55inches in the three dimensions.

Distribution. Throughout the countries east of the Bay of Bengal—Burma, Malacca, Siam, and the islands of Sumatra, Java, and Borneo. Common in Assam, Sylhet, &c., and extending west to the neighbourhood of Rangpur and Dacca, but not found in the Himalayas.

Habits. Purely nocturnal and arboreal. This animal feeds on leaves and shoots of trees, fruits, insects, birds' eggs, and young birds. It has been observed by Tickell to raise itself on its hind legs and throw itself upon an insect. As a rule it is silent, or only utters a feeble crackling sound, but when angry and about to bite it emits a tolerably loud growl or grunt. When captured, it is at first apt to be savage and prone to bite, but soon becomes very gentle and docile.

Tickell, from whose MS. the above notes are chiefly derived, says:—"This animal is tolerably common in the Tenasserim provinces and Arakan, but, being strictly nocturnal in its habits, is seldom seen. It inhabits the densest forests, and never by choice leaves the trees. Its movements are slow, but it climbs readily.



and grasps with great tenacity. If placed on the ground, it can proceed, if frightened, in a wavering kind of trot, the limbs placed at right angles. It sleeps rolled up in a ball, its head and hands buried between its thighs, and wakes up at the dusk of evening to commence its nocturnal rambles. The female bears but one young at a time."

#### Genus LORIS, Geoffroy, 1796.

Head short; nose narrow; body slender; limbs very slender and long; tail wanting; ears larger than in *Nycticebus*, rounded, and naked towards the margin; eyes very large and close together.

Skull with orbits that are very close together, merely separated by a very thin bony plate, and so large that the breadth across the orbits is greater than that across the zygomatic arches; muzzle narrow anteriorly. Vertebra: C. 7, D. 15, L. 8, S. 3, C. 6–8.

Dentition: i.  $\frac{2-2}{4}$ , c.  $\frac{1-1}{1-1}$ , pm.  $\frac{3-3}{3-3}$ , m.  $\frac{3-3}{3-3}$ . The upper incisors all small and of equal size. Hindmost upper molar with four well-developed tubercles.



Fig. 13.—Loris gracilis.

#### 27. Loris gracilis. The slender Loris.

Loris gracilis, Geoffr. Magasin Encyclopédique, An 4<sup>e</sup> (1796), t. i, p. 48; Blyth, Cat. p. 19; Jerdon, Mam. p. 15; Anderson, Cat. p. 97.

Stenops gracilis, Kelaart, Prod. p. 9.

Devánga-pilli, Tel.; Tevángu, Tam.; Nala and Adavi-manushya, Can.; Chinge-Kuli, Kurg; Una happolava, Cing. Fur very close, soft, and rather woolly : ears thin, rounded, naked towards the edge, of moderate size, considerably larger and more conspicuous than in the slow Loris.

Colour. Dark earthy grey, more or less rufescent above and on the outside of the limbs, often with a silvery wash. Dorsal fur whitish (occasionally ashy near the skin), with a blackish ring near the end and white tips. Lower parts much paler. Some specimens of the young are much more rufous, almost ferruginous. A narrow white stripe between the eyes expanding into a broader area on the forehead; sides of face, including the eyes, darker.

Dimensions. Length of head and body about 8 inches, arm 5, leg 5.6. Skull of an adult 2 inches long from occiput to end of nasal bones, which project beyond the premaxillaries; basal length 1.5; breadth 1.25 across the orbits, 1.2 across the zygomatic arches.

Distribution. Southern India and Ceylon, in the lowland forests, not, so far as is known, at any considerable elevation above the sea. This species does not appear to have been recorded as far north as the Godavari valley. It may probably be found on the West coast of India, in the Southern Concan, near Ratnagiri, but even this is not clearly ascertained. According to Jerdon, it appears to be rare on the Malabar coast, but common in the forests of the "Eastern Gháts" (probably the hills south of the Kistna river).

