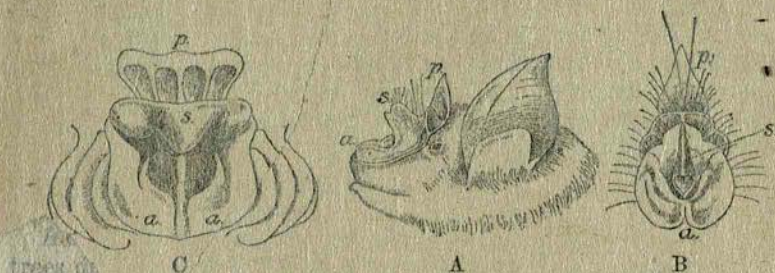


The greatly developed nose-leaf is evidently an organ of special perception akin to touch*; the variations in the form of this appendage are characteristic of the different species. The *Rhinolophidæ* are more nocturnal and less crepuscular than other insectivorous *Chiroptera* a circumstance perhaps connected with the development of the nose-leaf.



—A. Head of *Rhinolophus affinis*, nat. size. B. Nose-leaf of *R. hipposiderus*, $\times \frac{1}{2}$. C. Nose-leaf of *Hipposiderus armiger*, $\times 2$. a. Anterior; p. posterior nose-leaf; s, sella.

Family is found throughout the temperate and tropical parts of the Eastern hemisphere and Australia, but not in Polynesia east of New Guinea, nor in America. It is divided into two subfamilies:—

- First toe with two, remaining toes with three joints each; a distinct antitragus separated by a notch from the outer margin of the ear. *Rhinolophinæ*.
- All the toes with two joints; no notch separating the antitragus from the outer margin of the ear. *Hipposiderinæ*.

It may be useful to repeat here that the measurements of bats, mostly taken, with other details, from Dobson's work, are from alcoholic specimens.

Subfamily RHINOLOPHINÆ.

Genus **RHINOLOPHUS**, Desm. (1803).

The only genus in the subfamily. The nose-leaf is large and perfect, all three parts (anterior, median, and posterior) being well developed; the anterior is horseshoe-shaped, usually with a deep incision in the middle in front, and rests flatly on the muzzle, the nostrils opening one inside each arm of the horseshoe; between and behind the nostrils the median nose-leaf or sella commences, the anterior portion being flat or recumbent on the nose, the continuation is then bent up and becomes an erect process, rising vertically from the face and consisting in most cases of two lamellæ at right angles to each other, the anterior transverse, the posterior longitudinal; the latter usually forms a connecting-process and

* Hutton observed that when the animals were disturbed the nose-leaf of several *Rhinolophidæ* were kept in a state of contraction.



joins the sella to the anterior portion of the posterior nose-leaf, which, in this genus, is always more or less triangular and terminates behind in a single point, whilst its surface in most species is divided into cells or hollows by transverse laminae, often divided in the middle.

This genus may be distinguished by the form of the posterior nose-leaf and also by the deep notch at the base of the outer ear-margin, dividing off the large antitragus.

The wings are very large, the metacarpal bone of the fourth finger exceeds that of the second (or index) in length. Basioccipital at base of skull very narrow between the auditory bullae.

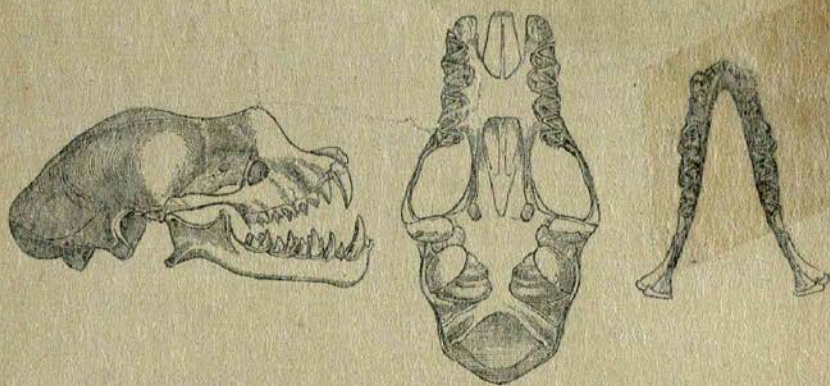


Fig. 81.—Skull of *Rhinolophus ferrum-equinum*, $\times 2$. (Blasius, Säugeth. Deutschl.)

Dentition: i. $\frac{2}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$. The first upper premolar minute, pointed, either in the tooth-row or else external to it between the closely approximated canine and second premolar, which is large. Second lower premolar generally minute and external to the tooth-row.

The genus *Rhinolophus* inhabits the temperate and tropical regions of the Eastern hemisphere, including Australia. No less than 13 species out of about 25 known at present are found within Indian limits.

Synopsis of Indian, Ceylonese, and Burmese Species.

- A. Size large; forearm exceeding 2.5 inches *R. luctus*, p. 270.
B. Size moderate; forearm 1.75 to 2.5 inches
a. Posterior nose-leaf thickened around a large internal subcruciform hollow; forearm 1.85 *R. coelestis*, p. 272.
b. Posterior leaf without large internal hollow.
a'. Second upper premolar close to canine, first premolar minute, external.
a''. Lower lip with a single median vertical groove; forearm 2.25 *R. ferrum-equinum*, [p. 278.
b''. Lower lip with 3 grooves; forearm 2.25 *R. tragatus*, p. 279.

- b'*. Second upper premolar separated from canine by a space in which the small first premolar is placed.
- a''*. Erect transverse process of sella with wing-like lateral expansions above nostrils; forearm 2 *R. trifolius*, p. 272.
- b''*. No lateral expansions to erect process of sella.
- a'*. Anterior recumbent process of sella expanded, cup-shaped; erect transverse process much higher than posterior longitudinal buttress; forearm 2.25 *R. nitratus*, p. 273.
- b'*. Anterior recumbent process of sella not expanded.
- a'*. Transverse and longitudinal erect processes of sella equal in height; forearm 2.2 *R. pearsoni*, p. 273.
- b'*. Longitudinal (posterior) process the higher.
- a*. Recumbent process of sella broader than erect transverse process.
- a'*. Margins of posterior nose-leaf concave; forearm 2.1 *R. affinis*, p. 274.
- β'*. Margins of posterior leaf straight; forearm 2.05 *R. andamanensis*, [p. 275.]
- β*. Recumbent process and erect transverse processes the same width; forearm 2. *R. petersi*, p. 275.
- C*. Size small; forearm less than 1.75 inches.
- a*. Ears very large, longer than the head; forearm 1.6 *R. macrotis*, p. 276.
- b*. Ears shorter than the head.
- a'*. Lower lip with three vertical grooves; forearm 1.45 *R. minor*, p. 276.
- b'*. Lower lip with a single vertical groove; forearm 1.5 *R. hipposiderus*, p. 277.

145. *Rhinolophus luctus*. *The great Eastern Horseshoe-Bat.*

Rhinolophus luctus, *Temm. Mon. Mam.* ii, p. 24, pl. 30 (1835); *Hutton, P. Z. S.* 1872, p. 694; *Blyth, Mam. Birds Burma*, p. 19; *Dobson, Mon. As. Chir.* p. 39; *id. Cat. Chir. B. M.* p. 105; *Anderson, Cat.* p. 107; *Scully, J. A. S. B.* lvi, pt. 2, p. 240.

Rhinolophus perniger, *Hodgs. J. A. S. B.* xii, p. 414; *Blyth, J. A. S. B.* xiii, p. 484; *id. Cat.* p. 23; *Jerdon, Mam.* p. 23.

This is the largest known species of the genus. The ears are very large, the tips acuminate and bluntly pointed, the outer margin concave below the tip and divided from the large and long antitragus by a deep re-entering angular notch.

Nose-leaf greatly developed and peculiar. The anterior leaf very large, projecting over the lip in front and at the sides, deeply incised in the middle. Sella expanded on each side of the base of the erect process into a rounded flat disk, one above each nostril. The transverse erect process is much higher than the short longitudinal posterior buttress, the free margin of the latter is rounded.



The posterior nose-leaf is long, it terminates in an acuminate blunt point between the ears, and its surface is complicated, being crossed by a flat diamond-shaped lamella above and by another lamella below.

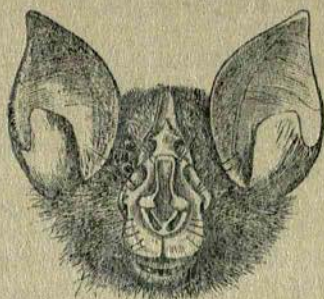


Fig. 82.—Head of *Rhinolophus luctus*. (From Guide to the Galleries of Mammalia, British Museum.)

Lower lip divided in the middle by a single deep groove. Wing-membrane greatly developed and attached to the base of the first or outer toe; interfemoral membrane large, projecting behind and terminating in a point at the tip of the tail, which does not extend outside the membrane. Fur of body very long and dense, soft and slightly curly. Premolars as in *R. coelophyllus*.

Colour of the fur usually jet-black with ashy tips to the hairs, occasionally, it is said, reddish brown.

Dimensions of a large Himalayan specimen in alcohol: head and body 3.55 inches, tail 2.6, ear from head outside 1.25, forearm 2.95. Specimens from Southern India and Ceylon are rather smaller. The forearm in a series of specimens varies from 2.6 to 3 inches in length.

Distribution. The Himalayas at moderate elevations, the hill-ranges of Southern India and Ceylon, Burma, the Malay Peninsula and Archipelago, extending to Borneo and the Philippines. This bat appears to be restricted to the highlands of the countries inhabited.

Habits. Hodgson, in his original description of *R. perniger*, stated that it was shy, keeping to the forests and never approaching houses or cultivation; but Hutton, to whom we are indebted for a fuller account of the animal's habits, says that at Mussoorie he had taken specimens "hanging from the roof of an outhouse in which rabbits and firewood were kept, the bat looking, with its ample black wings folded round it as a cloak, somewhat like a large black cocoon."

Captain Hutton adds:—"This fine species commences its flight rather early in the evening, and does not soar high, like the smaller bats in general, but remains below at about twenty or thirty feet from the ground, wheeling with a somewhat heavy and noiseless flight around buildings and large trees in search of small beetles and other insects." . . . "This species appears usually to dwell in pairs, and does not associate in communities like some of the smaller *Rhinolophi*—though, in a large cavern, affording ample room for them to hang apart, several pairs may sometimes be found.



I have taken them from the roofs of outhouses, and in wide caves in limestone-rocks, but they appear to fly only during the warmer months of summer, remaining (at least such is the case at Mussoorie) in a semitorpid state during the winter."

146. *Rhinolophus cælophyllus*. *The crosetted Horseshoe-Bat.*

Rhinolophus cælophyllus, *Peters, P. Z. S.* 1866, p. 426, pl. xxxv. *Blyth, Mam. Birds Burma*, p. 19; *Dobson, Mon. As. Chir.* p. 53; *id. Cat. Chir. B. M.* p. 104, pl. vii, fig. 1 (nose-leaf); *Anderson, An. Zool. Res.* p. 96; *id. Cat.* p. 107.

Ears large, with narrow acute tips directed outwards, outer margin concave below the tip, a deep re-entering angle between descending portion of the outer margin and the large antitragus.

Anterior nose-leaf well developed. Median leaf or sella expanded in front, covering the nostrils; the transverse erect process narrow, and the longitudinal erect crest thicker and higher than usual and the same height as the transverse process; the upper edge of the longitudinal process rounded, the posterior termination in a deep hairy subcruciform hollow, which occupies the middle of the posterior leaf. This latter is thick, pointed behind, nearly triangular in outline, the surface covered with long hairs. The lower lip divided by three grooves.

The wings are from the ankles or from just above them. Interfemoral membrane concave or straight behind; tip of the tail projecting. Second upper premolar separated from the canine by a space, in the middle of which stands the small first premolar; the second lower premolar minute and external to the tooth-row.

Colour of fur brown above, pale brownish white below, the hairs above are white at the base, brown at the extremity.

Dimensions. Length of head and body 2 inches, tail 0·8, ear outside from the head 0·6, forearm 1·85.

Distribution. Hitherto only found in Burma. This species has been procured in the Salween valley near Moulmein by Captain A. C. Beavan, and at Tsagain in Upper Burma by Dr. J. Anderson.

Nothing is known of the habits. The nose-leaf differs from that of any other species.

147. *Rhinolophus trifolius*. *The trefoil Horseshoe-Bat.*

Rhinolophus trifolius, *Temm. Mon. Mam.* ii, p. 27, pl. 31 (1835); *Dobson, Mon. As. Chir.* p. 41; *id. Cat. Chir. B. M.* p. 106; *Anderson, Cat.* p. 108.

Very similar to *R. luctus* in structure and even in the colour and length of the fur, but distinguished by its smaller size, by the erect transverse process of the sella being narrower above, and by the shape of the interfemoral membrane, the posterior margin of which is straight, with the extreme tip of the tail projecting. The specimens in the British Museum are from Borneo and are reddish brown in colour.

Dimensions. Head and body 2·3 inches long, tail 1·3, ear from head outside 0·9, forearm 2.



Distribution. A specimen from Assam, obtained by Mr. Peal, is in the Indian Museum; two others were obtained at Mergui by Mr. Hume; other localities recorded are India (eastern coast), Java, and Borneo.

148. *Rhinolophus mitratus*. *The mitred Horseshoe-Bat.*

Rhinolophus mitratus, Blyth, *J. A. S. B.* xiii, p. 483 (1844), xxii, p. 409, footnote; *id. Cat.* p. 23; *Jerdon, Mam.* p. 24; *Dobson, Mon. As. Chir.* p. 42; *id. Cat. Chir. B. M.* p. 107; *Anderson, Cat.* p. 108.

Ears large, pointed, outer margin very slightly convex, divided from the large antitragus by a shallow angular notch.

Anterior nose-leaf moderately developed; sella formed in front of two lappets, one over each nostril, together forming a cup-shaped depression, and behind of a small, erect, transverse process and of a still smaller and less elevated longitudinal lamella. Posterior nose-leaf subequilaterally triangular, sharply pointed. Lower lip with a single groove. Fur soft and rather long.

Colour of the fur rich light brown above, paler towards the base; below, the colour is much paler and the hair shorter.

Dimensions. Head and body 2.4 inches long, tail 1.6, ear (anteriorly) 1, forearm 2.25. Another specimen was smaller.

Distribution. Chybassa, S.W. Bengal (*Tickell*); Darjiling (*Dr. G. King*). Apparently rare.

149. *Rhinolophus pearsoni*. *Pearson's Horseshoe-Bat.*

Rhinolophus pearsoni, Horsfield, *Cat.* p. 35 (1851); Blyth, *J. A. S. B.* xxii, p. 409; *id. Cat.* p. 24; *Jerdon, Mam.* p. 25; *Dobson, Mon. As. Chir.* p. 43; *id. Cat. Chir. B. M.* p. 108; *Anderson, An. Zool. Res.* p. 95, pl. iv, fig. 1; *id. Cat.* p. 109.

Rhinolophus larvatus, *M.-Fav. Rech. Mam.* p. 248, pl. xxxvii a, fig. 1, pl. xxxvii c, fig. 1.

Rhinolophus yunnanensis, *Dobson, J. A. S. B.* xli, pt. 2, p. 336.

Ears large, acutely pointed; outer margin concave, separated at the base from the large antitragus by a deep angular notch.

Anterior nose-leaf large, concealing the upper lip when viewed from above; sella in front, between the nostrils, of moderate breadth, having a raised longitudinal rib in the middle; the erect portion at first the same breadth, then suddenly narrowing and rounded off above; the posterior longitudinal buttress-like lamella of the same height, with a rounded upper margin; posterior leaf subequilaterally triangular with straight sides. Lower lip with a single groove.

Wings very wide, wing-membrane from the ankles; posterior free margin of interfemoral membrane nearly straight, the extreme tip of the tail protruding. Fur very long, dense and soft.

Colour dark brown to light chestnut, lower parts sometimes greyer.

Dimensions. Head and body 2.7 inches, tail 0.9, forearm 2.2, ear from head outside 0.8.

Distribution. The Himalayas (Mussoorie, Darjiling) and their extension in Eastern Tibet; also the Assam ranges south of the Brahmaputra (Khási and Gáiro hills), the Lushai hills, and Yunnan.

150. *Rhinolophus affinis*. *The allied Horseshoe-Bat.*

Rhinolophus affinis, *Horsfield, Res. Java* (1824); *P. Cantor, J. A. S. B.* xv, p. 181; *Blyth, J. A. S. B.* xxi, p. 346; *id. Cat.* p. 24; *id. Mam. Birds Burma*, p. 20; *Jerdon, Mam.* p. 25; *Hutton, P. Z. S.* 1872, p. 696; *Dobson, Mon. As. Chir.* p. 47; *id. Cat. Chir. B. M.* p. 112; *Anderson, Cat.* p. 109; *Scully, J. A. S. B.* lvi, pt. 2, p. 242; *W. Blanford, J. A. S. B.* lvii, pt. 2, p. 261.

Rhinolophus rouxii, *Temm. Mon. Mam.* ii. p. 30 b (1835); *Blyth, l. c.*; *Jerdon, l. c.*; *Hutton, l. c.* p. 697.

Rhinolophus rubidus, *R. cinerascens*, and *R. rammanika*, *Kelaart, Prod.* pp. 13, 14.

Rhinolophus rubidus (*errore fulvidus*) and *R. n. s.*, *Kelaart, apud Blyth, J. A. S. B.* xx, pp. 182-3.

Ears shorter than the head, sharply pointed, the outer margin nearly straight, separated from the large antitragus by a moderately deep angular notch.

Anterior nose-leaf not quite large enough to conceal the muzzle when viewed from above, but very broad between its own outer and inner margins; sella moderately broad in front between the nostrils, the erect transverse portion of the same breadth throughout as that between the nostrils and rounded above, the longitudinal lamellar buttress-like process behind being of the same height or slightly higher, and with a rounded upper surface from which a few long hairs arise (fig. 80 A, p. 268); posterior leaf longer than broad, with concave margins, the tip elongate, acuminate, and rather blunt. Lower lip with three grooves.

Wing-membrane broad, variously attached to the tarsus, the ankle, or to the tibia above the ankle. Interfemoral membrane nearly straight behind or projecting angularly in the middle. Fur dense, soft, moderately long.

Colour very variable, from dark sooty brown or even dark ashy to bright ferruginous or golden orange-brown, the hairs darker towards their extremities.

Dimensions. Head and body 2·3 inches long, tail 0·9, ear from head between ears 0·6, from base of inner margin 0·75, forearm 2·1, thumb 0·35.

Distribution. Peninsula of India from the Himalaya to Cape Comorin, ascending the Himalayas to 7000 feet (Mussoorie, Nepal, Darjiling), Ceylon, Burma, Cochin China, Sumatra, Java, and Borneo. Probably chiefly found in those parts of India that have a heavy rainfall; no specimens appear to be recorded from the Central Provinces, Coromandel Coast, N.W. Provinces, or Punjab. Dobson states that this bat inhabits the hill-tracts, but specimens are recorded by Blyth from Calcutta and Barrackpur, and from a cave near Colgong on the Ganges, and by Jerdon from Tellicherry.

Habits. The only account I can find is given by Hutton, who says:—"This species is early on the wing and may be seen in the evening twilight coursing slowly round the trees in search of insects, crunching the hard-winged beetles as it flies, with a sharp



crackling sound. It often flies so low as to be easily caught in a common butterfly net." Of *R. rouxi*, which, as Dobson has shown, is merely a lighter-coloured variety of *R. affinis*, Hutton remarks that at Mussoorie it makes its appearance as early as March, remaining inactive during the winter.

151. *Rhinolophus andamanensis*. *The Andaman Horseshoe-Bat.*

Rhinolophus andamanensis, Dobson, *J. A. S. B.* xli, pt. 2, p. 337 (1872); *id. Mon. As. Chir.* p. 46; *id. Cat. Chir. B. M.* p. 113; Anderson, *Cat.* p. 110.