Habits. Very similar to those of Nycticchus tardigradus, except that the slender Loris is rather quicker in its movements, though still slow in general. Like its ally, it is purely necturnal and arboreal; living upon shoots and young leaves, insects, birds' eggs, birds, and lizards. It is said to be very fond of honey or syrup. It sleeps rolled up in a ball with its head between its legs, grasping its perch with its arms.

According to Jerdon, numbers are occasionally brought to the Madras market. The eyes are a favourite remedy of the Tamul doctors for certain eye-diseases.

# 4-SL

## Order CARNIVORA.

Whether the members of the great group of flesh-eating Mammals, comprising cats, civets, ichneumons, hyanas, dogs, weasels, badgers, otters, racoons, bears, seals, and their allies, are structurally inferior to the Primates or not, is a question on which some difference of opinion exists; but there can be no question as to the superiority of organization shown by the higher Carnivora when compared with any other mammalian order, except that containing Man and the anthropoid Apes. The superiority is quite as well marked in the development of the brain as in that of the body and limbs.

The Carnivora are animals with never less than four toes on each foot, all the toes being armed with claws. The pollex and hallux are never opposable. The teeth comprise incisors, canines, and molars. The incisors are, with very few exceptions, three on each side of each jaw—the outer, especially in the upper jaw, being larger than the others. The canines are well developed. There is a milk-dentition. The condyle of the lower jaw is a transverse half-cylinder, working in a glenoid fossa of corresponding form, hence the movement of the jaw is only up and down, not lateral. The stomach is simple. The eacum is short or absent. The uterus is bicornuate; the placenta deciduate, and often zonary. The mamme are abdominal. The clavicle is often absent, and when present imperfect. In many forms there is a bony septum inside the skull, between the cerebrum and cerebellum.

There is but little difference of opinion amongst naturalists as to the limits of the Carnivora; the only point on which the agreement is imperfect is as to whether the seals should be included in the order or classed separately. When they are included, as in the system here followed, they form a separate suborder, called Pinnipedia, distinguished by having the whole external form modified for an aquatic life, the hind feet especially being converted into paddles. The teeth of the molar series, both premolars and molars, are similar to each other in size and form. Nearly all seals inhabit cold climates, and none are found in India or the neighbouring The Carnivora vera or Fissipedia are fitted for a countries. terrestrial or partially terrestrial life, and have the teeth of the molar series in each jaw dissimilar in size and form, there being always one tooth on each side, above and below, that is especially modified, and that is, in the majority of the families, larger than the other teeth: this is the sectorial, carnassial, or flesh-tooth.

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The teeth in front of it are more or less sharp, pointed, and compressed; those behind are broad and tuberculated. The sectorial in the upper jaw is the hindmost premolar, and consists of a more or less compressed bicuspid or tricuspid crown on two roots and an inner lobe supported by a third root. In the Ursida, in which the sectorial teeth are ill-developed, the inner lobe and root are wanting. The lower sectorial is the first true molar, and consists of two roots supporting a bilobed compressed crown, with, in general, a keel and an inner tubercle; both of which, however, are wanting or rudimentary in the most specialized Carnivora, as the Felida.



Fig. 14.—Upper sectorial teeth of I. Felis, II. Canis, III. Ussus. (Flower, Art. Mammalia, 'Encyclopædia Britannica.').—I, anterior, 2, middle, 3, posterior cusp of blade; 4, inner lobe supported on distinct roots; 5, inner lobe posterior in position, and without distinct root, characteristic of the Ursudæ.