Like *R. affinis* generally, but the anterior horseshoe-shaped membrane is very large, completely concealing the muzzle when viewed from above, as in *R. pearsoni*; the posterior terminal leaf is also much longer, produced backwards between the ears, and not concave on the sides as in *R. affinis*. The thumb is also much longer.

Colour of fur bright reddish brown above and below.

Dimensions. Length of an adult male preserved in alcohol: head and body 2.5 inches, tail 0.9, ear (from origin of outer margin) 0.85, forearm 2.05, thumb 0.45.

Distribution. A single specimen in the Indian Museum, Calcutta, was obtained on the Southern Andaman Island. The above description is copied from Dobson; I have not been able to examine a specimen.

152. *Rhinolophus petersi*. *Peters's Horseshoe-Bat.*

Rhinolophus petersi, Dobson, *J. A. S. B.* xli, pt. 2, p. 337 (1872); *id. Mon. As. Chir.* p. 49; *id. Cat. Chir. B. M.* p. 114; Hutton, *P. Z. S.* 1872, p. 700; Anderson, *Cat.* p. 110; W. Blanford, *J. A. S. B.* lvii, pt. 2, p. 261.

Ears moderate, subacutely pointed, outer margin concave, separated from the large antitragus by a moderately deep angular notch.

Anterior nose-leaf moderate, not nearly covering the muzzle. Sella of uniform breadth from between the nostrils to the rounded extremity of the erect transverse process; to this is attached posteriorly a longitudinal buttress-like lamella, the convex upper margin of which exceeds the transverse portion in height. Posterior leaf a little longer than broad, with concave sides and a subacute tip. Lower lip with three grooves.

Wing-membrane from the ankles; interfemoral membrane nearly square behind, the tip of the tail projecting slightly. Fur long and soft.

Colour of fur varying from greyish mouse-colour to brown, generally paler and greyer below.

Dimensions. Head and body 2.5 inches, tail 1, ear (from head between ears) 0.55, from base 0.75, forearm 2.

Distribution. Mussoorie (Hutton), and Coonoor, Nilgiri hills, South India (W. Davison).

Habits. At Mussoorie, where it is not common, Peters's leaf-nosed bat is said by Hutton to be found only during the warm summer months. It hides in caves &c. during the day and flies in the evening high and rapidly as a rule, though it is occasionally seen hunting over beds of flowers.

153. *Rhinolophus macrotis.* The large-eared Horseshoe-Bat.

Rhinolophus macrotis (Hodgson), *Blyth, J. A. S. B.* xiii, p. 485 (1844); *id. Cat.* p. 25; *Jerdon, Mam.* p. 26; *Hutton, P. Z. S.* 1872, p. 699; *Dobson, Mon. As. Chir.* p. 45; *id. Cat. Chir. B. M.* p. 110; *Anderson, Cat.* p. 109; *Scully, J. A. S. B.* lvi, pt. 2, p. 241.

Ears very large, their length exceeding that of the head, bluntly pointed; outer margin slightly concave.

Anterior nose-leaf large, covering the upper lip; sella broad, rounded in front, maintaining the same breadth throughout the erect transverse portion, which is rounded above, and supported behind by a longitudinal buttress-like connecting process, hairy, equal or slightly superior to the transverse process in height, obtusely rounded above; posterior leaf triangular, obtusely pointed, subequilateral. Lower lip with three grooves across it.



Fig. 83.—Head of *R. macrotis*. (Dobson, *Mon. As. Chir.*)

Wing-membrane from the ankles; inter-femoral membrane generally pointed and projecting in the middle, but sometimes straight; the extreme tip of the tail free. Fur moderately long.

Colour sooty brown varying to light earthy brown (and probably to bright chestnut) above, paler and greyer below.

Dimensions. Head and body 1·7 inches long, tail 0·8, ear from crown of head 0·75 (from base 0·85), forearm 1·6. In fresh specimens the ear is an inch long according to Hutton and from nose to tail 2·5.

Distribution. Hitherto only recorded from two Himalayan localities, Nepal and Mussoorie. At the last-named locality one was captured at 5500 feet.

Habits. Hutton says of these bats, "They come out of caves in the earlier twilight hours, and may be seen flitting rapidly at some height in the air, chasing the small flies and beetles which abound during the rainy season."

154. *Rhinolophus minor.* The little Indian Horseshoe-Bat.

Rhinolophus minor, *Horsfield, Res. Java* (1824); *Blyth, J. A. S. B.* xxi, pp. 347 note, 361; *Hutton, P. Z. S.* 1872, p. 698; *Dobson, Mon. As. Chir.* p. 50; *id. Cat. Chir. B. M.* p. 114; *id. Report Brit. Assoc.* 1880, p. 175; *Anderson, Cat.* p. 110; *Scully, J. A. S. B.* lvi, pt. 2, p. 243; *W. Blanford, J. A. S. B.* lvii, pt. 2, p. 261.



- ♀ *Rhinolophus lepidus*, *Blyth, J. A. S. B.* xiii, p. 486 (1844).
Rhinolophus subbadius, *Blyth, J. A. S. B.* xiii, p. 486, xxi, pp. 347, 361; *id. Cat.* p. 25; *Jerdon, Mam.* p. 26, *nee Hodgson*.
Rhinolophus pusillus, *Dobson, P. A. S. B.* 1872, p. 155; *Blyth, Mam. Birds Burma*, p. 20, *nee Temminck*.
Rhinolophus garoensis, *Dobson, J. A. S. B.* xli, pt. 2, p. 387; *id. Mon. As. Chir.* p. 48; *id. Cat. Chir. B. M.* p. 115; *Anderson, Cat.* p. 110.

Ears a little shorter than the head, subacutely pointed, outer margin concave just below the tip.

Anterior nose-leaf deep from outer to inner margin, but not large enough to conceal the muzzle when viewed from above; sella somewhat broader in front, the erect transverse process a little narrower than that between the nostrils, and rounded off above, the longitudinal buttress-like lamella behind much higher than the transverse process, and pointed above (more pointed in some specimens than in others); posterior leaf longer than broad in general, and with the sides concave and the tip acuminate, but this is variable also, and in one variety (*R. garoensis*, fig. 84) the posterior leaf is almost an equilateral triangle with straight sides. Lower lip with three grooves.



Fig. 84.—Nose-leaf of *R. minor*, var. (*Dobson, Mon. As. Chir.*)

Wings from the ankles. Interfemoral membrane straight or nearly so behind, but somewhat variable.

Fur moderately long.

The second lower premolar is sometimes in the tooth-row, more often, as in most other species, external, wedged in between the outer angles of the adjoining teeth.

Colour of fur light brown above, greyish brown below, varying in tint as usual.

Dimensions. Head and body 1.75 inches, tail 0.75, ear from crown of head 0.45, from base 0.55, forearm 1.45.

Distribution. The Himalayas (Mussoorie, Nepal), Gáro hills, the Wynaad and Malabar Coast, and probably the neighbourhood of Calcutta (*R. lepidus*), Burma, Siam, Sumatra, Java, Borneo, and Japan. Apparently rare in the Peninsula of India. The Himalayan and Gáro form is that with the triangular posterior nose-leaf, fig. 84 (*R. subbadius*, Blyth, or *garoensis*, Dobson).

155. *Rhinolophus hipposiderus*. *The lesser Horseshoe-Bat.*

Noctilio hipposideros, *Bechstein, Naturg. Deutschl.* edit. 2, i, p. 1194 (1801).

Rhinolophus hipposideros, *Dobson, Mon. As. Chir.* p. 52; *id. Cat. Chir. B. M.* p. 117; *Scully, P. Z. S.* 1881, p. 198.

Ears nearly as long as the head, very pointed, the outer margin deeply concave and separated from the large antitragus by a deep angular notch.



Anterior nose-leaf broad from the nostrils to the margin, but not concealing the muzzle; sella of moderate breadth where flat, the erect transverse portion gradually becoming narrower, rounded at top; the hinder longitudinal buttress-like lamella hairy, pointed, scarcely exceeding the transverse portion in height; posterior leaf longer than broad, with the sides slightly concave and the tip blunt (fig. 80 B, p. 238). Lower lip with a single groove.

Wings from the ankles; interfemoral membrane projecting angularly behind; extreme tip of the tail free.

Colour of fur light brown above, light greyish brown below. Young animals often darker.

Dimensions. Head and body 1·55 inches, tail 1·15, ear from origin of outer margin 0·6, from head between ears 0·55, forearm 1·5.

Distribution. In India this species has only been observed in Gilgit, where Scully found it fairly common in the warm valleys 4000 to 6000 feet above sea-level, during the summer months. It is also met with throughout the greater part of the Palearctic region, extending in Western Europe as far north as the shores of the Baltic.

Habits. During the day *R. hipposiderus* hides in caves, ruined buildings, outhouses &c., often in large numbers. It usually appears abroad about dusk, and according to Scully has a powerful and long sustained flight, but Blasius says its flight is rather irregular and fluttering. It flies generally higher in the air than *R. ferrum-equinum*, and is more frequently found away from dense tree-growth.

156. *Rhinolophus ferrum-equinum.* *The greater Horseshoe-Bat.*

Vespertilio ferrum-equinum, Schreb. *Säugeth.* i, p. 174, pl. lxii (1775).

Rhinolophus ferrum-equinum, Dobson, *Mon. As. Chir.* p. 53; *id. Cat. Chir. B. M.* p. 119, partim; Scully, *P. Z. S.* 1881, p. 199.

Ears nearly equal to the head in length, sharply pointed; the outer margin concave just below the tip and separated below by a shallow obtuse notch from the moderately large antitragus.

Nose-leaf rather small, anterior horseshoe broad from nostrils to outer margin, but not nearly covering the muzzle; sella small, erect transverse process narrow, with the sides slightly concave and the top rounded; longitudinal buttress-like lamina behind a little higher than the transverse process, hairy and obtusely pointed; posterior leaf longer than broad, with concave sides and a blunt tip. Lower lip with a single groove.

Wings from the ankles, interfemoral membrane projecting slightly in the middle behind; tip of the tail free.

The second upper premolar is close to the canine; the first premolar minute and external to the tooth-row; second lower premolar very minute, often not to be detected, lying in the outer angle between the closely approximate first and third premolars.



Colour of fur above reddish brown with a greyish tinge, beneath pale grey, almost white.

Dimensions. Head and body 2.35 inches, tail 1.55, ear from anterior base 0.9, from crown of head 0.75, forearm 2.25.

Distribution. Europe, Africa, and Asia north of the Himalayas, not ranging quite so far north as *R. hipposiderus*, but extending to the Cape of Good Hope. Within Indian limits this species has, like *R. hipposiderus*, only been found in Gilgit.

Habits. In the day the greater horseshoe-bat hides in dry caves, outhouses, ruins, and similar places, like so many of the other *Rhinolophi*; it appears rather late in the evening, flies low, and keeps much about trees. Its flight is less well sustained than that of *R. hipposiderus*. Scully found it very common in the low hot valleys of Gilgit from about the middle of April to the end of September, its vertical range being from about 4500 to 5500 feet.

157. *Rhinolophus tragatus*. *Hodgson's Horseshoe-Bat*.

Rhinolophus tragatus, *Hodgson, J. A. S. B.* iv, p. 699 (1835); *Blyth, J. A. S. B.* xiii, p. 484, xxii, p. 409, note; *id. Cat.* p. 24; *Jerdon, Mam.* p. 24; *W. Blanford, J. A. S. B.* lvii, pt. 2, p. 263.

Rhinolophus ferrum-equinum, *Dobson, P. A. S. B.* 1872, p. 208; *id. Mon. As. Chir.* p. 53; *id. Cat. Chir. B. M.* p. 119, partim; *Hutton, P. Z. S.* 1872, p. 698; *Anderson, Cat.* p. 111, partim; *Scully, J. A. S. B.* lvi, pt. 2, p. 245; *nee Schreber*.

? *Rhinolophus brevitarisus**, *Blyth, Cat.* p. 24, no description.

This species, which was by Dobson united to *R. ferrum-equinum*, resembles that bat closely in all characters except in having three grooves instead of one on the lower lip, as was observed by Blyth (*J. A. S. B.* xxii, p. 409). The nose-leaf is considerably broader as a rule, but there is some variation in this respect. In structure, with the above exception, colour and dimensions the characters of the last species apply to the present. Pubic teats greatly developed.

Distribution. The Himalayas from Mussoorie to Sikhim, and from a moderate elevation to 6000 or 7000 feet.

Habits. According to Hodgson this bat emerges from the rock-cavities in which it passes the day sooner in the evening than the *Vespertilionidae* and always in considerable numbers. It is not migratory and does not hibernate. It breeds once in the year towards the close of summer and produces two young.

The only Asiatic *Rhinolophi* not found in India are two Western forms, *R. euryale* and *R. blasii*, *R. acuminatus* known only from Java, and two Philippine species. The remaining members of the genus are African or Australian, mostly the former.

* Founded on a dried specimen in bad condition, perhaps referable to *R. minor* (see Dobson, *Cat. As. Chir.* p. 197, no. 197).

Subfamily HIPPOSIDERINÆ.

This subfamily is distinguished from the *Rhinolophina* by having only two phalanges in all the toes (a character exhibited by only one other bat, the American *Thyroptera tricolor*), by the absence of a notch in the outer border of the ear, and consequently by having no distinct antitragus, and by the shape of the nose-leaf, the posterior portion of which is not triangular. Another peculiarity, unknown amongst other Chiroptera, is the existence of a second pair of large foramina in the pelvis, besides the usual thyroid or obturator foramina. The second foramen is preacetabular, and formed by the ileo-pectineal spine being united by a bony isthmus with a process derived from the antero-inferior surface of the ilium. This character, Dobson points out, greatly strengthens the pelvis, which is remarkably weak in bats, but it is not known whether any peculiarity in the habits of *Hipposiderus* and its allies corresponds to the increased strength of the pelvic girdle.

Two genera of the *Hipposiderina* occur in India and a third is known from Persia and may probably occur in Baluchistan. These genera may thus be distinguished:—

- | | |
|--|---------------|
| A. No flat expanded lamina between the nostrils; a transverse swollen bar behind them. | |
| <i>a.</i> Anterior nose-leaf or horseshoe not divided in the middle | HIPPOSIDERUS. |
| <i>b.</i> Anterior nose-leaf divided into two distinct lappets | CŒLOPS. |
| B. A flat expanded lamina between the nostrils, no transverse bar behind them | TRIENOPS. |

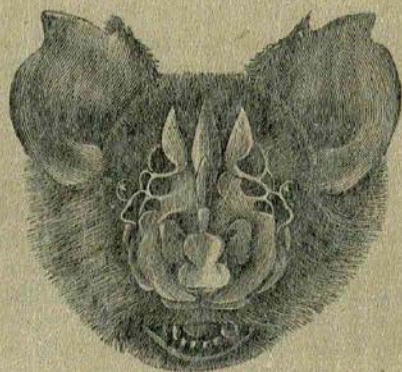


Fig. 85.—Head of *Trienops persicus*, $\times 2$. (Dobson, Mon. As. Chir.)

Trienops persicus has been found in Persia at Shiráz, and in East Africa. Should it occur within Indian limits, the accompanying woodcut will enable it to be easily recognized. It is a pale buff bat, with the forearm 2 inches long.

Genus **HIPPOSIDERUS**, Gray (1831).Syn. *Phyllorhina*, Bonaparte (1837), *neq* Leach; *Asellia*, &c., Gray.

The nose-leaf more or less square or oblong in form, and complicated, consisting of three portions—anterior, median (or *sella*), and posterior; the anterior horseshoe-shaped or semicircular as in *Rhinolophus*, resting flatly on the muzzle, but without any deep incision, and, in most species, without even a notch, in front. The nostrils open freely in the middle of the horseshoe, each is generally partly or wholly surrounded by a lamina, and there is a more or less pronounced longitudinal ridge between them. On each side of the horseshoe there are, in several species, supplementary leaflets forming a fringe. The *sella* does not come forward between the nostrils; it is a prominent transverse bar behind them and divides the horseshoe in front from the posterior leaf behind. The latter is never triangular: the hinder margin is simply rounded in most species, tricuspid in a few; it is usually bent forward over the front surface of the leaf, which is generally divided into shallow cells (as a rule four in number) by longitudinal (antero-posterior) ribs (fig. 80 C, p. 268). Behind the nose-leaf there is, in the males of several species, and to a smaller degree in females, a large pore, being the orifice of a glandular sac, which the animal can evert at pleasure like the finger of a glove; the opening is marked by a pencil of stiff hairs. At the sides of the posterior leaf and above the eyes are one or more wart-like prominences, sometimes bearing pores; in some species these prominences form a kind of fringe to the posterior nose-leaf.

Dentition: i. $\frac{2}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{2-3}$. First upper premolar minute, blunt, in the outer angle between the canine and second premolar, rarely deciduous except in *H. tridens* and one other species (not Indian), in which adults have pm. $\frac{1-1}{2-2}$.

I have explained at full length elsewhere (P. Z. S. 1887, p. 637) the reasons that have induced me to employ the name *Hipposiderus* for this genus instead of *Phyllorhina*, which is adopted by Dobson and others.

The genus *Hipposiderus* ranges throughout the tropical and sub-tropical parts of Asia (including the Malay Archipelago), Africa, and Australasia. It is not Palearctic like *Rhinolophus*, nor is it by any means restricted in India to the hills and highlands. The Indian species are not quite so numerous as those of *Rhinolophus*, but they are more generally diffused.

Synopsis of Indian, Ceylonese, and Burmese Species.

- A. Size large, forearm exceeding 3 inches.
 a. A large frontal glandular sac; posterior leaf narrower than horseshoe; forearm about 3·5 *H. armiger*, p. 283.
 b. No frontal sac; posterior leaf not narrower than horseshoe; forearm about 3·4 *H. diadema*, p. 284.



- B. Size small, forearm less than 3 inches.
- a. Posterior margin of nose-leaf terminating in three sharp points; forearm 1.75 *H. tridens*, p. 282.
- b. Posterior margin of nose-leaf rounded.
- a'. Three supplementary leaflets on each side of the horseshoe.
- a''. Surface of posterior leaf divided into 2 cells; forearm 2.6 *H. nicobarensis*, p. 286.
- b''. Surface of posterior leaf divided into 4 cells.
- a. Posterior leaf narrower than horseshoe; forearm 2.45 *H. leptophyllum*, p. 284.
- β. Posterior leaf as wide as horseshoe or wider.
- a'. Hinder margin of interfemoral membrane straight; forearm 2 *H. speoris*, p. 287.
- β'. Hinder margin of interfemoral membrane forming a salient angle; forearm 2.25 *H. larvatus*, p. 288.
- b'. Two supplementary leaflets; forearm 1.75 *H. galeritus*, p. 287.
- c'. No supplementary leaflets.
- a'. Ears laid forward extend to muzzle; forearm 1.55 *H. bicolor*, p. 289.
- b'. Ears do not extend to muzzle; forearm 1.4 *H. amboinensis*, p. 290.

158. *Hipposiderus tridens*. *The trident leaf-nosed Bat*.

Rhinolophus tridens, Geoffroy, *Descr. de l'Égypte*, ii, p. 130 (1813).

Phyllorhina tridens, Dobson, *Cat. Chir. B. M.* p. 131.

Phyllorhina tridens, var. *murraiana*, Anderson, *Cat.* p. 113; Murray, *Vert. Zool. Sind.* p. 6, pl. i, fig. 2 (head).

Ears of moderate size, tips pointed, outer margin slightly concave above, then convex, inner margin very convex. Anterior nose-leaf or horseshoe semicircular, having, on each side, two secondary leaflets; sella prominent, trilobate; posterior leaf having the surface divided into four cells by three longitudinal ribs, and terminating above on the forehead in three thickened and pointed projections.

Wings from the lower third of the tibia; interfemoral membrane short, square behind; the last two vertebræ of the tail and sometimes part of the penultimate free. First minute upper premolar deciduous.

Colour of fur above greyish brown, the basal portion paler, sometimes white; beneath wholly yellowish white or pure white.

Dimensions of a Karáchi specimen: head and body 2.3 inches, tail 1, ear from origin of outer margin 0.75, forearm 2.1. African specimens are smaller.

Distribution. Sind; procured in Karáchi by Mr. J. Murray, who observed it in April about dusk in large numbers. Also found in Southern Persia, Mesopotamia, Egypt, and Zanzibar.



The variety called *murraiana* by Anderson is larger, its ears are somewhat shorter, broader, and less pointed, and its wing and interfemoral membranes are attached rather lower on the tibia. One or two other small differences are noted, but they are not of much importance.

159. *Hipposiderus armiger*. *The great Himalayan leaf-nosed Bat.*

Rhinolophus armiger, *Hodgson, J. A. S. B.* iv, p. 699 (1835).

Hipposideros armiger, *Blyth, J. A. S. B.* xiii, p. 488; *id. Cat.* p. 25; *Jerdon, Mam.* p. 27.

Hipposideros diadema, *Cantor, J. A. S. B.* xv, p. 181, *nec Geoffroy*.
Phyllorhina armigera, *Hutton, P. Z. S.* 1872, p. 700; *Dobson, P. Z. S.* 1873, p. 242; *id. J. A. S. B.* xliii, pt. 2, p. 234; *id. Mon. As. Chir.* p. 64; *id. Cat. Chir. B. M.* p. 135; *Anderson, Cat.* p. 114; *Scully, J. A. S. B.* lvi, pt. 2, p. 245.

Ears moderate, tips blunt, outer margin slightly concave near the tip, then moderately convex, inner margin convex.

Nose-leaf large; anterior leaf shield-shaped, with four supplementary leaves on each side; sella trilobate, posterior leaf narrower than the anterior (exclusive of the lateral leaflets), the surface divided into four cells as usual, the hinder margin sinuate, slightly elevated at the centre and at both ends (fig. 80 C, p. 268). There is a well-marked frontal sac with a transverse opening; this sac is much developed in old males, in which it forms the apex of a swollen fleshy naked area bordering the posterior leaf behind and on the sides. In females there are only wart-like elevations on each side above the eyes.

Wing-membrane from the tibia a little above the ankle; interfemoral membrane projecting triangularly behind; extreme tip of tail free. Fur soft and thick.

Colour of fur varying from light to dark brown, generally dark brown, a little paler below. The hairs of the back, in some cases at all events, are brown at the base, then whitish, and darker brown at the tips.

Dimensions of a large male: head and body 4.2 inches long, tail 2.1, ear from origin of outer margin 1.15, from crown of head 0.95, forearm 3.8. In a female the head and body are 3.5, tail 2.2, forearm 3.3 inches. This is the largest of Indian *Rhinolophidae* and is only exceeded in size by one species of the family, the African *H. commersoni*.

Distribution. Himalayas (Mussoorie, Nepāl, Sikhim), Khāsi hills, also Penang, Cochin China, and China. Ceylon is given by Dobson as a locality, but I am unable to discover the authority*. This bat probably inhabits Burma.

* Perhaps Blyth, *J. A. S. B.* xxi, p. 346, where *H. lankadiva*, Kelaart, was identified with *H. armiger*. But the specimens referred to by Blyth in the passage have been identified by Dobson with *H. diadema*, *Mon. As. Chir.* p. 200.



Habits. Hutton describes this species as not enveloping itself so completely in its wings, when suspended by its feet, as *Rhinolophido*, and as keeping the tail and interfemoral membrane turned up over the lower part of the back. He observed specimens at Mussoorie in a loft, whence they issued before dark, or, during cloudy and misty weather, before sunset, and flew with a slow steady flight about the trees, capturing beetles and *Cicada*. The latter, as Hutton remarks, are peculiarly noisy just after sunset in the rainy season and thus are easily found by the bats.

When this bat is captured alive, Hutton says, the large ears are kept in a constant state of rapid tremulous motion, and the animal emits a low purring sound, which becomes a sharp squeak under the influence of alarm or irritation. The tremulous motion of the ears is common to the majority of insectivorous bats.

According to Hodgson *H. armiger* breeds once a year and produces two young towards the close of summer.

160. *Hipposiderus leptophyllum*. *Dobson's leaf-nosed Bat*.

Phyllorhina leptophylla, Dobson, *J. A. S. B.* xliii, pt. 2, p. 234 (1874); *id. Mon. As. Chir.* p. 66; *id. Cat. Chir. B. M.* p. 136; *Anderson, Cat.* p. 114.

"Ears rather large, broad and triangular, with subacute tips, the outer margin slightly concave beneath the tip. The upper (posterior) transverse nose-leaf small, upper edge simple, narrower than the horseshoe portion, thin, the three vertical folds in front faintly discernible at the base only; the horseshoe with a small incision in the centre of its front free edge; frontal pore small, placed at some distance behind the transverse nose-leaf.

"Wing-membranes from the tibia, a short distance above the ankle; interfemoral membrane triangular, the extremity of the tail projecting.

"Fur and integuments dark throughout.

"Distinguished from *H. armiger* by its considerably smaller size, by the upper transverse nose-leaf being simple, not lobed above as in that species, and by the incised front edge of the horseshoe, which in *H. armiger* is invariably plain.

"Length (of an adult male preserved in alcohol): head and body 2·5 inches, tail 1·65, ear (from origin of outer margin) 0·9, forearm 2·45." (*Dobson*.)

Distribution. The Khási hills, where a single specimen was obtained by Col. H. H. Godwin-Austen. No other is known. The above is copied from Dobson's description.

161. *Hipposiderus diadema*. *The large Malay leaf-nosed Bat*.

Rhinolophus diadema, Geoffroy, *Ann. Mus. Hist. Nat.* xx, p. 263 (1813).

Rhinolophus nobilis, Horsfield, *Res. Java* (1824).



Hipposideros nobilis, Cantor, *J. A. S. B.* xv, p. 182; *Blyth, J. A. S. B.* xxi, p. 346; *id. Cat.* p. 23.

Hipposideros lankadiva, Kelaart, *Prod.* p. 19; *Blyth, J. A. S. B.* xx, p. 183; *id. Cat.* p. 26.

Phyllorhina masoni, Dobson, *J. A. S. B.* xli, pt. 2, p. 338.

Phyllorhina diadema, Dobson, *Mon. As. Chir.* p. 61; *id. Cat. Chir. B. M.* p. 137; *Blyth, Mam. Birds Burma*, p. 20; *Anderson, Cat.* p. 115.

Hipposiderus diadema, *W. Blanf. J. A. S. B.* lvii, pt. 2, p. 263.

Ears pointed, outer margin nearly or quite straight below the tip.

Anterior nose-leaf about the same width on the face as the posterior, almost semicircular, with three supplementary leaflets on each side. Sella with a prominent ridge in the middle. Posterior leaf with a rounded free margin, slightly prominent and thickened

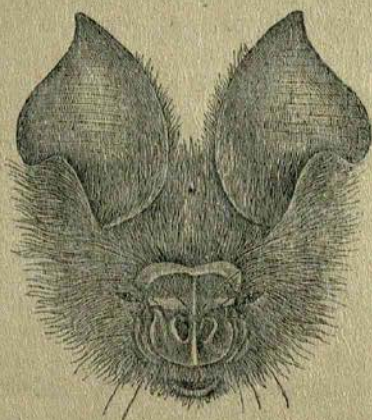


Fig. 86.—Head of *Hipposiderus diadema*, var. (*H. masoni*). (Dobson, *Mon. As. Chir.*)

in the middle, the front surface divided into four cells by longitudinal ribs as usual. No frontal pore. Wings from the ankles; interfemoral membrane large, projecting triangularly behind; last caudal vertebra free.

Colour. Fur various shades of brown above, paler below. The basal and terminal portions of the dorsal hair brown, intermediate parts paler, sometimes white.

Dimensions. Head and body 3·4 inches, tail 2·3, ear from the crown 0·9, forearm 3·4 (varying from 3 to 3·6).

Distribution. In the Indian Peninsula this species has been found by Mr. V. Ball at Udaipur, north-west of Sambalpur, Central Provinces, and by myself near Bhandāra east of Nāgpur; remains also occur fossil in the Kurnool caves (Pleistocene). Other localities are Ceylon, Sikhim, Moulmein, Penang, and most of the islands in the Malay Archipelago, also the Philippines.

A specimen (fig. 86) from Moulmein, which differs in having the posterior nose-leaf divided into two cells only and in having

a small bony process from the symphysis of the mandible, was separated by Dobson as *Phyllorhina masoni*; but in his British Museum Catalogue he states that the differences are probably merely individual peculiarities.

Habits. This species, like other members of the genus, haunts rocky caves, old tombs, and other buildings; Kelaart found it swarming in a tunnel cut through a rocky hill near Kandy.

162. *Hipposiderus nicobarensis.* *The Nicobar leaf-nosed Bat.*

Phyllorhina nicobarensis, Dobson, *J. A. S. B.* xl, p. 262, pl. xx, fig. 2 (1871); *id. Mon. As. Chir.* p. 63; *id. Cat. Chir. B. M.* p. 138; *Anderson, Cat.* p. 115.

"Ears large, acutely pointed, outer margin slightly concave beneath the tip; no frontal sac behind the nose-leaf; upper margin of the transverse leaf simple, forming an arc of a circle, folded back

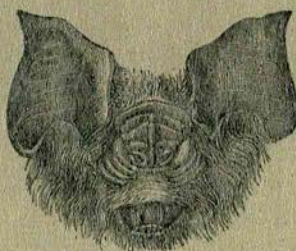


Fig. 87.—Head of *Hipposiderus nicobarensis*. (Dobson, *Mon. As. Chir.*)

(? forward) and overhanging the concave front surface, which is divided into *two cells only* by a single central vertical ridge; in front the margin of the horseshoe has three small points.

"Wing-membrane from the base of the metatarsal bone of the outer toe; tail of six vertebrae, the last free.

"Fur above light brown at the base, then greyish brown, with light brown extremities; beneath pale brownish grey."

Dimensions. Head and body 3 inches, tail 1·7, ear from origin of outer margin 0·9, forearm 2·6.

Distribution. Nicobar Islands. The only specimen known was procured by Dr. Stoliczka and is preserved in the Indian Museum, Calcutta.

The above description is copied from Dobson; the form resembles *H. diadema*, but is distinguished by the posterior leaf being only divided into two cells, by the different attachment of the wing-membrane, and by much smaller size. From the figures it appears that there are three supplementary leaves on each side of the horseshoe, and the sella appears to have a prominent median ridge.

163. *Hipposiderus galeritus*. *Cantor's leaf-nosed Bat*.

Hipposiderus galeritus, *Cantor*, *J. A. S. B.* xv, p. 183 (1846).

Phyllorhina brachyota, *Dobson*, *J. A. S. B.* xliii, pt. 2, p. 237.

Phyllorhina galerita, *Dobson*, *Mon. As. Chir.* p. 69; *id.* *Cat. Chir.* B. M. p. 141; *Anderson*, *Cat.* p. 116.

Ears comparatively short and broad, outer margin concave below the blunt tip, then convex, inner margin very convex.

Anterior nose-leaf well developed, extending almost to the end of the muzzle, and having two secondary leaflets on each side; sella broad, with a slightly prominent ridge in the middle; posterior leaf evenly rounded behind, the surface divided into four cells by longitudinal ribs. Frontal sac distinct in males, just behind the posterior leaf, very indistinct in females.

Thumb and foot small; wing from the metatarsus, between the ankle and the base of the toes; interfemoral membrane broad, projecting triangularly behind; tip of the tail free. Second upper premolar more distant from the canine than usual in this genus; first premolar minute.

Colour of fur deep reddish brown above, paler beneath, the fur on the shoulders and along the spine darkest. The dorsal hairs are light brown at the base, the terminal third dark brown, the extreme tips paler again. Bright ferruginous specimens also occur.

Dimensions. Head and body 2 inches, tail 1.4, ear from crown 0.4, forearm 1.75.

Distribution. This form appears to be very rare west of the Bay of Bengal; it has been found in Ceylon and at one locality in the Indian Peninsula, Lingasugur, N.N.W. of Bellary. It has been recorded from Penang, Singapore, Java, and Borneo.

Dobson notices some variation in the size of the nose-leaf, length of the tail, and place of attachment of the wing-membrane.

164. *Hipposiderus speoris*. *Schneider's leaf-nosed Bat*.

Vespertilio speoris, *Schneider*, *Schreber*, *Säugeth. Supp.* pl. 59 B; *Geoff. Ann. Mus.* xx, p. 261 (1813).

Rhinolophus dukhunensis, *Sykes*, *P. Z. S.* 1831, p. 99.

Rhinolophus speoris, *Elliot*, *Mad. Jour. L. S.* x, p. 98.

Hipposideros speoris, *Blyth*, *J. A. S. B.* xiii, p. 489, xxi, p. 347; *id.* *Cat.* p. 26; *Jerdon*, *Mam.* p. 27.

Hipposiderus speoris, *H. templetoni*, *H. aureus*, and *H. blythii*, *Kelaart*, *Prod.* pp. 17, 18, 20.

Phyllorhina speoris, *Dobson*, *Mon. As. Chir.* p. 67; *id.* *Cat. Chir.* B. M. p. 143; *Blyth*, *Mam. Birds Burma*, p. 21; *Anderson*, *An. Zool. Res.* p. 97; *id.* *Cat.* p. 116.

Ears broad, pointed, outer margin concave below the tip, then convex, and having a small spine-like projection about one third the distance from the base to the tip (in the same position as the notch in *Rhinolophus*); upper third of inner margin nearly straight, lower two thirds very convex.



Anterior nose-leaf not covering the end of the muzzle, having three supplementary leaflets on each side; sella broad; posterior leaf evenly rounded behind, the surface divided into four cells by longitudinal ridges. Frontal sac well developed. Wing-membranes from the tibia near the ankle. Interfemoral membrane short, square behind; the end of the tail projecting.

Colour of fur above brown, varying from bright golden-brown to mouse-colour, the hairs white at the base; below, the tint is similar but paler.

Dimensions. Head and body 2·4 inches, tail 0·85, ear from crown 0·5, forearm 2.

Distribution. Throughout the greater part of India, specimens having been obtained from Dehra Dun, from Chānda and other localities in the Deccan, and from several places in Southern India (Madras, Nellore, Trichinopoly, Travancore, &c.), where Jerdon says this bat is far from rare, inhabiting old buildings, wells, &c. It also appears to be common in Ceylon. It has been found at Prome in Burma, and has an extensive range in the Malay Archipelago.

As in so many other cases, nothing appears known of the habits of this common bat, except that it is found in caves and masonry-buildings, ruins, tombs,* wells, &c.

165. *Hipposiderus larvatus*. *Horsfield's leaf-nosed Bat*.

Rhinolophus larvatus, vulgaris, deformis, and insignis, *Horsfield, Res. Java* (1824).

Hipposideros larvatus, *Blyth, J. A. S. B.* xiii, p. 488; *id. Cat.* p. 26.

Hipposideros vulgaris, *Blyth, J. A. S. B.* xiii, p. 488; *Cantor, J. A. S. B.* xv, p. 183.

Phyllorhina larvata, *Dobson, P. A. S. B.* 1872, p. 155; *id. J. A. S. B.* xliii, pt. 2, p. 235; *id. Mon. As. Chir.* p. 68; *id. Cat. Chir. B. M.* p. 145; *Blyth, Mam. Birds Burma*, p. 21; *Anderson, An. Zool. Res.* p. 97; *id. Cat.* p. 117.

Ears broad, pointed, outer margin concave below the tip, then convex; there is a slight thickening about one third the distance from the base, but no distinct projection as in *H. speciosus*.

Anterior nose-leaf not covering the end of the muzzle and having three supplementary leaflets on each side; sella well developed, distinctly trilobed; posterior leaf rather broader than the horse-shoe, divided into four cells, hinder margin regularly rounded. A well-marked frontal sac in males, but much smaller in females. In some males the wart-like glandular prominences on each side of the posterior leaf are greatly developed, as in *H. armiger*. Wings from the ankle-joint, or from the tibia just above; interfemoral membrane projecting and triangular behind; extreme tip of tail free.

Colour of fur very variable, generally reddish brown, the base of the hairs paler.

Dimensions. Head and body 3 inches, tail 1·5, ear from crown 0·75, forearm 2·45.



Distribution. Assam, Sylhet, and throughout Burma, also Siam and Java.

This species is closely allied to *H. speoris*, but distinguished by larger size, proportionally larger ears, and by the posterior margin of the interfemoral membrane forming a salient angle, instead of being straight.

166. *Hipposiderus bicolor.* *The bicoloured leaf-nosed Bat.*

Rhinolophus bicolor, *Temminck, Mon. Mam.* ii, p. 18 (1835-41).

Hipposideros fulvus and murinus, *Gray, Mag. Zool. Bot.* ii, p. 492 (1838); *Blyth, J. A. S. B.* xiii, p. 489, xxi, p. 347.

Rhinolophus murinus and fulgens, *Elliot, Mad. Jour. L. S.* x, p. 99.

? *Rhinolophus subbadius*, *Hodgson, J. A. S. B.* xiii, p. 486, *nec Blyth.*

Hipposideros murinus, *Cantor, J. A. S. B.* xv, p. 183.

Hipposideros ater, *Templeton, J. A. S. B.* xvii, p. 252.

Hipposideros fulvus, murinus, and atratus, *Kelaart, Prod.* pp. 15, 16.

Hipposideros cineraceus, *Blyth, J. A. S. B.* xxii, p. 410.

Hipposideros cineraceus and murinus, *Blyth, Cat.* p. 27; *Jerdon, Mam.* p. 28.

Phyllorhina fulva, *Dobson, P. A. S. B.* 1872, p. 155; *id. J. A. S. B.*

xli, pt. 2, p. 220, xliii, pt. 2, p. 235; *id. P. Z. S.* 1873, p. 250;

Anderson, An. Zool. Res. p. 98; *Scully, J. A. S. B.* lvi, pt. 2, p. 248.

Phyllorhina bicolor, *Hutton, P. Z. S.* 1872, p. 702; *Dobson, Mon. As.*

Chir. p. 70; *id. Cat. Chir. B. M.* p. 148; *Anderson, Cat.* p. 117.

Hipposiderus bicolor, *W. Blanf. J. A. S. B.* lvii, pt. 2, p. 262.

Ears extending to the end of the muzzle when laid forward, broad, with very blunt rounded tips, outer margin straight, not concave below the tip. A low raised band of skin connects the base of the ears across the crown of the head; this band is hairy and requires to be looked for.

Nose-leaf small, oblong; no secondary leaflets at the side of the horseshoe, which is of about the same width as the posterior leaf, or rather narrower; sella less broad transversely than the anterior leaf; posterior leaf rounded behind, the front surface concave, divided longitudinally into four cells. Frontal sac well developed in males, rudimentary in females.

Wing-membrane from the ankle or tarsus; interfemoral membrane projecting angularly slightly behind; tip of tail free.

Colour varying from golden chestnut to very dark reddish brown, almost black, above, paler, sometimes white, below. The fur is generally pure white, buffy white, or grey for three-quarters of its length, the tips reddish brown, or ashy brown, or blackish. Some specimens are brilliant golden or bright ferruginous. Dobson found that several golden-coloured specimens examined by himself were pregnant females, but males were subsequently obtained by Anderson in Burma exhibiting the same brilliant coloration, though both males and females were found in adjoining caves of the usual coloration, whitish fur with dark tips.

Dimensions. A male Burmese specimen measured:—head and body 1.75 inches, tail 1.15, ear from crown 0.75, forearm 1.55.



Distribution. The Oriental region and part of the Australian. Throughout India from Sind, the Punjab, and North-west Himalayas, below about 5000–6000 feet, to Cape Comorin; also in Ceylon, Assam, Burma, &c.