## Suborder FISSIPEDIA.

As already mentioned, the limits of this suborder (or order according to some writers) are generally admitted; but the subdivision into sections and families is difficult, owing to the complicated relationships between the different genera. The majority live entirely upon animal food; but a few, like the bears, feed on a mixed diet, of which vegetables form a portion. A considerable number, as the cats and dogs, walk on their toes, and are known as Digitigrade, whilst others, for instance the bears, rest upon their palms (palma) and soles (planta) and are distinguished as Plantigrade; a somewhat intermediate mode of progression, found in the weasels, otters, and badgers, being termed Semiplantigrade. This distinction has been extensively employed in classification, but is defective, for *Paradoxurus, Arctictis*, and *Cryptoprocta* are more or less plantigrade, although in other respects much more nearly

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allied to the digitigrade cats and civets than to any of the plantigrade or subplantigrade Carnivora. Mr. H. N. Turner \* and Professor Flower † have proposed to divide the order into three sections, named *Æluroidea*, *Cynoidea*, and *Arctoidea*, from the Greek names of the cat, dog, and bear respectively, each of these animals being typical of a particular section, and the distinctive characters being taken principally from the base of the skull and the development of a cœcum. Some other characters taken from the generative organs support this classification, which is employed in the following table. The accompanying cut of part of a wolf's skull will serve to illustrate the distinctions mentioned, and a dog's or jackal's skull will be found precisely similar in all essential points to a wolf's, and will serve for comparison.



Fig. 15.— Part of the base of the skull of a Wolf (Canis lupus). (Flower, P. Z. S. 1869, p. 25.)

c. The condyloid foramen. *l*. The foramen lacerum posticum. car. The carotid canal. c. The enstachian canal. c. The foramen ovale. a. The posterior, and a', the anterior opening of the alisphenoid canal. p. The paroccipital process. m. The mastoid process. a.m. The external auditory mentus. g. The glenoid foramen.

\* P.Z. S. 1848, p. 86.

+ P. Z. S. 1869, p. 4. This paper contains numerous details of anatomy.

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Auditory bulla much dilated, rounded, and (except in Hyanida) divided into two chambers by a septum. Bony auditory meatus short. Paroccipital process flattened against the bulla and (except in Hyænidæ) not projecting behind. Condyloid and glenoid foramina concealed or wanting. Cacum small ..... HELUROIDEA \*.

- a. Head short; 3 or 4 teeth in upper molar series, 3 in lower; dorsal vertebræ 13; claws sharp, curved, and (except in Cyncelurus) completely retractile. Toes 5-4 ..... 1. Felidæ.
- b. Head elongate; 5 or 6 teeth in molar series of each jaw; claws variable. Toes usually 5-5. 2. Viverridæ.
- c. Head elongate; 4 teeth in upper molar series, 3 or 4 in lower, all small and widely sepa-rated; claws blunt. Toes 5-4 ..... Proteleidæ.
- d. Head slightly elongate; 5 teeth in upper molar series, 4 in lower; dorsal vertebræ 15; claws blant, not retractile. Toes 4-4 ..... 3. Hyænidæ.
- B. Auditory bulla much dilated, rounded but not divided. Bony auditory meatus short. Paroccipital process flattened against bulla, but projecting behind. Condyloid and glenoid foramina distinct. Cæcum elongate, and generally folded on itself ..... CYNOIDEA. a. Premolars  $\frac{4-4}{4-4}$ , true molars variable  $\left(\frac{2-2}{2(3)-2(3)}\right)$ 
  - in all Indian forms); claws exserted, blunt, non-retractile. Toes 5-4 (except in Lycaon) 4. Canidæ.
- C. Auditory bulla not rounded nor divided, most prominent on inner border and sloping thence forwards, backwards, and outwards, flattened off towards the meatus, the lower lip of which is prolonged. Paroccipital process prominent, quite free from bulla. Condyloid and glenoid foramina distinct. No cæcum. Toes 5-5 ... ARCTOIDEA †.
  - a. True molars  $\frac{1-1}{2-2}$  (one tubercular molar behind the sectorial above and below). No alisphenoid
  - upper jaw, one in lower, behind sectorial) .. 6. Procyonidæ.

c. True molars  $\frac{2-2}{3-3}$ . An alisphenoid canal .... 7. Ursidæ.

Of the above-named families one only, Proteleidee, containing a single species, Proteles cristatus, peculiar to Southern Africa, is not found in the Indian region. The remaining seven are represented.

\* For anatomical details of classification see Mivart, P. Z. S. 1882, pp. 135, 459. + For anatomical details see Mivart, P. Z. S. 1885, p. 340.