Varieties. Dobson recognizes four varieties, chiefly distinguished by the size of the ears. One of these, however, *H. amboinensis*, with the shortest ears of all, is altogether smaller in size, and must I think, from its distribution throughout the same area, be kept distinct. Of the other varieties, one, *H. aruensis*, is not Indian; whilst the typical *H. bicolor*, with ears as long as the head, has only been found within our area in the Nicobar Islands; *H. fulvus*, with ears longer than the head, being the common Indian and Burmese form.

Habits. Scarcely any information is available. This species lives during the day in caves, old tombs, and other buildings, like most members of the family. If Dobson's suggestion be correct, the golden colour observed in some members of this species is assumed during the breeding-season only, and, if so, it is a manifest corollary that the season must vary in different individuals. A similarly brilliant coloration is occasionally found in *H. speoris* and some other species and in the smaller *Rhinolophi*. This was noticed as long ago as 1852 by Blyth.

167. *Hipposiderus amboinensis.* *The little leaf-nosed Bat.*

? *Rhinolophus subbadius*, *Hodgson, J. A. S. B.* xiii, p. 486, *nee Blyth*.

Phyllorhina amboinensis, *Peters, MB. Akad. Berl.* 1871, p. 323;

Dobson, Mon. As. Chir. p. 72; *id. Cat. Chir. B. M.* p. 150; *Scully,*

J. A. S. B. lvi, pt. 2, p. 249.

Phyllorhina micropus, *Hutton, P. Z. S.* 1872, p. 703.

Ears when laid forward not extending to the end of the muzzle. Size considerably smaller, and projecting extremity of tail longer. In other respects this species agrees with *H. bicolor*, to which it was united by Dobson.

Dimensions. Head and body 1·7 inches, tail 0·95, ear from crown 0·45, forearm 1·4.

Distribution. This bat has been found at Mussoorie and Katmandu in the Himalayas, and at Lingasugur, N.N.W. of Bellary in the Deccan; also in Amboyna.

H. stoliczkanus (*Phyllorhina trifida*, Peters), a small species with the posterior nose-leaf very peculiarly formed, is found in Penang. Although the type of *P. trifida* was said to be from Burma (*P. Z. S.* 1871, p. 513), the form has not yet been obtained except at the original locality.

Genus **CÆLOPS**, Blyth (1848).

Nose-leaf well developed, consisting of three parts. Anterior leaf bifid, composed of two distinct lappets, one on each side, from



beneath each of which a supplementary lappet extends forward over the muzzle. Sella transverse, as in *Hipposiderus*. Posterior leaf semicircular, the rounded posterior margin bent forward so as partly to conceal the front surface, and bearing a small heart-shaped, flat projection in the middle. Index finger extending beyond the end of the first phalanx of the middle finger. No tail. Calcaneum short and weak; interfemoral membrane deeply emarginate.

Dentition: i. $\frac{2}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$, as in *Hipposiderus*. The upper incisor has a small additional cusp in front, and a large one behind, both some distance above the base. First upper premolar small, placed internally to the tooth-row. The teeth generally resemble those of *Hipposiderus*.

168. *Cœlops frithi*. *The tailless leaf-nosed Bat*.

Cœlops frithi, Blyth, *J. A. S. B.* xvii, p. 251 (1848); *id. Cat.* p. 27; *Jerdon, Mam.* p. 29; *Dobson, J. A. S. B.* xli, pt. 2, p. 141; *id. Mon. As. Chir.* p. 74; *id. Cat. Chir. B. M.* p. 152; *id. Rep. Brit. Assoc.* 1880, p. 180; *Anderson, Cat.* p. 119.

Ears rounded, the whole surface hairy, both margins convex, and the outer margin very much so, so as to form a large antitragal lobe, which, however, is not separated by any notch from the rest of the ear-conch. The supplementary lappets of the anterior nose-leaf

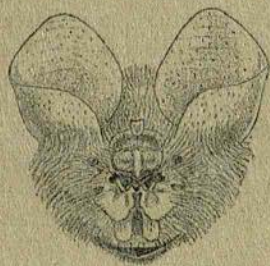


Fig. 88.—Head of *Cœlops frithi*. (Dobson, *Cat. Chir. B. M.*)

come forward beyond the end of the muzzle. There are two or three tubercles on the nose-leaf close to the nostrils, which are much sunken. Sella very broad from front to back and with a raised rib in the middle. The sides of the nose-leaf covered with long hairs, as is the face generally. Behind the posterior leaf is a circular pore with a pencil of long hairs from it.

Metacarpal bone of thumb very long, phalanx short; the thumb included in the wing-membrane to the base of the claw.

Wings from the metatarsus. The posterior border of the interfemoral membrane angularly emarginate as far as a line between the knees.

Colour dusky, the fur tipped with dull ashy brown above, paler and somewhat albescent below, according to Blyth, but Dobson says shining brown above and below, the bases of the hairs much paler. There is probably some variation.

Dimensions. Head and body 1·7 inches, depth of interfemoral membrane in middle 0·3, ear from crown 0·45, forearm 1·6, thumb without claw 0·3 (of which the metacarpal is 0·25).

Distribution. This was originally described from a Sundarban specimen, but has recently been discovered at Darjiling by Col. Kinloch. It has also been found in Siam and Java.

Family NYCTERIDÆ.

A distinct nose-leaf around the nostrils, which are situated on the upper surface of the muzzle. Ears large, united at the base; tragus well developed. Middle finger with two phalanges, of which the first is extended in repose, in a line with the metacarpal bone; index finger with or without a phalanx besides the metacarpal; tibia long, fibula rudimentary or absent. Premaxillary bones cartilaginous or small; upper incisors small or absent; molars well developed.

The nasal appendages are much less complicated than in the *Rhinolophidæ*, but are well developed in the Indian forms belonging to the present family.

The *Nycteridæ* inhabit the Ethiopian, Oriental, and Australian regions. Two subfamilies, each containing a single genus, are recognized by Dobson, but only one of these occurs within Indian limits.

Genus **MEGADERMA**, Geoffr. (1810).

Muzzle long; nostrils in a depression near the extremity, surrounded by a naked expansion or nose-leaf, which extends to the end of the muzzle anteriorly and for some distance posteriorly between the eyes; the nostrils are covered and concealed by a second smaller flat leaf, resting upon the other; the lower lip, when viewed from above, is seen to project beyond the upper. Ears large, joined at the base; tragus long, bifid. No external tail. Wings ample; interfemoral membrane large, concave behind. Index finger with a single short bony phalanx besides the metacarpal bone; tibia very long; calcaneum distinct. A pair of pubic teat-like appendages as in the *Rhinolophidæ*.

Dentition: i. $\frac{0}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$, in both Indian species.

The upper canine has a pointed internal basal cusp, directed

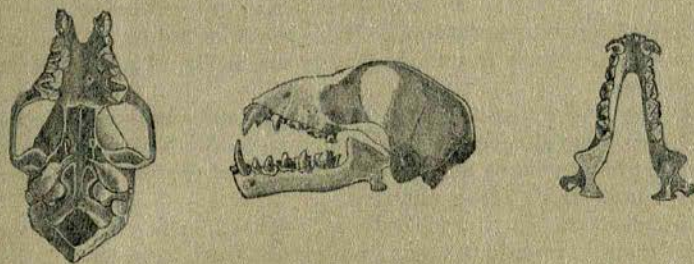


Fig. 89.—Skull of *Megaderma lyra*. (Dobson, Mon. As. Chir.)

obliquely inwards, and resembling an incisor, also a large posterior cusp. The first upper premolar is exceedingly minute, and situated



quite inside the anterior lobe of the large second premolar; the last molar is scarcely half the size of either of the anterior molars. Lower incisors equal, tricuspid. The African forms want the first upper premolar entirely.

Species of *Megaderma* are found in Southern Asia, the Malay Archipelago, in Australia and in Africa. Two forms occur within Indian limits.

Synopsis of Indian, Ceylonese, and Burmese Species.

- A. Posterior termination of nose-leaf truncated. . . . *M. lyra*, p. 293.
B. Posterior termination of nose-leaf rounded *M. spasma*, p. 294.

169. *Megaderma lyra*. *The Indian Vampire Bat.*

Megaderma lyra, Geoffr. *Ann. Mus.* xv, p. 190 (1810); Blyth, *J. A. S. B.* xi, p. 255, xiii, p. 480, xx, p. 156; *id. Cat.* p. 22; Kelaart, *Prod.* p. 11; Jerdon, *Mam.* p. 22; Dobson, *P. A. S. B.* 1872, p. 203; *id. Mon. As. Chir.* p. 78; *id. Cat. Chir. B. M.* p. 156; Anderson, *Cat.* p. 120.

Vespertilio (*Megaderma*) *carnatica*, Elliot, *Mad. Jour. L. S.* x, p. 96.
Megaderma spectrum, Wagner, *Hügel's Kaschmir*, iv, p. 569, pl.; Jerdon, *Mam.* p. 22.

Megaderma schistacea, Hodgson, *J. A. S. B.* xvi, p. 889, pl. xxxix.

Ears very large, extending, when laid forward, considerably beyond the muzzle, their inner margins united for more than one third the length; their tips broadly rounded off, margins convex,



Fig. 90.—Head of *Megaderma lyra*. (Copied from Dobson, *Cat. Chir. B. M.*)
outer margins terminating halfway between the tragus and the angle of the mouth. Tragus very large, bifid, the posterior portion long and pointed, the anterior portion about half the length of the posterior, rounded on its anterior margin and above.

Nose-leaf rounded in front, not varying much in breadth, but with a notch on each side behind the nostrils, dividing it into an anterior and posterior portion, the latter much the longer, having



the sides slightly convex and the posterior termination cut off squarely. The additional leaf that covers the nostrils is rounded below and joined to a prominent rib that traverses the posterior leaf from end to end, a deep groove corresponding to it on the lower surface. Lower lip with a projecting triangular naked extremity, divided by a deep median groove.

Wing-membranes from the back of the foot, at the base of the two outer toes. Fur soft and moderately long.

Colour of fur dark ashy or slaty grey above, paler, sometimes whitish, below.

Dimensions. Head and body 3·4 inches, ear from crown 1·1 (from origin of outer margin 1·6), forearm 2·6.

Distribution. India generally from Kashmir to Cape Comorin, and Ceylon; occurring west as far as Karachi, and east to Calcutta and Mymensingh. This species is also found in China (Amoy, see Swinhoe, P. Z. S. 1870, p. 616; and Swatow, whence there is a skin in the British Museum). Hitherto, however, this bat has not been recorded from Burma. Col. McMaster notices the destruction of two canaries by bats in Rangoon, and suggests this species as the depredator, which is not improbable.

Habits. During the day this bat hides in caves, old buildings, roofs of houses, &c. The food may consist partly of insects; but it is certain that *Megaderma lyra* feeds on smaller bats, for one was detected and observed in the act by Blyth, and it probably lives chiefly on small Vertebrata. Mr. Frith informed Blyth that at Mymensingh the verandah of his house was a favourite resort of a number of these bats, and that every morning the floor was strewn with the hind quarters of frogs and the wings of large grasshoppers and crickets; on one occasion the remains of a small fish were observed, but frogs appeared to constitute the bats' chief diet, never toads; and of a quiet evening these animals could be heard crunching the heads and smaller bones of their victims.

In the case observed by Blyth of a *Megaderma* killing and eating a smaller bat (*Vesperugo abramus*), the former began by seizing its prey behind the ear and sucking the blood during flight. Dobson shows that the peculiar dentition and lips of *Megaderma* are evidence of its prey differing from that of other insectivorous bats.

Hodgson has observed that in this species males greatly exceed females in number. Anderson found the young adhering to the abdominal teats and moving about from them to the true or pectoral mammae. Hodgson found a single young in many pregnant females examined by him at the end of February.

170. *Megaderma spasma*. The Malay Vampire Bat.

Vespertilio spasma, L. *Syst. Nat.* i, p. 47 (1766).

Megaderma spasma, Cantor, *J. A. S. B.* xv, p. 179; Blyth, *J. A. S. B.* xxi, p. 346, xxiv, p. 711; *id. Cat.* p. 23; Dobson, *Mon. As. Chir.* p. 79; *id. Cat. Chir. B. M.* p. 157; Anderson, *Cat.* p. 121; W. Blanford, *J. A. S. B.* lvii, pt. 2, p. 264.

Megaderma horsfieldi, Blyth, *Cat.* p. 23.



Rather smaller than *M. lyra*, and nose-leaf shorter.

Ears rounded, extending beyond the muzzle when laid forward; inner margins united by less than a third of their length. Tragus bifid, the posterior limb pointed, more than double the length of the rounded anterior limb.

Nose-leaf rounded posteriorly, the lanceolate portion behind the lateral emarginations about equal in length to the anterior portion. The additional leaf above the nostrils heart-shaped and broad, projecting laterally beyond the edge of the principal leaf. A raised median rib to the posterior rib.

Wing-membrane from the metatarsus. Interfemoral membrane deeper than in *M. lyra*. In other characters the two species are similar.

Colour of fur dark ashy above, paler below.

Dimensions. Head and body 3·4 inches, ear from crown 1·2, from origin of outer margin 1·5, forearm 2·3.

Distribution. Tenasserim, Siam, Cochin China, and the Malay Peninsula and Archipelago; also Ceylon, and probably Travancore. A description by Mr. Bourdillon of a bat obtained by him at Mynall, Travancore, from a hollow tree in dense forest at 2700 feet elevation, appears to refer to this species, and this serves to confirm the statement by Blyth that he had examined specimens from Ceylon. There are specimens in the British Museum labelled from the island. They are rather small, forearm 2·1 to 2·2 inches.

Of the other genus belonging to the present family, *Nycteris*, having the nostrils at the anterior extremity of a long facial groove, and a long tail, one species, *N. javanica*, has been found in the Malay Peninsula and Java, the remaining species are all African.

Family VESPERTILIONIDÆ.

This is by far the largest family of bats and comprises most of the commoner forms found in India. The species are at once readily distinguished from all other *Microchiroptera* (so far at least as the Indian and Palearctic forms are concerned) by the presence of a tragus, by the absence of all trace of nose-leaf, by the tail neither being produced to any great extent beyond the interfemoral membrane, nor exerted from its upper surface, and by the presence of two phalanges besides the metacarpal bone, making three joints altogether, in the middle finger, with the first phalanx in repose extended in a line with the metacarpal bone. The eyes are minute, and the inner margins of the ears arise from the sides of the head, not from the forehead. The tail is long.

The lower incisors are always six in number; the upper incisors



vary from 2 to 4, divided by a wide space in the middle, and placed in pairs or singly near the canine. The upper premolars vary from one to three in number on each side; when more than one occur, the anterior premolars are generally very small, and sometimes have a position inside the general line of the teeth, or tooth-row. The lower premolars are 2 or 3 on each side.

Members of this family are found throughout the tropical and temperate regions of the world, extending even to many oceanic islands.

Whilst the majority of the genera are well defined and easily recognized, the two great groups comprised in *Vesperugo* and *Vespertilio* contain several intermediate forms, so that although most of the species fall readily into two perfectly distinct genera, the actual line of distinction is artificial and depends on the presence or absence of an upper premolar*, which is, in some cases, not to be detected without the aid of a lens. The genera found in India may be thus distinguished:—

- A. Crown of head but little raised above face-line ; second or terminal phalanx of third or longest finger not more than double length of first phalanx.
- a. Ears distinctly united at base.
- a'. Ears enormous, outer margin of each terminating behind angle of mouth PLACOTUS.
- b'. Ears moderate, outer margin carried forward and terminating above mouth.... SYNOTUS.
- b. Ears not united at base.
- a'. Ears very large, about double length of head OTONYCTERIS.
- b'. Ears moderate, about same length as head or less.
- a''. Outer margin of ear-conch terminating about halfway between tragus and angle of mouth; 4 or 5 teeth behind canine on each side of upper jaw.
- a'''. Two pairs of upper incisors VESPERUGO.
- b'''. Only one pair of upper incisors; one on each side, close to canine NYCTICEJUS.
- b''. Outer margin of ear terminating nearer to tragus than to angle of mouth.
- a'''. Nostrils tabular, projecting; 5 teeth behind canine on each side of upper jaw HARPYIOCEPHALUS.
- b''. Nostrils simple; 6 teeth in upper molar row.
- a. Nostrils crescentic VESPERTILIO.
- β. Nostrils rounded. CERIVOULA.

* In specimens preserved in spirit the mouth can be opened widely and the teeth examined with a microscope if necessary. With bats, however, as with other small mammals, it is well to extract and clean one or two skulls of each species.



- B. Crown of head greatly raised above face-line; outer margin of ear terminating close to angle of mouth; second or terminal phalanx of third or longest finger more than treble the length of first phalanx **MINIOPTERUS.**

Genus **PLECOTUS**, Geoffr. (1813).

Ears very large, the inner margins united, outer margin of each terminating just behind the angle of the mouth; tragus large, tapering. Nostrils elongate, narrow, crescentic, situated at the extremity of the muzzle, the upper surface of which is hairy, flat and depressed in the middle, but swollen at the sides, which bulge above the central depression, and sometimes cover it just behind the nostrils. Muzzle not grooved in front below the nostrils.

Dentition: i. $\frac{2-3}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$. Upper incisors widely separated in the middle and directed obliquely inwards, the inner are bifid, the inner cusp of each considerably longer than the outer, and this again is larger and longer than the small simple unicuspidate outer incisor; canines without accessory cusps; first upper premolar small, but distinctly seen from the outside, second premolar large. Of the lower premolars the third is the largest and the second the smallest.

The only Palearctic species, which has an extensive range, is found in the Himalayas.

171. **Plecotus auritus.** *The long-eared Bat.*

Vespertilio auritus, L. *Syst. Nat.* i, p. 47 (1766).

Plecotus homochrous, Hodgson, J. A. S. B. xvi, p. 895.

Plecotus auritus, Blyth, *Cat.* p. 35; Jerdon, *Mam.* p. 47; Hutton, *P. Z. S.* 1872, p. 704; Dobson, *Mon. As. Chir.* p. 84; *id.* *Cat. Chir.* B. M. p. 178; Anderson, *Cat.* p. 123; Scully, *P. Z. S.* 1881, p. 199.

Ears enormous, not much shorter than the head and body together, ovate, the tips broadly rounded. Inner margins joined near the base, just above the junction a prominent rounded lobe projects from each.

Wings from the base of the toes; feet slender. Tail as long as the head and body; the tip exserted. Fur soft.

Colour brown, generally fawn-colour or light brown above, whitish below. The basal half or two-thirds of the fur, above and below, is nearly black. Some specimens are dark throughout, owing to the wearing away of the paler tips to the hairs; such a specimen is the type of Hodgson's *P. homochrous*.

Dimensions of a female from near Mussoorie: head and body 1.7 inches, tail 1.7, ear from crown 1.35, tragus (inner margin)



7. forearm 1.65 (Hutton's measurements of, I believe, this individual when fresh are larger; head and body $2\frac{1}{4}$, &c.).

Distribution. The Palaearctic region, including the higher portions of the Himalayas from Gilgit (Scully) and Leh (Stoliczka) to Darjiling. The Himalayan variety has rather longer ears than the European, but the short thumb, observed by Dobson in Hodgson's type of *P. homochrous*, appears to be an individual peculiarity, as it does not exist in other Himalayan specimens.

Habits. The long-eared bat, according to Blasius, hides in hollow trees or old buildings (probably in caves also) during the day and comes out rather late in the evening. The flight is not rapid, but the twists and turns are quickly made. This species only flies in the summer months, hibernating in the winter. The ears are usually folded under the arms during sleep.

Genus **SYNOTUS**, Keys. & Blas. (1839).

Syn. *Barbastellus*, Gray, 1838 (*nec* 1831).

Ears of moderate size, the inner margins coming forward at the forehead rather in front of the eyes and united at the base; the outer margin of each ear carried forward below the eye and terminating between the eye and upper lip; thus the eye, which is minute, is within the external ear; tragus well developed, attenuate above.

Muzzle short, the upper surface naked and flat in the middle, the sides glandular and swollen so as to form a raised border, the nostrils at the end of the muzzle, a broad shallow groove from each across the upper lip.

Dentition: i. $\frac{2-2}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$. Upper incisors oblique, outer pair small, inner pair large and bifid; upper canines with small anterior and posterior basal cusps. First upper premolar minute, in the inner angle between the closely approximate canine and second premolar. First lower premolar half the height and breadth of the second.

This genus comprises two known species, both Palaearctic; one of them is found in the Himalayas.

172. **Synotus darjelingensis.** *The Eastern Barbastelle.*

Plecotus darjelingensis, Hodgson, *Horsfield, A. M. N. H.* (2) xvi, p. 103 (1855).

Barbastellus communis, Blyth, *J. A. S. B.* xxi, p. 360, xxiv, p. 363; *id. Cat.* p. 36; Jerdon, *Mam.* p. 48; Hutton, *P. Z. S.* 1872, p. 703;

Dobson, *J. A. S. B.* xliii, pt. 2, p. 236, *nec* Gray.

Barbastellus dargelinensis, Dobson, *P. A. S. B.* 1875, p. 85.

Synotus darjelingensis, Dobson, *Mon. As. Chir.* p. 86; *id. Cat. Chir. B. M.* p. 177; Anderson, *Cat.* p. 123; Scully, *P. Z. S.* 1881, p. 199.



The ears are very broad and, when laid forward, extend beyond the nostrils, tips broadly rounded, inner margin convex, outer almost straight for nearly half its length, and without any projecting lobe, lower half also nearly straight. Tragus broad at the base, and becoming broader just above the commencement of the inner margin, but attenuate thence to the narrow but rounded tip.

Wings from the base of the toes. Calcaneum extending half-way from the foot to the end of the tail. Postcalcaneal lobe narrow. Tail as long as the head and body; tip projecting from interfemoral membrane, which extends triangularly far behind the feet. Fur soft and long.

Colour greyish black, the hairs with paler greyish tips, more conspicuous below than above.

Dimensions. Head and body 2 inches, tail 1·9, ear from crown 0·45, forearm 1·65.

Distribution. This form, which is distinguished from the European *Synotis barbastellus* by larger ears without any projecting lobe to the outer margin, appears to be common in the Himalayas at an elevation of 5000–8000 feet, and has been taken at Gilgit, Simla, Mussoorie, and Darjiling, in Upper Sikkim at Lachung, and also in the Khási hills south of Assam. The same bat was also procured by Stoliczka in Eastern Turkestan, and may very possibly replace *S. barbastellus* in Central and Eastern Asia.

Habits. According to Hutton the Eastern barbastelle makes its appearance rather late in the evening. It hibernates in winter. He remarks on the very narrow holes and crevices into which it squeezes itself. The European form is said to appear in the evening before *Plecotus auritus* and to fly higher and more rapidly*.

Genus OTONYCTERIS, Peters (1859).

Head very flat; nostrils crescentic, at the extremity of the muzzle. Ears large, separate†; tragus long.

Dentition: i. $\frac{1-1}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{1-1}{2-2}$, m. $\frac{3-3}{3-3}$. The upper incisors close to the canines and bifid, the outer cusps very small; single upper premolar large, close to the canine; lower incisors flattened laterally, the longer diameter of each transverse to the line of teeth; first lower premolar scarcely half the size of the second.

* An Australian bat, *Nyctophilus geoffroyi* (*N. timoriensis*, see Dobson, Cat. Chir. B. M. p. 172), was by mistake included by Jerdon (Mam. Ind. p. 48) amongst Indian forms and stated to have been sent from Mussoorie by Hutton, who, however (P. Z. S. 1872, p. 704), denied all knowledge of the species. It is evident that the error, which has puzzled some writers on the Indian Mammalia, arose from a mistake in the printing of Blyth's Catalogue (see J. A. S. B. lvii, pt. 2, p. 264).

† According to Dobson, there is, hidden amongst the hairs of the forehead, a very low band that connects the ears, but practically they are separated.

Of this genus, which is evidently allied to *Plecotus*, only one species is known.

173. *Otonycteris hemprichi*. *Hemprich's long-eared Bat*.

Otonycteris hemprichii, *Peters, MB. Akad. Berl.* 1859, p. 223 ;
Dobson, Cat. Chir. B. M. p. 182 ; *Scully, P. Z. S.* 1881, p. 199.

Ears large, very much longer than the head, oval, broadly rounded at the tips, inner margin convex, lower third especially so, but without any projection, outer margin nearly straight for the upper half, then convex, emarginate opposite the base of the tragus, terminating behind the angle of the mouth. Tragus long, attenuate, rounded at the end.

Wings from the base of the toes. Tail long, the point beyond the triangular extremity of the interfemoral membrane. No post-calcaneal lobe. Fur long, dense, and soft.

Colour above pale sepia-brown, all the basal portions of the hairs white, below white ; membranes and ears pale brown.

Dimensions. Head and body 3 inches, tail 2·3, ear from crown 1·25, forearm 2·6.

Distribution. Two specimens have been obtained in Gilgit, one by Col. Biddulph, the other by Dr. Scully. The type was brought by Hemprich and Ehrenberg from N.E. Africa, and a specimen has recently been recorded from Algeria.

Genus **VESPERUGO**, Keys. & Blas. (1840).

Syn. *Noctulinia*, Gray (1842) ; *Scotophilus*, partim, Gray, *nee* Leach ;
Myotis, partim, Blyth, *nee* Gray.

Ears separate, moderate or short, generally much shorter than the head, each outer margin terminating behind the angle of the

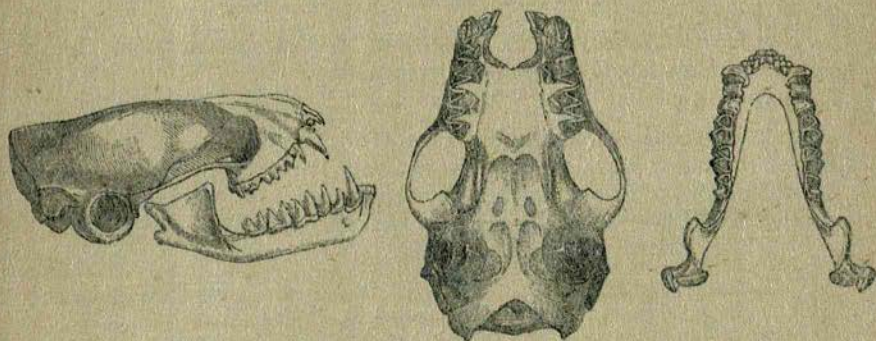


Fig. 91.—Skull of *Vesperugo noctula*, $\times 2$. (Blasius, Säugeth. Deutschlands.)

mouth and considerably in front of the base of the tragus ; the terminal portion of the outer margin usually consists of a



rounded lobe or antitragus, the inner margin is turned inwards near the base and generally forms a rounded edge termed the basal lobe. Tragus generally short and obtuse, the outer margin more or less convex, the inner straight or concave.

Muzzle in most species short and obtuse*, with prominent glandular swellings at the side between the eyes and nostrils, increasing the width of the face; the sides of the head as far back as the ears, and extending upwards to above the eyes, together with the terminal portion of the muzzle above from a little in front of the eyes, are very thinly covered with hair. Tail shorter than the head and body together; there is a small membranous expansion (the postcalcaneal lobe), varying much in form and development, behind the calcaneum, and the interfemoral membrane always ends posteriorly in a salient angle. Wings (except in *V. noctula*, *V. leisleri*, and two Malayan species) from the base of the toes.

Dentition: i. $\frac{2-2}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$ or $\frac{1-1}{2-2}$, m. $\frac{3-3}{3-3}$. The upper incisors in pairs inclined inwards and separated by a wide interval in the middle, outer incisor of each pair close to the inner and parallel to it; the inner generally the larger of the two and often bifid, the outer sometimes very small (see fig. 92, p. 306). First upper premolar minute or wanting, often, when present, difficult to detect. First lower premolar in the tooth-row, not crushed in between the adjoining teeth; its summit directed slightly outwards.

This genus of bats, which comprises more species than any other, and contains the commonest and most widely spread forms, is found in all extensive land areas, except those of the polar regions, but is particularly well represented in the temperate and sub-tropical portions of the Eastern hemisphere. All the species have a rapid flight with very sudden twists and turns, and many are amongst the first bats to appear in the evening and the earliest to leave their winter-quarters in the spring. In the majority of the species, according to Blasius, unlike other bats, the females produce two young at a time; but Dobson found one to be the rule in the numerous specimens that he examined.

On account of the number of species included, attempts have been made to divide the genus, but the subgenera, with the exception of *Hesperoptenus*, are ill defined and more or less artificial. This is especially the case with the two largest subgenera, *Vesperus* and *Vesperugo*. The small first upper premolar, wanting in the first but present in the latter, is sometimes to be distinguished from outside between the canine and the second premolar, but often it can only be detected by the use of a good lens when the mouth is widely opened.

* *V. annectens* differs in this and several other characters.

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

- A. Incisors $\frac{2-2}{6}$; outer upper incisors in a line with inner or anterior to them; premolars $\frac{1-1}{2-2}$ (four teeth behind canine in the upper jaw); wings from base of toes Subgenus *VESPERUS*.
- a. No thickened base to ear, nor swollen pads to feet.
- a'. Forearm 2 inches or more long *V. serotinus*, p. 303.
Forearm less than 2 inches.
- a''. No postcalcaneal lobe; forearm 1.45. *V. nasutus*, p. 304.
- b'. Postcalcaneal lobe present.
- a. Ears much shorter than head.
- a'. Tragus broadest below middle of inner margin; forearm 1.5 *V. borealis*, p. 305.
- β'. Tragus broadest above middle of inner margin; forearm 1.6 *V. discolor*, p. 305.
- β. Ears nearly as long as head; forearm 1.7 *V. atratus*, p. 306.
- b. Base of ear thickened; forearm 1.6 *V. pachyotis*, p. 307.
- c. Soles of feet and base of thumbs with broad fleshy pads; forearm 1.1 *V. pachypus*, p. 307.
- B. Incisors $\frac{2-2}{6}$, outer upper incisors in same line as inner, or anterior to them; premolars $\frac{2-2}{2-2}$ (five teeth in upper jaw behind canine), first upper premolar minute Subgenus *VESPERUGO*.
- a. Wings from ankles.
- a'. Forearm 2 inches or more *V. noctula*, p. 308.
- b'. Forearm about 1.65 *V. leisteri*, p. 300.
- b. Wings from base of toes.
- a'. Tragus rounded above.
- a''. Tragus broadest about middle of inner margin.
- a. Fur above black.
- a'. Outer upper incisors but little shorter than inner; a postcalcaneal lobe; forearm 1.55 *V. mordax*, p. 310.
- β'. Outer upper incisors very short; no postcalcaneal lobe; forearm 1.5 *V. circumdatus*, p. 312.
- β. Fur above brown.
- a'. Outer upper incisors acutely pointed; forearm 1.55 *V. affinis*, p. 311.
- β'. Outer upper incisors hollowed to receive lower canines; forearm 1.65 *V. ceylonicus*, p. 312.
- b'. Tragus broadest slightly above base of inner margin.
- a. Outer upper incisors more than half length of inner.
- a'. Outer margin of ear below tip straight; forearm 1.8 *V. abramus*, p. 313.
- β'. Outer margin of ear below tip concave; forearm 1.25 *V. pipistrellus*, p. 314.



- β . Outer upper incisors less than half length of inner; interfemoral membrane white-edged; forearm 1.4... *V. kuhli*, p. 315.
 β' . Tragus pointed above; face hairy; forearm 1.8..... *V. annectens*, p. 316.
C. Incisors $\frac{2-2}{6}$, outer upper incisors very small, behind inner incisors; pm. $\frac{1-1}{2-2}$; wings from base of toes..... Subgenus *HESPEROPTENUS*.
a. Forearm 2.1 inches..... *V. tickelli*, p. 317.
b. Forearm 1.1..... *V. blanfordi*, p. 317.

174. *Vesperugo serotinus*. *The Serotine*.

- Vespertilio serotinus*, Schreb. *Säugeth.* i, p. 167, pl. 53 (1775).
Scotophilus serotinus, Blyth, *J. A. S. B.* xxi, p. 360; *id.* *Cat.* p. 32; *Jerdon, Mam.* p. 34.
Scotophilus pachyomus, *Tomes, P. Z. S.* 1857, p. 50; *Jerdon, Mam.* p. 34.
Vesperugo andersoni, *Dobson, P. A. S. B.* 1871, p. 211; *id.* *Mon. As. Chir.* p. 110; *id.* *Cat. Chir. B. M.* p. 195; *id.* *Rep. Brit. Assoc.* 1880, p. 184; *Anderson, An. Zool. Res.* p. 101, pl. iv, figs. 2-6; *id.* *Cat.* p. 124.
Vesperugo serotinus, *Dobson, Mon. As. Chir.* p. 108; *id.* *Cat. Chir. B. M.* p. 191; *id.* *Second Yarkand Miss., Mam.* p. 12; *Anderson, Cat.* p. 124.

Ears of moderate size, the broadly rounded tips, when laid forward along the face, are rather nearer to the nostril than to the eye; inner margin slightly convex, basal lobe rounded, outer margin straight or very slightly concave for its upper half, then convex, slightly emarginate opposite the base of the tragus and ending in a convex lobe behind the angle of the mouth. Tragus broadest just above the base of the inner margin, thence diminishing slowly in breadth to the tip, which is rounded, inner margin straight or slightly concave, outer convex with a small projecting rounded lobe at the base.

Head flat. Muzzle flat and thick, the sides swollen and glandular; face almost naked in front, but the upper lip fringed with hair. Thumb with a callosity at the base. Wings from the metatarsus close to the base of the toes. Postcalcaneal lobe very narrow. Last two caudal vertebrae free.

Upper inner incisors long, strong, bifid at their extremities, when not worn down; outer incisors very short, scarcely one third the length of the inner pair, and lying against their outer and anterior sides. Lower incisors trifid, crowded. First lower pre-molar half the breadth and half the height of the second.

V. andersoni, with smaller and narrower ears, a rather smaller foot, only the last caudal vertebra free, and some other slight differences, was ultimately classed by its describer as a variety of the *Serotine*.

Colour. Above dark smoky brown as a rule, below yellowish brown to yellowish white. Specimens from dry desert countries are pale buff-brown above, paler beneath.

Dimensions of a male from Kashmir. Head and body 2·85 inches, tail 2, ear from crown 0·5, forearm 2·1.

Distribution. Palaearctic and Nearctic regions, with parts of the Neotropical and Oriental. This bat seems to be common in Kashmir, and was found in Assam by Col. Godwin-Austen. Blyth, too, identified it amongst the bats obtained near Mussoorie by Hutton. The variety *V. andersoni* was obtained in Yunnan.

Habits. The name of this bat indicates one of its characteristic traits, that of appearing late in the evening. It likewise does not come out of its winter sleep until the spring is well advanced. According to Blasius it does not fly about on cold, wet, and windy nights, but it is to be seen, in Europe, on warm summer evenings about woods and gardens. It is frequently found in hollow trees in the day, and remains as a rule solitary or in small numbers even in winter. Its flight is rather slow and the action of its wings fluttering; its turns are less actively made than those of its allies of the genus *Vesperugo* generally. As a rule it has only one young at a time.

175. *Vesperugo nasutus.* *The Sind Bat.*

Vesperugo nasutus, Dobson, *J. A. S. B.* xlv, pt. 2, p. 311 (1877);
id. Cat. Chir. B. M. p. 200; *Anderson, Cat.* p. 125.

Ears shorter than the head, triangular, the tips rounded; inner margin of each commencing above the eye, not forming a distinct rounded lobe at the base, but straight almost from the base to the tip of the ear, outer margin also straight. Tragus broadest below the middle of the inner margin, the outer margin convex with an ill-defined lobe near the base, inner margin slightly concave, tip subacutely pointed.

Head flat, muzzle conical, the extremity projecting considerably beyond the lower lip in front, nostrils opening sublaterally. No postcalcaral lobe. Only the tip of the tail is free. Fur short, the face nearly naked in front of the eyes.

Upper inner incisors moderately long and unicuspidate, outer pair very short; lower incisors trifid, crowded, longest across the direction of the jaws. First lower premolar not half as long as the second.

Colour above pale yellowish brown; beneath pale buff, almost white; membranes light brown, traversed by numerous white reticulations.

Dimensions. Head and body 1·8 inches, tail 1·7, ear (from base of outer margin) 0·6, forearm 1·45.

Distribution. The only specimen known was obtained by myself in Upper Sind. I believe that the type of the present species was procured a little east of Rohri. The locality originally assigned, Shikárpur, was that of some other specimens in the same collection.

The above description is taken from that by Dobson.

176. *Vesperugo borealis*. *The Northern Bat.*

Vespertilio borealis, Nilsson, *Illum. Fig. Scand. Fauna*, häft. 19, pl. 36 (1838).

Vesperugo nilsoni, Keys. & Blas. *Wieg. Arch.* 1839, p. 315.

Vesperugo borealis, Dobson, *Mon. As. Chir.* p. 105; *id. Cat. Chir. B. M.* p. 203; Scully, *P. Z. S.* 1881, p. 200.

Ears nearly triangular, tips broadly rounded, outer margin straight almost to the base, where it turns forwards and after a distinct emargination terminates in a short but prominent lobe, just behind the angle of the mouth. Inner margin straight above, ending below in a rounded basal lobe. Outer margin of tragus very convex with a projecting lobe at the base, inner margin straight below and slightly concave above, tip rounded, greatest breadth below the middle of the inner margin.

Muzzle flat and of moderate breadth. Postcalcaral lobe distinct, but narrow; the two last caudal vertebrae free.

The inner upper incisor bifid, outer incisor as long as the outer and shorter cusp of the inner incisor, and equal to the latter in cross section at the base; lower incisors trifid, placed at right angles to the jaw, and overlapping each other, those next the canines rounded above and higher than the rest.

Colour of fur very dark brown, above with yellowish-brown tips, below with ashy.

Dimensions. Head and body 2 inches, tail 1·7, ear from crown 0·4, forearm 1·5.

Distribution. Throughout the northern Palaearctic region, as far north as the Arctic Circle. This species has been obtained in Eastern Turkestan and China. The only specimen hitherto recorded within Indian limits was taken by Dr. Scully in Gilgit.

Habits. According to Blasius this species, which flies well and quickly, migrates north in summer, being only found in Northern Russia about August, and is, of all European bats, the least sensitive to cold and bad weather. According to the same authority, the female usually produces two young at a time.

177. *Vesperugo discolor*. *The particoloured Bat.*

Vespertilio discolor, Natterer, Kuhl, *Deutsche Flederm.* p. 43 (1817); *id. Wetterau Gesell. N. Annal.* i, p. 187 (1819).

Vesperugo discolor, Dobson, *Mon. As. Chir.* p. 106; *id. Cat. Chir. B. M.* p. 204; Anderson, *Cat.* p. 125; Scully, *P. Z. S.* 1881, p. 199.

Ears oval, tips broadly rounded; outer margin straight for the upper third, folded back on itself about the middle, emarginate opposite the base of the tragus, and terminating in a long, but not prominent lobe behind and a little above the angle of the mouth, a tubercle between the termination and the angle; inner margin very slightly convex above, more so below, and with a prominent rounded basal lobe. Outer margin of tragus with a small projecting basal lobe, above very convex, tip rounded, inner



margin straight, broadest portion of tragus just above the middle of the inner margin.

Muzzle broad, flat above, end of the nose and upper lip projecting slightly beyond the lower; postcalcaral lobe narrow. Last caudal vertebra and part of penultimate free.

Inner upper incisor long, bifid; the outer incisor is shorter than the outer and shorter cusp of the inner incisor. First lower premolar about half the height of the second.

Colour of the fur above dark brown with pale yellowish-brown tips, below dark brown with ashy or whitish tips longer than those on the back, the dark basal part of the hairs producing a somewhat mottled appearance on the dorsal surface.

Dimensions. Head and body 2 inches, tail 1.65, ear from crown 0.4, forearm 1.6.