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### Family FELIDÆ.

This, the most typical and highly specialized group of flesheating mammals, and that to which the term "beasts of prey" is especially applicable, comprises the various kinds of cat, all of which, despite great differences in size, are closely allied and resemble each other in almost all details of structure. In the cat, the whole organism is peculiarly adapted for the capture and killing of other animals for food; the armature of teeth and claws, the power of speed for a short distance, the excessive muscular development and activity, are all combined to enable a feline to seize and kill animals, in some cases, superior in size to itself \*.

The cats are distinguished from all other families of *Carnivora* by having a rounder head and more highly specialized teeth; the canines and sectorial, or flesh-teeth, in particular being highly developed weapons for cutting and tearing, whilst the remaining teeth of the molar series are poorly developed. The claws also are adapted for inflicting severe wounds, and are applied to the armature of a foot worked by powerful muscles, and, in the case of the fore legs, with unusual freedom of action, as may easily be seen by comparing the movements of a cat's fore limb with those of a dog's. The vertebræ are C. 7, D. 13, L. 7, S. 3, C. 13–29. There is no alisphenoid canal.

The dental formula in the Felidae is i.  $\frac{6}{6}$ , c.  $\frac{1-1}{1-1}$ , pm.  $\frac{3-3}{2-2}$  or  $\frac{2-2}{3-2}$ , m.  $\frac{1-1}{1-1}$ . The outer incisors are much larger than the others, especially in the upper jaw. The canines have, in many species, a sharp hinder edge. The anterior upper premolar is small, has a single root (except in F. pluniceps), and is often lost in old skulls, whilst it is always wanting in the adults of some species, as in F. rubiginosa and the Lynxes. The second upper premolar is tworooted, pointed, with a large central lobe preceded by one small cusp and followed by two.\* The third upper premolar, the sectorial or flesh-tooth, is by far the largest of the molar series, and bears three roots or fangs, with a crown consisting normally of four lobes, three along the inner margin and an inner lobe, the development of which varies in different species. The hindmost tooth is the true molar, which is small, bears two roots and a flattened crown, and is placed with its longer axis nearly at right angles to that of the premolars. This tooth, like the anterior premolar, is often lost in old animals.

The teeth of the molar series in the lower jaw consist of two premolars, similar in shape, each being, like the second upper premolar, quadricuspid, with two roots, the anterior premolar rather smaller than the other; behind these is the sectorial, or

\* For a complete account of the cat's anatomy, see Dr. St. George Mivart's work entitled 'The Cat,' published in 1881.

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true molar, with two roots and two nearly equal lobes, each ending in a point, the points diverging but connected by a sharp cuttingedge. There is sometimes a rudimentary hinder tubercle or "talon."

The deciduous or milk-teeth are of course much smaller ; but resemble in form the permanent teeth that succeed them, with the exception of the second milk-molar in each jaw and the third in the upper. The second upper milk-molar is three-fanged, and much resembles in form the permanent third premolar or sectorial, whilst the third milk-molar resembles the upper true molar in shape, but is relatively larger. The second lower milk-molar somewhat simulates the lower first true molar or sectorial, but the anterior lobe is smaller than the second, and behind the latter are two posterior tubercles.

The claws are perfectly retractile (partially in *Cynœlurus*). The terminal or third phalanx of each digit is attached to the side, not the end, of the second, and is drawn back by a retractor ligament attached to the proximal end of the third phalanx, and passing through a bony sheath on the first phalanx.

All cats are truly digitigrade. The pollex, or thumb, is well developed and has a large claw, but is not used in walking, being more proximally situated than the other digits. There is no hallux. There is a thick pad for each toe, that for the pollex being smaller than the others, and a large median pad between the four toes on each foot. A seventh small pad exists on the fore leg on the outer palmar surface of the metacarpus.

The organs of sight and hearing are well developed and the senses acute. The long vibrissæ, commonly called whiskers, are delicate organs of touch. The tongue is covered with rough papilæ directed backwards, and adapted to remove flesh from bones. The intestines are comparatively short, being from twice to five times the length of the body.

Cats are found in all the Continents, but are wanting in the Australian and Madagascar regions.

The Felidæ comprise only two genera, both of which are found in India. They are thus distinguished :---

Claws perfectly retractile ; inner cusp of upper sectorial

well developed ..... FELIS.

Claws imperfectly retractile; inner cusp of upper sectorial

rudimentary ..... CYNÆLURUS.

A monograph of the family, with excellent coloured figures of all the species by Wolf, has been published by Mr. D. G. Elliot.

Several forms of fossil *Felida* have been discovered belonging to both living and extinct genera. In the Siwaliks of North-western India remains of five species of *Felis*, one of which, *F. cristata*, nearly equalled the tiger in size, have been found, together with those of two forms of the great sabre-toothed feline *Machaerodus*, an extinct type with enormous canines, and jaw-fragments indicating two other genera, *Ælurogale* and *Æluropsis*, the latter



peculiar to the Indian Pliocene. Some bones of felines have also been found in Indian Pleistocene deposits, but they have not been identified with certainty.

## Genus FELIS, Linnæus, 1766.

This genus is perhaps represented by more species in India and its dependencies than in any other tract of the earth's surface equal in area.



Fig. 16.-Skull of Felis viverrina, (Gray, P. Z. S. 1867, p. 268.)

Synopsis of Indian, Ceylonese, and Burmese Species.

| A. Ears of moderate length, not tuffed, or with<br>short hairs only at the end       |
|--|
| a. Large, tawny throughout; tail tufted at   |
| b. Large, transversely striped; tail not tufted. F times p. 58.                      |
| c. Spotted throughout, spots on body less than                                       |
| a'. Large, exceeding 5 feet from nose to   |
| tail-tip   |
| a". Tail about one fourth of total longth  |
| (from nose to tail-tip) F. viverrina, p. 76.   |
| a. No distinct longitudinal hands on   |
| crown; ears pointed F. ornata, p. 84.  |
| 5. Distinct longitudinal bands on<br>crown: ears rounded                             |
| a'. Upper molar series 3 on each   |
| side; tail unspotted   |
| spotted above F. bengalensis p 78  |
| a. Large spots, exceeding 2 inches in diameter,<br>or irregular blotches on the body |
| a'. Large, pale grey or whitish with dark  |
| rings on body F. uncia, p. 71.   |



- b'. Brownish grey or tawny, with large irregular blotches or irregular black bands.
  - a". Total length from nose to tail-tip over 5 feet in adults..... F. nebulosa, p. 72.

b". Total length under 5 feet. .... F. marmorata, p. 74. e. Uniformly coloured or with more or less

- indistinct transverse bands; size moderate or small,
- a'. Chestnut (rarely dark brown) above; tail whitish below ...... F. temmincki, p. 75.
- b'. Silvery grey or buff; fur long, thick, ..... F. manul, p. 83. and soft .....
- c'. Tawny or grey.
  - a". Tail less than one third of total

transverse bands much more distinct F. torquata, p. 85.

- B. Ears long, pointed, with a pencil of hair exceeding half an inch in length at the end.
  - a. Tail about one fourth of total length ..., F. caracal, p. 88.

b. Tail less than one fifth of total length.... F. lyn.v, p. 80.

#### 28. Felis leo. The Lion.

Felis leo, L. Syst. Nat. i, p. 60 (1766); Blyth, Cat. p. 53; id. P. Z. S. 1863, p. 182; Jerdon, Mam. p. 91; D. G. Elliot, Mon. Felidæ, pl. i.

Sher, Babar-sher, Singh, Hindi; Untia-bágh (Camel-tiger), Guzerati; Sawach, Kattywar; Shingal, Bengali; Sith or Suh &, Siming 2, Kashmiri ; Rastar, Brahui.

Pupil round. A heavy mane of long hair (varying in length however) all round the neck and on the sides and crown of the head in adult males only. Tail about half the length of the head and body, well tufted at the end, a small horny point at the tip, surrounded by the tuft. Caudal vertebræ 24 or 25.