Distribution. The Palearctic region throughout the temperate zone, keeping much to hills and mountains. Within Indian limits this species has been recorded only at Gilgit, where a few were found in summer at from 10,000 to 11,000 feet above the sea by Dr. Scully.

Habits. Very similar to those of the nearly allied *V. borealis*. The flight is rather stronger, but the animal is more sensitive to cold, and its range does not extend nearly so far to the north. The female is said by Blasius always to produce two young at a time.

178. *Vesperugo atratus*. The sombre Bat.

Nycticejus atratus, Blyth, *Cat.* p. 31 (no description); *Jerdon, Mam.* p. 38 (1867).

Vesperus atratus, Dobson, *P. A. S. B.* 1871, p. 212.

Vesperugo atratus, Dobson, *Mon. As. Chir.* p. 107; *id.* *Cat. Chir. B.* M. p. 206; *Anderson, Cat.* p. 125.

Ears oval, tips rounded, but appearing pointed when viewed from the side, owing to the conch being longitudinally folded, like in *Cerivoula*; inner margin convex, outer slightly hollowed beneath the tip, with an angular emargination opposite the base of the tragus, and terminating in a rounded lobe, the summit of which is marked by a small triangular notch. Tragus with a small rounded lobe at the outer side of its base, expanded above, convex externally and above, inner margin slightly concave.



Fig. 92.—Incisors and canines of *V. atratus*. (Dobson, *Mon. As. Chir.*)

Wings from the base of the toes; last rudimentary caudal vertebra free. Fur long and dense.

Inner upper incisors very long and slightly bifid at the extremity; outer incisors minute, scarcely raised above the level of the gum and close to the base of the inner incisors.

Colour black throughout.

Dimensions. Head and body 1.9 inches, tail 1.8, ear (from base of outer margin) 0.6, forearm 1.7.

Distribution. Only recorded hitherto from Darjiling. The description is taken from Dobson's.

179. *Vesperugo pachyotis*. *The thick-eared Bat.*

Vesperugo pachyotis, Dobson, *P. A. S. B.* 1871, p. 211; *id.* *Mon. As. Chir.* p. 104; *id.* *Cat. Chir. B. M.* p. 206; Anderson, *Cat.* p. 126.

"Ears triangular above, with rounded tips; outer side straight without emargination; lower portion of the ear (from below the level of the tip of the tragus to the termination of the outer margin near the angle of the mouth) very thick and fleshy; tragus short, expanded above and curved inwards.

"Head flat, muzzle very broad and short, glandular prominences much developed; immediately behind them a furrow extends from the anterior corner of one eye to that of the other, beyond which the fur of the head does not pass." "Wing-membrane from the base of the toes. Teeth very small; inner incisors bifid at their extremities, much larger and longer than the outer."

Colour above dark brown throughout, below a lighter shade of brown.

Dimensions. Head and body 2·2 inches, tail 1·6, ear (from base of outer margin) 0·55, forearm 1·6.

Distribution. Only found hitherto in the Khási hills, south of Assam. The types, a male and female, in the Indian Museum, Calcutta, are the only specimens hitherto recorded.

The above description is copied from Dobson, who remarks that the species, which may be recognized by the peculiar thickness of the lower half of the ear-conch, is rather related in the form of the ears and muzzle to *V. noctula* and its allies, but that the first minute upper premolar, characteristic of those forms, is wanting.

180. *Vesperugo pachypus*. *The club-footed Bat.*

Vespertilio pachypus, Temminck, *Mon. Mamm.* ii, p. 217, pl. 54, figs. 4-6 (1835-41).

Scotophilus fulvidus, Blyth, *J. A. S. B.* xxviii, p. 293 (1859); *id.* *Cat.* p. 33.

Vesperus pachypus, Dobson, *P. A. S. B.* 1871, p. 212.

Tylonycteris pachypus, Peters, *MB. Akad. Berl.* 1872, p. 704; Blyth, *Mam. Birds Burma*, p. 23.

Vesperugo pachypus, Dobson, *Mon. As. Chir.* p. 115; *id.* *Cat. Chir. B. M.* p. 208; Anderson, *Cat.* p. 126; Thomas, *P. Z. S.* 1886, p. 59.

Ears short, scarcely extending to halfway between the eye and nostril when laid forward, oval, with broadly rounded tips; outer margin slightly convex, with a shallow but distinct emargination below the base of the tragus, and terminating in a convex lobe behind the angle of the mouth; inner margin straight in the middle, convex above, and with a well rounded basal lobe. Tragus short, widest opposite the base of the inner margin, which is nearly straight, tip rounded, outer margin convex and having a small lobe at the base.

Crown of head very flat, muzzle broad, nostrils directed somewhat



downwards. The under surface of the base of the thumbs and the soles of the feet expanded into fleshy pads. In some specimens the thumb-pad extends almost to the base of the claw. On the foot the pad forms an almost circular disk, the round margin projecting a little beneath the toes, which are short. Wings rather short; calcaneum short and feeble; postcalcaneal lobe rudimentary. Only the extreme tip of the tail projects from the interfemoral membrane.

Upper incisors all small, the inner bicuspid, the outer anteriorly placed and shorter than the smaller outer cusp of the inner; lower incisors not crowded.

Colour of fur moderately deep rich brown, with a rufous tinge above, paler below; dorsal hair a little paler towards the base.

Dimensions. A female from Darjiling measures:—head and body 1·5 inches, tail 1·05, ear from crown 0·25, forearm 1·05. Dobson gives rather larger measurements:—head and body 1·75, tail 1·3, forearm 1·1.

Distribution. Eastern Himalayas (Darjiling), Manipur, Tenasserim, Mergui Archipelago, Andaman Islands, and probably the Burmese and Malay countries generally, extending to Java, Sumatra, and the Philippine Islands.

The fleshy foot- and thumb-pads are supposed by Dobson to be adapted for adhering to the under surface of large leaves and fruits.

181. *Vesperugo noctula*. *The noctule Bat.*

Vespertilio noctula, Schreb. *Säugeth.* i, p. 166, pl. 52 (1775).

Vesperugo labiata, Hodgson, *J. A. S. B.* iv, p. 700 (1835).

Noctulinia noctula, Blyth, *J. A. S. B.* xiv, p. 340; *id.* *Cat.* p. 30; *Jerdon, Mam.* p. 36.

Vesperugo noctula, Dobson, *Mon. As. Chir.* p. 88; *id.* *Cat. Chir. B. M.* p. 212; *Anderson, Cat.* p. 126; *Scully, J. A. S. B.* lvi, pt. 2, p. 250.



Fig. 93.—Head of *Vesperugo noctula*. (Blasius, *Säugeth. Deutschlands.*)

Ears thick, broadly rounded above, nearly as broad as long, extending very little beyond the eye when laid forward; outer margin convex and reflected backward, slightly notched below the base of the tragus, forming a thickened convex lobe in front of the notch and terminating behind the angle of the mouth; inner margin nearly straight above, convex below; basal lobe moderately



rounded. Tragus short, expanded above, curved inwards, broadest near the top, which is round; outer margin very convex, with a small pointed projection at the base; inner margin concave.

Head broad and flat, the glandular swellings at the sides of the muzzle very pronounced; nostrils projecting and directed outwards and downwards, space between them concave. Thumb short, with a small callosity at the base. Feet thick, toes short. Wing-membranes from the ankle. Postcalcaral lobe well developed, rounded. Only the tip of the tail is free.

Inner upper incisor bicuspid in the young only, the small outer cusp disappearing in adults; outer incisor much shorter than the inner, but much broader in transverse section at the base, and having the crown hollowed out to receive the summit of the lower canine. Lower incisors with their broad crowns parallel, oblique to the jaw and overlapping each other. The first upper premolar very small, in the internal angle between the canine and the second premolar, which meet externally.

Colour of fur light yellowish brown, very little paler below, and the hairs on the upper surface paler towards the base. A specimen said to be from Ceylon is rather darker brown. Some European examples are said to be reddish brown.

Dimensions. Head and body 3 inches, tail 2, ear from crown 0.38, forearm 2.1.

Distribution. Found almost throughout the temperate Palearctic region and widely spread in the Ethiopian. This bat has been found in Nepal and Sikhim, and perhaps in Kandahar; there are specimens in the British Museum labelled Ceylon and Singapore, and the species has been recorded from Sumatra and Java.

Habits. The noctule bat generally rests in trees during the day, though it is sometimes found in considerable numbers in buildings. It appears early in the evening, and has an especially strong and powerful flight, rising high in the air. It haunts wooded country, and lives largely on cockchafer and similar beetles. It hibernates thoroughly, never appearing till late in the spring, and it disappears soon in the autumn. Large numbers are found hibernating together. This species has a strong unpleasant odour. A good account of some of its habits, and especially of the birth of the young, by Mr. G. Daniell, will be found in the Proc. Zool. Soc. for 1834, p. 130. He found only a single young in several females; but Blasius states that two are generally produced. The young are born blind and naked.

182. *Vesperugo leisleri.* *The hairy-armed Bat.*

Vespertilio leisleri, Kuhl, *Deutsch. Flederm.* p. 38 (1817).

Scotophilus leisleri, Blyth, *J. A. S. B.* xxiv, p. 363; *id. Cat.* p. 33; *Jerdon, Mam.* p. 34.

Vesperugo leisleri, Hutton, *P. Z. S.* 1872, p. 707; *Dobson, Mon. As. Chir.* p. 91; *id. Cat. Chir. B. M.* p. 215.

Ears and tragus similar to those of *V. noctula*, as are all details of



structure except the dentition. The outer incisors equal to the inner in cross section at the base, but much shorter. Lower incisors in a semicircle scarcely overlapping each other. In this bat, as in the noctule, a band of fine short hair passes on the underside behind the forearm to the carpus, hence the English name.

Colour of fur bright yellowish brown above, light brown below, the basal three fourths of the hairs on both surfaces dark brown.

Dimensions. Head and body 2·4 inches, tail 1·6, ear from crown 0·25, forearm 1·65.

Distribution. Europe and the temperate regions of Asia. There are in the British Museum specimens collected by Hutton at Mussoorie, whence also the species was recorded by Blyth. It does not appear to have been observed elsewhere in the Himalayas.

Habits imperfectly known, Blasius saying that this species is a high-flyer and tree-haunter like *V. noctula*; whilst Bell in his 'British Quadrupeds' doubts its dwelling in trees, and states that its flight is much less steady and powerful than that of the noctule. It appears early in the evening.

There is in the British Museum a skin of *V. imbricatus*, marked Calcutta, and sent by Blyth to the East India Company's Museum. As the species is not mentioned by Blyth, and no specimens collected by him are in the collection at Calcutta, it is doubtful if the specimen above noticed is Indian. The species, which is found in the Malay Peninsula and Java, may be recognized by its comparatively large well-rounded ears, and its crescentic pointed tragus. The forearm measures 1·4.

183. *Vesperugo mordax*. *The grizzled Bat.*

♂ *Scotophilus maderaspatanus*, Gray, *List Mam. B. M.* p. 29 (1843), no description.

Vesperugo mordax, Peters, *MB. Akad. Berlin*, 1866, p. 402; *Dobson, Rep. Brit. Assoc.* 1880, p. 184; *W. Blanford, J. A. S. B.* lvii, pt. 2, p. 265.

Pipistrellus austenianus, Dobson, *P. A. S. B.* 1871, p. 213.

Vesperugo maurus, Dobson, *Mon. As. Chir.* p. 99; *id. Cat. Chir. B. M.* p. 218, partim, *nec Blasius*; *Anderson, Cat.* p. 127.

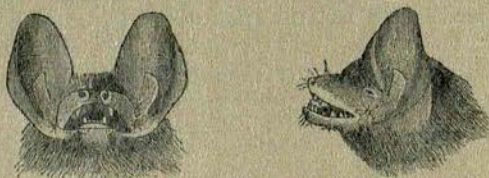


Fig. 94.—Head of *Vesperugo mordax*. (Dobson, *Mon. As. Chir.*)

Ears thick, broad, triangular, rounded off above, extending when laid forward nearly halfway between the eye and the nostril; outer margin straight or concave above, convex and folded back below, distinctly notched below the base of the tragus, and terminating in a small lobe behind the angle of the mouth; inner margin straight above, convex below, with a rounded basal lobe. Tragus broadest



above the middle of the inner margin, which is straight; outer margin very convex above, tip rounded; at the base of the outer margin a pointed lobe, and above it a second very small projection, indistinct in some specimens.

Muzzle broad and flat, nostrils opening on a level with the muzzle. Wings from the base of toes. Postscapular lobe well developed, rounded. Last caudal vertebra free.

Upper incisors nearly equal in length, inner bifid; the outer cusp smaller, directed inwards, and disappearing with age. Lower incisors overlapping each other. First upper premolar small, quite internal to the tooth-row, but visible from without.

Colour of fur black or dark sooty brown, the hairs on the back behind the shoulders and on the lower parts with light grey tips. Membranes black; ears, nose, and skin of face the same.

Dimensions. Head and body 1.9 inches, tail 1.6, ear from crown 0.35, forearm 1.55.

Distribution. India (Kumaun, Sind, Allahabad, Deccan, Khási hills, Assam) and Java. Probably throughout the Oriental region, replacing the Palearctic *V. maurus* (or *V. savii*), which is a smaller species, widely distributed from the Canary Isles to China.

184. *Vesperugo affinis.* *The chocolate Bat.*

Pipistrellus affinis, Dobson, *P. A. S. B.* 1871, p. 213.

Vesperugo affinis, Dobson, *Mon. As. Chir.* p. 102; *id.* *Cat. Chir. B.* M. p. 220; *Anderson, An. Zool. Res.* p. 100, pl. iv, figs. 7, 8; *id.* *Cat.* p. 128.

Ears broad, rounded, outer margins without emargination or lobe, inner margins convex; a small tubercle with long hairs between the end of the outer margin and the angle of the mouth. Tragus with the inner margin straight; outer margin convex above, and having a small pointed lobe at the base, tip rounded.

Head flat; glands at the side of the muzzle much developed so as to produce a depression in the middle of the face behind the nostrils; anterior portion of face almost naked. The nostrils open sublaterally. Wing-membrane from the base of the outer toe, which is shorter than the others. Feet small. Tail long, of nine vertebrae, the last free. Upper incisors nearly equal in length; first upper premolar minute, internal.

Colour of fur chocolate-brown above, lighter on the head and neck; below dark brown, with light brown or ashy tips; on the pubes and along the thighs white or very pale buff.

Dimensions. Head and body 1.9 inches, tail 1.65, ear from base of outer margin 0.6, forearm 1.55.

Distribution. Bhámo, Upper Burma. A single specimen, now in the Indian Museum, Calcutta, was obtained by Dr. Anderson.

The above description is that of Dobson, slightly condensed. This bat is distinguished from *V. mordax* by colour, by the want of a notch in the outer ear-margin, and by the number of caudal vertebrae.

185. *Vesperugo circumdatus*. *The black Bat.*

Vespertilio circumdatus, *Temminck, Mon. Mam. ii, p. 214, pl. 53, figs. 3, 4 (1835-41).*

Vesperugo circumdatus, *Dobson, Cat. Chir. B. M. p. 221.*

Ears with rounded tips, outer margin concave below the rounded tip, then convex, notched opposite the base of the tragus, terminating in a convex lobe; inner margin straight above, convex below. Tragus broadest about the middle of its inner margin, terminating above in an acute angle, inner margin slightly concave, outer with a lobule at the base.

Nostrils scarcely projecting, opening sublaterally, the space between them concave. Terminal third of the muzzle half naked. Wings from the base of the toes; no postcalcaneal lobe; half the last caudal vertebra free. Inner upper incisors long and strong, faintly bifid, outer very small; first upper premolar minute, in the inner angle between the closely approximated canine and second premolar. Lower incisors transversely placed at right angles to the jaws.

Colour of fur above intensely black, the extreme tips of some of the hairs bright ferruginous; beneath dull black, the tips of the hairs greyish. Membranes black. According to Temminck the black ears are margined by white, but this is not seen in dried specimens.

Dimensions of type from Java. Head and body about 2·4 inches, tail 1·3, ear from base of outer margin 0·5, forearm 1·5. In the only Indian specimen known the forearm measures 1·65.

Distribution. India and Java. The only specimen known from India is one presented by Jerdon to the British Museum, and this has no locality attached, but in all probability it was collected in Southern India.

186. *Vesperugo ceylonicus*. *Kelaart's Bat.*

Scotophilus ceylonicus, *Kelaart, Prod. p. 22 (1852).*

Vesperugo indicus, *Dobson, Cat. Chir. B. M. p. 222 (1878).*

Vesperugo ceylonicus, *W. Blanford, J. A. S. B. lvi, pt. 2, p. 265.*

Ears subtriangular, extending when laid forward two thirds the distance from the eye to the nostril; tips rounded, both margins nearly straight below the rounded tip; the basal lobe scarcely convex, outer margin concave, not notched, opposite the base of the tragus. Tragus varying but little in breadth for some distance above the base of the inner margin, which is straight; outer margin convex above, meeting the inner in an obtuse point, and bearing a distinct triangular lobe at the base.

Muzzle broad, sides swollen, middle of upper surface depressed. Wings from the metatarsus. Postcalcaneal lobe well developed. Extreme tip of tail free.

Inner upper incisors bifid, the outer pair but little shorter than the outer and small cusps of the inner, and exceeding the inner in cross section at the base. The crown of the outer incisors is



hollowed out, as in *V. noctula*, to receive the point of the lower canine, and thus may appear bifid or trifid.

Colour of fur reddish brown above, hairs of the same tint from base to tip, pale brown below; the tips rather paler than the basal portion of the hairs.

Dimensions of a male from the Wynaad. Head and body 2 inches, tail 1·6, ear from crown 0·45, forearm 1·65, tibia 0·58.

Distribution. Ceylon and the Malabar coast of India. A specimen presented by Sir W. Elliot to the British Museum and labelled Madras is probably from the Western Ghâts.

187. *Vesperugo abramus*. *The Indian Pipistrelle*.

? *Vespertilio* de Coromandel, *F. Cuv. Nouv. Ann. Mus. Hist. Nat.* i, p. 21 (1832).

Vespertilio imbricatus, *Temminck, Mon. Mam.* ii, p. 216, *nec Horsfield*.

Vespertilio abramus, *Temminck, ib.* p. 232 (1835-41).

Vespertilio coromandelicus, *Blyth, J. A. S. B.* xx, p. 159 (1851).

? *Myotis parvipes*, *Blyth, J. A. S. B.* xxii, p. 581; *Jerdon, Mam.* p. 46.

Scotophilus coromandelianus, *Blyth, Cat.* p. 33; *Jerdon, Mam.* p. 35.

Vesperugo imbricatus and *V. micropus*, *Hutton, P. Z. S.* 1872, pp. 707, 708.

Vesperugo abramus, *Dobson, Mon. As. Chir.* p. 97; *Cat. Chir. B. M.* p. 226; *Anderson, Cat.* p. 129; *Scully, J. A. S. B.* lvi, pt. 2, p. 250;

W. Blanford, J. A. S. B. lvii, pt. 2, p. 266.

Ears subtriangular, rounded at the tips, when laid forward extending to about halfway between the eye and the nostrils, outer margin nearly straight or slightly concave; the concavity opposite the base of the tragus is slight; in front of this is a prominent lobe, terminating behind the angle of the mouth. Tragus a little curved forward, tip rounded, inner margin slightly concave, outer convex, with the usual small lobe at the base and only a slight concavity above it (see fig. 73, p. 252).

Muzzle blunt, glandular swellings on the sides well developed, the face behind them depressed; crown of the head and forehead between the eyes thickly furred; muzzle, extending back to the ears and including the eyes, almost naked in adults. Feet small. Wing-membrane from the base of the toes. Postscapular lobe well developed, rounded. Last rudimentary caudal vertebra free. Penis longer in proportion than in any other bat.

Upper inner incisor bifid, the small external cusp placed slightly posteriorly, often difficult to distinguish. Outer incisor nearly as long as the inner and exceeding the outer cusp of the latter in length. The second upper premolar separated from the canine by a slight interval.

Colour of fur dark brown above, a little paler below; head and neck often with a yellowish tinge. All the basal portion of the hairs, frequently amounting to three fourths of their length, black.

Dimensions. Head and body 1·8 inches, tail 1·4, ear from crown 0·3, forearm 1·3.



Distribution. This is perhaps the commonest bat in India, and appears to be found throughout the Peninsula, Ceylon, and Burma. It ascends the Himalaya to at least 7000 feet, and is met with commonly in Sind and the Punjab. Beyond Indian limits it inhabits the whole Oriental region and a considerable part of the Palearctic, its range extending to Northern Australia in one direction, and, in the summer at all events, to Central Europe and even to Sweden in the other.

Habits. Probably one cause why this species is so frequently observed in India is that it is especially a house bat, hiding in roofs, outhouses, and old buildings during the day, rather than in woods, and flying early in the evening, often close to human habitations. It frequently comes into rooms at night. Its flight is very quick, but very irregular; after going a short distance it often drops suddenly, doubtless in order to seize an insect, and it frequently keeps about the same spot for a considerable time. I cannot say that it hibernates in India, but certainly this and other bats disappear almost entirely during the cold season from November to the end of February in Northern India. In temperate climates it is said to sleep throughout the winter. Blasius found two young in all pregnant females examined by him.

188. *Vesperugo pipistrellus.* *The common Pipistrelle.*

Vespertilio pipistrellus, Schreb. *Säugth.* i, p. 167, pl. 54 (1775).

? *Vespertilio pallidiventris*, Hodgson, *Calc. Journ. N. H.* iv, p. 286 (no description; see Blyth, *J. A. S. B.* xx, p. 159, note).

Myotis pipistrellus, Blyth, *J. A. S. B.* xxi, p. 360; *id. Cat.* p. 35.

Vesperugo pipistrellus, Dobson, *Mon. As. Chir.* p. 95; *id. Cat. Chir. B. M.* p. 223; *id. Second Yarkand Miss., Mem.* p. 1; Anderson, *Cat.* p. 128; Scully, *P. Z. S.* 1881, p. 200; W. Blang, *J. A. S. B.* lvii, pt. 2, p. 267.

Ears subtriangular, tip rounded, outer margin nearly straight for one third its length below the rounded tip, then suddenly curved out into a prominent lobe. There is a slight concavity opposite the base of the tragus, and in front of this a prominent convex lobe. Tragus very similar to that of *V. abramus*, but the inner margin is less concave. Muzzle better clad than in *V. abramus*.

Inner upper incisors bifid, the outer cusps smaller and posteriorly situated; each outer incisor sometimes as long as the outer cusp of the inner, sometimes shorter. In all other details of structure this bat agrees with *V. abramus*.

Colour of fur moderately deep rufous-brown above, paler below; basal half to three fourths of all hairs black. Specimens from dry sandy districts are paler, sometimes almost white below.

Dimensions. Head and body 1.65 inches, tail 1.4, ear from crown 0.3, forearm 1.25.

Distribution. The Palearctic region, generally distributed. Within Indian limits this species has only been recorded with certainty from Gilgit and the valley of Kashmir.



Habits. Very similar to those of *V. abramus*. Like that species, the common pipistrelle is very often seen about human habitations, and it has the same rapid flight with frequent very quick turns and descents. It is said to live chiefly on gnats, and may be seen hawking them on summer evenings. During the day it hides in crevices of walls, clefts of rocks, or any dry protected hole, less frequently in trees. It appears early in the spring, and is sometimes found abroad on warm days in the winter, and it is usually the first bat to appear in the afternoon. The female bears sometimes one, sometimes two young.

189. *Vesperugo kuhlii*. *The white-bordered Bat.*

Vespertilio kuhlii, Natterer, Kuhl, *Deutsche Flederm.* p. 55 (1817).

Pipistrellus lepidus, Blyth, *J. A. S. B.* xiv, p. 340 (1845).

Nycticejus canus, Blyth, *Cat.* p. 32; *Jerdon, Mam.* p. 38.

Scotophilus lobatus, Jerdon, *l. c.* p. 35 (? Gray, *List Mam. B. M.* p. 29).

Vesperugo (*Pipistrellus*) *leucotis*, Dobson, *J. A. S. B.* xli, pt. 2, p. 222.

Vesperugo kuhlii, Dobson, *Mon. As. Chir.* p. 94; *id. Cat. Chir. B. M.*

p. 230; *id. J. A. S. B.* xlv, pt. 2, p. 311; *Anderson, Cat.* p. 131;

Scully, A. M. N. H. ser. 5, vol. viii, p. 223 (1881); *W. Blanford, J.*

A. S. B. lvii, pt. 2, p. 267.



Fig. 95.—Head of *V. kuhlii*. (Dobson, *Mon. As. Chir.*)

Ears larger than in *V. abramus*, extending when laid forward more than half way between the eye and the nostril, subtriangular; tips rounded; outer margins nearly straight, slightly concave just below the tip, with a small emargination opposite the base of the tragus, and a not very prominent lobe (much less convex than in *V. abramus*) at the end behind the angle of the mouth. Inner margin nearly straight. Tragus rounded at the tip, broadest below the middle of the inner margin, which is straight; outer margin convex, especially in the middle, and having a small pointed lobe at the base.

In other details of structure (except in the teeth) there is no important difference from *V. abramus*. The outer upper incisors are very short, only about one fourth the length of the inner, which are long and pointed, not bifid.

Colour of fur yellowish or greyish brown above, paler, often whitish, below, the basal two thirds to three fourths of the hairs black, both above and below. Some specimens are much darker than others. Membranes and ears usually dark, the hinder border of the interfemoral and wing-membranes more or less bordered with white. In specimens from Cutch, Sind, Baluchistan (*Pipistrellus lepidus*, Blyth, *P. leucotis*, Dobson), and the neighbouring countries the tips of the fur are light yellowish brown, the ears, interfemoral and antebrachial membranes, and wing-membrane near the sides of the body are white, and the remainder of the wing-membrane traversed by white reticulations.

Dimensions. Head and body 1·75 inches, tail 1·5, ear from crown 0·4, forearm 1·4.

Distribution. Europe south of the Alps, Northern Africa, and Southern Asia. In India this species is widely, perhaps generally distributed, being common in Sind, the Punjab, and the neighbouring countries, and recorded from several parts of the Bengal and Madras Presidencies. It has not been hitherto noticed east of Cachar, nor obtained from the Himalayas nor from Ceylon.

Habits. The flight is not unlike that of *V. abramus*, but less rapid and with rather fewer sudden turns. The female has been found, both in Europe and India, to have two young at a birth.

190. *Vesperugo annectens.* *The intermediate Bat.*

Pipistrellus annectans, Dobson, *P. A. S. B.* 1871, p. 213.

Vesperugo annectens, Dobson, *Mon. As. Chir.* p. 116; *id.* *Cat. Chir. B. M.* p. 234; *Anderson, Cat.* p. 132.

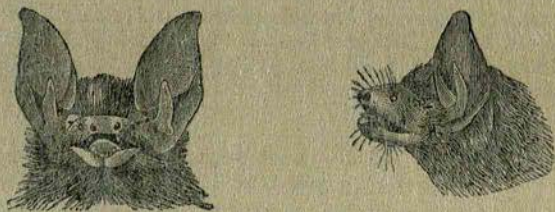


Fig. 96.—Head of *Vesperugo annectens*. (Dobson, *Mon. As. Chir.*)

Ears bluntly pointed, the tips rounded, outer margin hollowed out immediately below the tip, then convex, again slightly concave opposite the base of the tragus, and terminating in a small rounded lobe. Tragus long, subacutely pointed, inner margin almost straight, outer slightly convex, with a small rounded lobe at the base.

Head slightly elevated; the fur covers the whole face except the nostrils, and forms a thick fringe to the upper lip; the glandular prominences on the side of the muzzle are small, they and the sides of the face are less thickly covered with hair than the upper surface. No postcalcanal lobe; extreme tip of tail free.

Upper incisors nearly equal, the inner pair slightly notched at the extremity. First upper premolar minute, placed slightly inside the tooth-row, but distinctly visible from without.

Colour of fur, so far as can be ascertained from a specimen in spirit, dark brown above with paler tips; beneath brown, the tips reddish.

Dimensions. Head and body 2 inches, tail 1·6, ear from base of outer margin 0·6, forearm 1·8.

Distribution. Nāga hills, Assam. The only specimen obtained is in the Indian Museum, Calcutta. A skin, probably belonging to the same species, is amongst Mr. Hodgson's Nepal collections in the British Museum.



This species has the dentition of *Vesperugo* and the hairy face, the ear, and tragus of *Vespertilio*. The above is Dobson's description, slightly abridged.

191. *Vesperugo tickelli*. *Tickell's Bat*.

Nycticejus tickelli, *Blyth, J. A. S. B.* xx, p. 157 (1851); *id. Cat.* p. 31; *Kelaart, Prod.* p. 24.

Nycticejus isabellinus, *Blyth, Horsfield Cat.* p. 33 (no description).

Vesperugo tickelli, *Dobson, Mon. As. Chir.* p. 113; *id. Cat. Chir. B. M.* p. 240; *id. J. A. S. B.* xlv, pt. 2, p. 312; *Anderson, Cat.* p. 132.

Ears oval, rounded at the tips, extending when laid forwards to about halfway between the eye and the nostril; outer margin concave opposite the base of the tragus, and terminating in a rounded thickened lobe behind the angle of the mouth. Tragus lunate, curved forward, bluntly pointed, inner margin concave, outer very convex with a small lobe at the base.



Fig. 97.—Head of *Vesperugo tickelli*. (Dobson, *Mon. As. Chir.*)

Muzzle blunt, swollen at the sides, slightly depressed above in the middle. Wings from the base of the toes. A distinct post-calcaneal lobe; tail long, only the tip free. The fur extends forward on the middle of the face far in front of the eyes; sides of face including the eyes and extending to the ears, together with the terminal portion of the face, nearly naked.

Inner upper incisors large, unicuspidate, and situated near the canines, the outer incisors small, each placed behind the inner, in the angle between it and the canine. Thus on looking into the mouth only two upper incisors are seen, the small outer incisors looking like their basal cusps. No anterior upper premolar.

Colour of fur light greyish brown above, generally with a rufous tinge on the lower back; hairs, except the rufous tips, of the same colour throughout; below buff. Membranes dusky, paler along the digits and on the interfemoral.

Dimensions. Head and body 2·6 inches, tail 2, ear from crown 0·4, forearm 2·1.

Distribution. Peninsula of India (Nusseerabad in Rajputana; Bombay; Chybassa, Jashpur, Sirguja in S.W. Bengal), Ceylon, Andaman Islands, and near Moulmein in Burma.

192. *Vesperugo blanfordi*. *Limborg's Bat*.

Vesperugo (*Hesperoptenus*) *blanfordi*, *Dobson, J. A. S. B.* xlv, pt. 2, p. 312; *id. Cat. Chir. B. M.* p. 242; *Anderson, Cat.* p. 133.

Ears short, subtriangular, tips broadly rounded, upper half of

outer margins straight, then convex, slightly concave opposite the base of the tragus, and terminating abruptly in a deep lobe closer to the angle of the mouth than to the base of the tragus; tragus narrowest opposite to the base of its inner margin, expanded above and curved inwards.

Head very flat and broad; nostrils wide apart, semilunate. Feet very small, the sole of the feet forming a cushion, probably adhesive, but not expanded as in *V. pachypus*. Postcalcaneal lobe very large, broader than the foot, and with a median cartilaginous support, the extreme tip of the tail alone projecting. In all other details, this species, though less than half the size, exactly resembles *V. tickelli*, and the dentition is similar, the outer incisors being proportionally even smaller and placed more behind the inner.

Colour of fur dark reddish brown above, slightly paler beneath.

Dimensions. Head and body 1.75 inches, tail 1.1, ear from base of outer margin 0.45, forearm 1.1.

Distribution. The type was obtained by Mr. Limborg east of Moulmein in Burmah, together with *V. tickelli*; another specimen has been found at Johore in the Malay Peninsula.

Genus **NYCTICEJUS**, Rafinesque (1819).

Syn. *Scotophilus*, Leach (1822).

Head short and broad; ears far apart, usually short, rounded at the tips, generally with the basal lobe of the inner margin well developed and its inner termination free; tragus well developed; muzzle broad and swollen, nearly naked; nostrils near together, opening by simple lunate apertures in front or sublaterally.

Membranes thick and leathery, as a rule quite naked, the fur confined to the body. Wing-membranes from the base of the toes. Limbs stout. Tail long, but shorter than the head and body.

Dentition: i. $\frac{1-1}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{1-1}{2-2}$ or $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$. Four upper milk-incisors. Upper incisors long, unicuspidate, with their bases usually

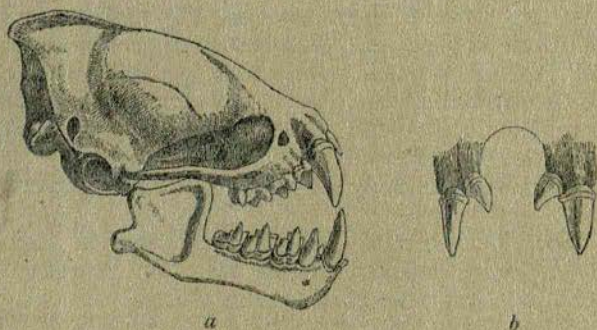


Fig. 98.—a, Skull of *Nycticejus kuhli*. b, Upper canine and incisor teeth.

close to those of the canines. Upper premolar (or second, if there are two) large, exceeding the molars in height, close to the canine. Last upper molar small.



The genus ranges throughout the Ethiopian and Oriental regions and extends to Australia on one side, and to N. America on the other. Mr. Thomas has recently shown (Ann. Mus. Civ. Genova, ser. 2 a, ix, p. 88) that the genera *Scotophilus* and *Nycticejus* must be reunited.

Synopsis of Indian, Ceylonese, and Burmese Species.

- A. Two upper premolars on each side; forearm
1.4 *N. dormeri*, p. 319.
B. One upper premolar on each side.
a. Basal lobe of ear angular; tragus with a
prominent rib across front surface; fore-
arm 1.9 to 2.7 inches *N. kuhli*, p. 320.
b. Basal lobe rounded; tragus without rib.
a'. Fur without white spots.
a''. Basal lobe of ear terminating intern-
ally in a rounded free lobule in
front of tragus; forearm 2.2 *N. emarginatus*, p. 321.
b'. Basal lobe rounded, not produced in-
ternally; forearm 1.4 *N. pallidus*, p. 322.
b'. Fur with white spots; forearm 2.3 *N. ornatus*, p. 322.

193. *Nycticejus dormeri*. *Dormer's Bat*.

Scotozous dormeri, Dobson, P. Z. S. 1875, p. 373.

Vesperugo dormeri, Dobson, Mon. As. Chir. p. 118; *id.* Cat. Chir.
B. M. p. 243.

Ears subtriangular, tips rounded, margins below the tips nearly straight, inner margin slightly emarginate at the base, but without any distinct basal lobe; outer margin concave opposite the base of the tragus, and ending in a rounded lobe. Tragus straight, pointed, a small lobe at the base of the outer margin, the two margins nearly parallel for some distance, but the terminal third of the outer margin slopes inwards and meets the inner margin at an acute angle.

Muzzle blunt without any median depression above, glands at side swollen; face in front of eyes, and comprising the area around the eyes, almost naked; nostrils opening sublaterally. Postcalcaral lobe distinct. Tip of the tail projecting.

A single large unicuspidate upper incisor on each side close to the canine directed forward and inward. Lower incisors crowded, middle pair larger than the others, all distinctly trid. Two upper premolars, first very minute, second large, not quite close to the canine. First lower premolar broader, but shorter than the second.

Colour of fur above dark brown with ashy tips, below dirty white, the basal portion of the hairs very dark brown.

Dimensions. Head and body about 1.75 inches, tail about 1.25 forearm 1.4.

Distribution. The Peninsula of India. The type specimen was found near Bellary, and I obtained two individuals in South-east Berar, near Chánda.

This species has generally been placed in *Vesperugo*, and is intermediate in character between that genus and *Nycticejus*.

94. *Nycticejus kuhlii*. *The common yellow Bat.*

Scotophilus kuhlii, *Leach, Tr. L. S.* xiii, p. 72 (1822); *W. Blanf.*

J. A. S. B. lvii, pt. 2, p. 267.

Vespertilio temminckii, *Horsf. Res. Java* (1824).

Nycticejus heathii, *Horsf. P. Z. S.* 1831, p. 113.

Vespertilio belangeri (and *V. noctulinus*?), *Is. Geoffr. Bélanger, Voy Ind. Or.* pp. 87, 92, pl. 3 (1834).

Scotophilus temminckii, *Cantor, J. A. S. B.* xv, p. 185; *Dobson,*

P. Z. S. 1875, p. 370; *id. Mon. As. Chir.* p. 120; *id. Cat. Chir. B. M.* p. 253; *Anderson, Cat.* p. 133.

Nycticejus heathii, *N. belangeri*, and *N. luteus*, *Blyth, J. A. S. B.* xx, p. 157.

Nycticejus temminckii, *N. flaveolus*, and *N. castaneus*, *Horsf. Cat.* pp. 37, 38.

Nycticejus heathii and *N. belangeri*, *Kelaart, Prod.* p. 23.

Nycticejus temminckii, *Blyth, J. A. S. B.* xxi, p. 345.

Nycticejus heathii, *N. luteus*, *N. temminckii*, and *N. castaneus*, *Blyth, Cat.* pp. 30, 31; *Jerdon, Mam.* pp. 37, 38.

Nycticejus luteus, *Hutton, P. Z. S.* 1872, p. 706.

Ears short, extending but little in front of the eyes when laid forward, subtriangular, the tips rounded, outer margin below tip nearly straight, deeply notched opposite the base of the tragus and terminating in a very convex lobe; upper half of inner margin of ear-conch slightly convex, then there is a blunt obtuse angle, and



Fig. 99.—Head of *N. kuhlii*.
(*Dobson, Mon. As. Chir.*)

the lower half is straight; at the base the margin turns by another obtuse angle into the straight-edged basal lobe, the inner termination of which is free and pointed. Tragus long, narrow and attenuate towards the slightly rounded tip, much curved forward and inward; inner margin concave, outer convex with a small lobe at the base; from the base of the inner margin a narrow prominent rib passes across the front surface, sloping somewhat upwards.

Muzzle thick; head broad; face nearly or quite flat, no depression behind the muzzle or in the middle. Postcalcaral lobe narrow. Only the extremity of the tail projecting. The fur is short.

Skull thick, with prominent crests; the anterior surface slopes evenly down from the occiput to the nose. Upper incisors close to the canines, the bases of the teeth in contact; there is a distinct but not large expansion behind the base of each upper incisor, forming a cingulum. One upper premolar. First lower premolar small, appearing as if compressed between the canine and second premolar, which is higher than the molars (fig. 98, p. 318).

Colour of fur variable, generally yellowish brown above, the basal portion of the hairs paler, dull buff or yellowish grey below. The colour of the upper surface, however, varies to deep or bright chestnut, golden brown, or to greyish brown, whilst the lower parts are yellow or dirty white.

Dimensions very variable. In a specimen of ordinary size the



head and body are 3 inches long, tail 2, forearm 2.1, ear from crown 0.85. In some adults the forearm is less than 2 inches. But large individuals occur, both males and females, with a forearm from 2.4 to 2.7. These have generally been separated as a distinct species under the name of *N. heathi*, but Dobson has classed them as a variety. I cannot but think he is right, though certainly the difference is very remarkable.

Distribution. The whole Oriental region from Sind to Borneo and the Philippines. Common nearly throughout India, Ceylon, Assam, and Burma, but, I think, less abundant in forest-regions than in cultivated tracts. This species is said by Hutton to occur at low elevations not exceeding about 3000 feet on the Western Himalayas. I cannot find it recorded from Nepal or Sikhim.