The skull of a lion is thick, heavy, and massive, with a broad zygomatic arch and well-marked sagittal and occipital crests. The superior surface is remarkable for its flatness; the postorbital processes, too, are very nearly in the same plane as the forehead. The posterior termination of the maxillary bones on the face between the orbits is opposite the end of the nasals. The exposed portion of the presphenoid bone in the mesopterygoid fossa is very narrow, and usually flat. The lower edge of the mandible is convex, owing to a small projection below the hindmost lowest molar. In all these characters the skull of a tiger differs.

Colour. Tawny (pale vellowish brown) everywhere, except the black tail-tuft and the outside of the ears, which are black towards the base, but not at the tip ; the hairs of the mane in the prime of life are also more or less black-tipped. Young cubs are marked with darker spots or irregular bands, and faint spots may often be seen on the belly and sides of almost adult or even adult animals, especially females.

SL

Dimensions. Head and body  $5\frac{1}{2}$  to  $6\frac{1}{2}$  feet long, tail  $2\frac{1}{2}$  to 3. A male measured: head and body 5 feet 11 inches, tail 2 feet 11 inches; a female 5 feet 5 inches and 2 feet 7 inches. A lion measuring 8 feet  $9\frac{1}{2}$  inches was 3 feet 6 inches high. The female is considerably smaller than the male, and, as with tigers, some individuals probably are larger, others smaller than the above extremes. The hairs of the mane are 10 inches to a foot long in some Indian lions. A skull of an adult male lion measures in extreme length 13 inches, breadth across zygomatic arches  $9^{\circ}4$ .

Distribution. In India the lion is verging on extinction. There are probably a very few still living in the wild tract known as the Gir in Kattywar, and a few more in the wildest parts of Rejputana, especially Southern Jodhpur, in Oodeypur, and around Mount Abá. About 20 years ago lions were common near Mount Abú, several were shot near Gwalior, Goona, and Kota, and a few still existed near Lalitpur, between Saugor and Jhansi. One is said to have been killed near Goona in 1873. In 1864 one was killed near Sheorajpur, 25 miles west of Allahabad; and when the railway was being made from Allahabad to Jubbulpoor, in 1866, a fine lion, with a good mane, was shot by two of the engineers near the 80th milestone from Allahabad. About 1830 lions were common near Ahmedabad. Several years previously, in the early part of the century, lions were found in Hurriana to the northward, and in Khandesh to the south, in many places in Rajputána (one was shot in 1810 within 40 miles of Kot Deji, in Sind), and eastward as far as Rewah and Palamow. It is probable that this animal was formerly generally distributed in North-western and Central India\*. I have never heard of lions in Cutch, and suspect Jerdon was mistaken in supposing them to be found there.

Eastward and north of India the lion is not found, and almost the only part of Western Asia in which it is common is in Mesopotamia and part of South-western Persia. As is well known, this animal abounds throughout Africa.

Varieties. For a long time it was supposed that the Indian lion was maneless, and in numerous books on natural history there are accounts of the "Maneless lion of Guzerat" (F. leo guzrattensis, Smee, Trans. Z. S. i, p. 165, pl. xxiv; P. Z. S. 1833, p. 140). It is probable that maneless male individuals may occasionally occur, and it is well known that lions in some parts of Africa,  $\epsilon.g.$ the Cape and Algeria, have longer manes than in other tracts. It is also asserted that lions inhabiting forests have shorter manes, owing to the hairs being pulled out by thorny bushes, but this is doubtful. It is certain, however, that some adult Indian lions have well-developed manes, and the typical maneless Guzerat lion in the British Museum is immature. The lion figured by Captain Smee was shot near Ahmedabad, and was a short-maned lion, similar to most Persian or Abyssinian animals.

\* J. A. S. B. xxxvi, pt. 2, p. 189; P. A. S. B. 1868, p. 198; Journ. Geog. Soc. 1870, p. 204.