Habits. Not only is this bat very common throughout India, but it is one of the first to appear in the evening, so that it is seldom wanting in any collection of Indian *Chiroptera*. It flies more slowly and steadily than the species of *Vesperugo* in general. In the day-time it has been found by Hutton singly, in pairs, or in small parties of five or six in outhouses, sheds, verandahs, temples, &c. In Java, according to Horsfield, it collects by hundreds in the trunks and hollows of trees, and feeds chiefly on "white ants."

Mr. Oldfield Thomas has recently ascertained that the immature type of *Scotophilus kuhlii* in the British Museum undoubtedly belongs to the present species.

195. *Nycticejus emarginatus*. *The large-eared yellow Bat.*

Nycticejus emarginatus, Dobson, *P. A. S. B.* 1871, p. 211.

Scotophilus emarginatus, Dobson, *Mon. As. Chir.* p. 123; *id. Cat. Chir. B. M.* p. 262; *Anderson, Cat.* p. 136.

Ears large, with broadly rounded tips; inner margin convex, with a rounded lobe at the base, passing in front of the inner margin of the tragus and resting on part of its anterior surface; outer margin abruptly emarginate below the tip, ending below in a rounded lobe; tragus moderately long, without any ridge on the front surface, slightly curved inwards and obtusely pointed, maintaining almost the same breadth from the base to within a short distance from the tip, above this there is a rapid diminution in the width.

Head broad and flat; muzzle thick and obtuse; glands of the upper lip largely developed, forming rounded prominences between the nostrils and eyes. Last tail-vertebra free. Fur short and close.

Colour of fur throughout at the base dark ferruginous brown, then buff, on the upper parts alone yellowish-brown tips are added.

Dimensions. Head and body 2.9 inches, tail 2.2, ear (from base of outer margin) 0.85, forearm 2.2.

Distribution. The only known specimen, the type in the Indian Museum, Calcutta, is from an unknown locality in India. The above description is slightly abridged from Dobson's.

196. *Nycticejus pallidus*. *The desert yellow Bat.*

Scotophilus pallidus, Dobson, *Mon. As. Chir.* p. 186; *id. Cat. Chir. B. M.* p. 264; *id. J. A. S. B.* xvi, pt. 2, p. 310; *Anderson, Cat.* p. 137.

Ears thick and short, tips broadly rounded, margins convex, basal lobe round; outer margin emarginate opposite base of tragus and ending in a convex lobe; tragus moderately long, not attenuate, rounded at the tip, inner margin straight or slightly concave, outer moderately convex, with a prominent pointed lobe at the base.

Muzzle and teeth as in *N. kuhli*. Tip of the tail free.

Colour of fur above light chestnut-brown, beneath brownish buff, basal portion of hairs on both surfaces pale buff. In some specimens the fur and membranes are all pale buff throughout.

Dimensions. Head and body 2 inches, tail 1·4, ear from crown 0·35, forearm 1·4.

Distribution. Sind and the Punjab.

197. *Nycticejus ornatus*. *The harlequin Bat.*

Nycticejus ornatus, Blyth, *J. A. S. B.* xx, pp. 159, 517, xxvi, p. 285; *id. Cat.* p. 30; *Jerdon, Mam.* p. 39.

Nycticejus nivicolus, Hodgson, *Horsfield, A. M. N. H.* (2) xvi, 1855, p. 104; *Jerdon, l. c.* p. 39.

Scotophilus ornatus, Dobson, *P. Z. S.* 1875, p. 371; *id. Mon. As. Chir.* p. 124; *id. Cat. Chir. B. M.* p. 265; *Anderson, An. Zool. Res.* p. 99; *id. Cat.* p. 137; *W. Blanf. J. A. S. B.* lvii, pt. 2, p. 268.

Ears of moderate size, subtriangular, with rounded tips; outer margin slightly concave below the tip, then convex, emarginate opposite the base of the tragus and ending in a rounded lobe; inner margin slightly convex above, ending in a well-rounded basal lobe, the free inner extremity of which is a rounded point. Tragus long, bluntly pointed, inner margin nearly straight, becoming concave above, outer margin convex, ending in a pointed projecting lobe at the base.



Fig. 100.—Head of *N. ornatus*. (Dobson, *Mon. As. Chir.*)

Muzzle broad, much swollen, nearly naked; the swollen terminal naked portion stands out abruptly, above and at the sides, just in front of the eyes, from the hinder part of the face, which is covered above with long hair; sides of the face thinly clad. The fur generally softer and longer than in *N. kuhli*. Tail long, only the tip free.

The premaxillary bones are more developed than in *N. kuhli*, and the incisors are separated from the canines by a space, even at the base.

Colour of fur brownish yellow above, almost orange-brown, with some white spots; the hairs dark brown at the base, then isabelline, the tips brownish yellow. A small elongate patch of pure white on the crown of the head; a narrow white stripe down the middle of the back (this is said to be interrupted in some specimens), and



two spots, just above the wing-membrane, behind each shoulder. In front of each shoulder is the termination of a broad white V-shaped band extending to the abdomen; there is another white band forming a collar commencing beneath each ear and running forward to the chin. Remainder of the lower parts brown. The size of the white patches varies, being larger in males; in females the markings are much less distinct. The limbs and digits and a variable portion of the membranes are sometimes tawny red.

Dimensions. Head and body 3·1 inches, tail 2·5, ear from crown 0·55, forearm 2·3.

Distribution. The Eastern Himalayas, Káási hills, and some of the ranges of Upper Burma and Yunnan. According to Jerdon, this bat inhabits warm valleys near Darjiling, whilst Hodgson's *Nycticejus nivicolus*, which an examination of Hodgson's drawings in the British Museum shows to be the same, is said to be from the northern region of the Sikhim Himalaya near the snows. Jerdon's account is doubtless correct; some of Hodgson's specimens from the interior of the hills, although obtained near high mountains, were from the deep valleys at low elevations above the sea.

Genus *HARPYIOCEPHALUS*, Gray (1842).

Syn. *Murina*, Gray (1842).

Muzzle elongate, but varying in breadth, crown of the head scarcely raised above the face-line. Nostrils prominent, tubular, produced beyond the upper lip, with a circular orifice opening more



Fig. 101.—Skull of *Harpyiocephalus cyclotis*, $\times 2$. (Dobson, Mon. As. Chir.)

or less laterally, the outer margin cleft; end of the nose between the nostrils concave. Ears thin, generally covered with glandular papillæ; tragus long, attenuate towards the tip, and inclined outwards. Thumb very large, with a large strongly curved claw. Wings broad, interfemoral membrane much covered with hair above.

Dentition: i. $\frac{2-2}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$. Upper incisors on each side parallel and stout; posterior upper molar small, sometimes absent in the adult.



This genus may be recognized by the peculiar tubular nostrils. The species range from Tibet and Gilgit to Ceylon and the Malay Archipelago, keeping to the hill-tracts.

Synopsis of Indian, Ceylonese, and Burmese Species.*

- A. Upper third of outer margin of ear-conch
concave or emarginate.
- a. First upper premolar not so high as second;
forearm 1·4 inches *H. tubinaris*, p. 324.
 - b. First and second upper premolars equal in
height.
 - a'. Ears narrow, pointed; forearm 1·3.... *H. griseus*, p. 325.
 - b'. Ears broadly rounded off above; fore-
arm 2 *H. harpyia*, p. 325.
- B. Upper third of outer margin of ear-conch
convex or straight.
- a. Colour ferruginous red above; forearm 1·3. *H. cyclotis*, p. 326.
 - b. Colour brown above; forearm 1·3 *H. leucogaster*, p. 327.

I am unable to concur in the reasons which induced Dobson and Peters to prefer *Harpyiocephalus* to *Murina*, both names having been proposed in the same paper; but it appears to me better to continue the use of the first term now that it has, through Dobson's important monographs, obtained general acceptance.

198. *Harpyiocephalus tubinaris*. *Scully's tube-nosed Bat*.

Harpyiocephalus tubinaris, *Scully*, *P. Z. S.* 1881, p. 200.

Muzzle narrow, elongate, hairy. Ears moderate, rounded off at the tips; the outer margin is slightly emarginate in its upper third, then moderately convex, again slightly convex opposite the middle of the tragus, and it terminates in a convex lobe in front of the base of the tragus; inner margin convex, with a distinct spur-like process projecting near the base. Tragus moderately long, tapering above, where it curves outwards; a small pointed lobule above the base of the outer margin, succeeded by a well-marked emargination; above this the tragus attains its greatest breadth, outer margin above this straight at first, the upper half concave; inner margin nearly straight at the base, the upper two thirds concave.

Wings from the side of the proximal phalanx of the outer toe; extreme tip of tail projecting. Interfemoral membrane naked above except at the base between the thighs; wing-membranes clothed close to the body.

Outer upper incisor distinctly shorter than the inner. First upper premolar shorter than the second, which is nearly as high as the canine; last molar a simple transverse plate.

* Mr. O. Thomas has just found, he informs me, amongst Mr. Fea's collections from Karennee, a new *Harpyiocephalus* allied to *H. auratus* from Eastern Tibet. A description will be published in the *Annali Mus. Civ. Genova*, ser. 2a, vol. x.



Colour of fur greyish brown above, white below; the basal half of the hairs blackish brown above, dusky beneath.

Dimensions. Head and body 1·8 inches, tail 1·4, forearm 1·4.

Distribution. The only specimen hitherto recorded was obtained by the describer Dr. J. Scully at Gilgit.

This species is allied to the Malay *H. suillus*, but differs in the ear being less emarginate and furnished with a basal spur, in colour, &c.

199. *Harpyiocephalus griseus.* *Hutton's tube-nosed Bat.*

Murina grisea, *Hutton*, *P. Z. S.* 1872, p. 712.

Harpyiocephalus griseus, *Dobson*, *Mon. As. Chir.* p. 154; *id. Cat. Chir. B. M.* p. 280.

Head conical, muzzle narrow, hairy. Ears small, narrow, bluntly pointed, with narrowly rounded tips, upper third of the outer margin angularly emarginate, middle third convex, lower straight, ending opposite the base of the tragus, which is pointed and slightly curved outwards.

Wings from the base of the toes. Extreme tip of tail only free. Interfemoral membrane densely covered above with rather long hair, which, however, thins out towards the posterior margin.

Upper incisors large, conical, nearly as long as the canine, the inner slightly the larger and having a short posterior blunt cusp arising from the cingulum. Upper premolars equal to each other and to the canine in height. Lower canine short.

Colour above dark brown, with the ends of the hairs yellowish brown; below similar, but the tips are ashy grey.

Dimensions. Head and body 1·4 inches, tail 1·1 (according to Hutton 2 inches and 1), ear outside 0·3, forearm 1·35.

Distribution. The only specimen known was taken at an elevation of 5500 feet by Captain Hutton at Jeripani near Mussoorie in the N.W. Himalayas.

200. *Harpyiocephalus harpyia.* *The hairy-winged Bat.*

Vespertilio harpia, *Temminck*, *Mon. Mam.* ii, p. 219, pl. 55, figs. 5, 6 (1835-41).

Noctilinia lasyura, *Hodgson*, *J. A. S. B.* xvi, p. 896 (1847).

Lasiurus pearsonii, *Horsfield*, *Cat.* p. 36; *Blyth*, *J. A. S. B.* xx, p. 524; *Jerdon*, *Mam.* p. 40.

Vespertilio pearsonii, *Tomes*, *P. Z. S.* 1858, p. 87; *Blyth*, *Cat.* p. 34.

Murina harpia, *Dobson*, *P. A. S. B.* 1873, p. 109.

Harpyiocephalus harpia, *Dobson*, *Mon. As. Chir.* p. 155; *id. Cat. Chir. B. M.* p. 281; *Anderson*, *Cat.* p. 138.

Muzzle thick and blunt, thinly clad in front of the eyes and on the sides of the head. Ear-conch nearly as broad as long, broadly rounded at the tip, outer margin straight below the tip, then slightly emarginate, convex in the middle, again emarginate opposite the base of the inner margin, and terminating in a small lobe in front of the tragus. Inner margin very convex below the



middle. Tragus moderately long, slender, attenuated, broadest opposite the base of the inner margin, whence the outer margin slopes rapidly downwards and inwards to the small basal lobe, and gently upwards to the subacutely pointed tip; inner margin straight or very slightly convex throughout.

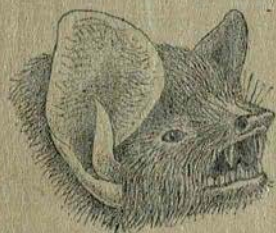


Fig. 102.—Head of *H. harpyia*. (Dobson, Cat. Chir. B. M.)

Wings from the base of the toes. The fur is long, soft, and silky, and extends over the whole upper surface of the interfemoral membrane, the legs, and the wing-membrane as far as beyond a line drawn from the middle of the humerus to the outer toe, being very dense upon the calcanea and backs of the feet. Beneath, the interfemoral membrane bears only a few short scattered hairs. Inner side of ear-conch thinly clad with short fine hair.

Outer upper incisors shorter than the inner; upper premolars subequal, third upper molar deciduous, often wanting. All the teeth very thick and strong, with blunt cusps.

Colour of fur above brownish grey with a ferruginous tinge, hairs with white tips being intermixed on the head, neck, and shoulders; hair of lower back, interfemoral and wing-membranes deep bay. Lower surface of body grey.

Dimensions. Head and body 2.5 inches, tail 2, forearm 2, ear outside from head 0.4.

Distribution. Found at Darjiling and on the Khási hills, also in Sumatra, Java, and Amboyna. A specimen in the British Museum labelled Malabar Coast may be from the hill-range of the Western Ghats. Probably this handsome bat is widely distributed in the hill-tracts of India and Burma.

Habits. Nothing is known except that fragments of the elytra of beetles have been found in the stomach, and that the teeth appear well suited for crushing the hard cases of Coleoptera. Dobson suggests that *H. harpyia* may feed on beetles with very solid wing-cases.

201. *Harpyiocephalus cyclotis*. *The round-eared tube-nosed Bat.*

Murina suilla, Blyth, Cat. p. 34; Jerdon, Mam. p. 41; nec *Vespertilio suillus*, Temm.

Murina cyclotis, Dobson, P. A. S. B. 1872, p. 210; id. J. A. S. B. xlii, pt. 2, pl. xiv, fig. 14.

Harpyiocephalus cyclotis, Dobson, Mon. As. Chir. p. 158; id. Cat. Chir. B. M. p. 282; Anderson, Cat. p. 139.

Muzzle thick. Ears almost circular, margins convex throughout; there is a small blunt projection to the basal lobe of the inner margin, very different from the pointed spur of *H. leucogaster*. Tragus narrow at the base, then broader, being widest just above



the base of the inner margin, thence gradually tapering to the end, which is finely subacutely pointed, the inner margin slightly convex throughout, outer straight below the widest part of the tragus, then angulate, concave above.



Fig. 103.—Ear
of *H. cyclotis*.
(Dobson, Mon.
As. Chir.)

Wing-membrane from the base of the claw on the outer toe; feet small; only the extreme tip of the tail free. Interfemoral membrane hairy above, hair densest at the root of the tail, along the tibiae and calcanea. Backs of the feet also thickly furred.

Upper incisors long and slender, the outer the shorter. First and second upper premolars subequal, the first a little the smaller, and about half as high as the canine.

Colour of fur above dark brown with ferruginous, or sometimes with yellowish-brown tips, below paler brown.

Dimensions. Head and body 1·7 inches, tail 1·5, forearm 1·3, ear from crown outside 0·37.

Distribution. A purchased specimen in the British Museum is said, apparently on fair authority, to be from Ceylon. All the other known examples are from the Sikhim Himalayas.

202. *Harpyiocephalus leucogaster.* *The white-bellied tube-nosed Bat.*

Murina leucogaster, A. Milne-Edwards, *Nouv. Arch. Mus.* vii, Bull. p. 91 (1871); *Rech. Mam.* p. 252, pl. xxxvii B, fig. 2, xxxviii C, fig. 3.

Harpyiocephalus huttonii, Peters, *P. Z. S.* 1872, p. 711.

Harpyiocephalus leucogaster, Dobson, *Mon. As. Chir.* p. 157; *id. Cat. Chir. B. M.* p. 283; Scully, *J. A. S. B.* lvi, pt. 2, p. 251.

Muzzle thick. Ears oval with convex margins; near the base of the inner margin a small pointed process projects. Tragus attenuated above, pointed and curved outwards, an obtuse lobule just above the base of the outer margin.

Wings from base of claw on outer toe. Fur long and dense. Interfemoral membrane hairy above as in *H. cyclotis*.

Outer upper incisors larger than the inner; first upper premolar smaller than the second, and situated a little inside the general line of the teeth.

Colour of fur above brown, not dark, the hair greyish at the base; beneath, the throat, chest, and abdomen are whitish, the sides of the body pale brown.

Dimensions. Head and body 1·9 inches, tail 1·5, forearm 1·3, ear from crown of head 0·4.

Distribution. This species was obtained by Hutton at Jeripani near Mussoorie, Scully captured it in Nepal, and there is a skin procured by Hodgson at Darjiling in the British Museum. The original type was from Eastern Tibet.

Habits. According to Hutton, this bat when searching for

insects, "skims closely and somewhat leisurely over the surface of the crops and grass." One that entered a room kept low down near the floor, instead of flying about the ceiling as most bats do.

Two other species of the genus, *H. suillus* found in the Malay Archipelago, and *H. auratus* from Eastern Tibet, may hereafter be found within Indian limits. Both are small forms with a narrow muzzle.

Genus **VESPERTILIO**, L. (1766).

Syn. *Trilatulus*, *Myotis*, Gray.

Muzzle long, face hairy; the glandular prominences on each side between the eye and the nostril much less developed than in *Vesperugo*, and scarcely increasing the breadth of the face; nostrils not prolonged, opening sublaterally by crescentic apertures; crown of the head but slightly raised above the face. Ears separate, longer than broad, generally longer than in *Vesperugo*, the internal

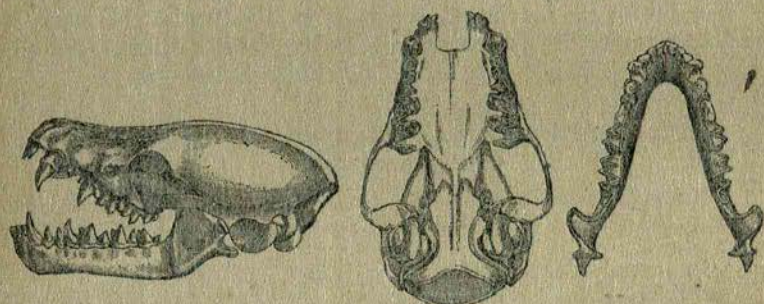


Fig. 104.—Skull of *Vespertilio*, enlarged. (Blasius, Säugeth. Deutschlands.)

basal lobe angular, the external margin of the ear-conch terminating below the base of the tragus or very slightly in front, and not carried far forward towards the angle of the mouth. Tragus long, generally attenuated above and pointed.

Tail less than the head and body (rarely equal); postcalcaral lobe absent or very small.

Dentition: i. $\frac{2-2}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{3-3}{3-3}$, m. $\frac{3-3}{3-3}$. The upper incisors subequal, in pairs on each side close to the canines, the points of the teeth in each pair generally diverging in direction, the outer incisor pointing slightly outwards, the inner inwards; lower outer incisors much larger than the inner. The first and second upper premolars small, the second always smaller than the first, often minute and internal to the tooth-row. The relative proportions of the three lower premolars are the same, the second being the smallest, but it is rarely so minute as the corresponding tooth in the upper jaw. The last upper molar is rather less in section than half the next.

The genus *Vespertilio*, as at present restricted, ranges throughout



nearly all tropical and temperate regions in both hemispheres, and has consequently a wider distribution than any other genus of *Chiroptera*. The species are recognized by the narrow hairy muzzle, the long oval ear, the narrow elongate tragus, and the numerous teeth. The members of this genus are, as a whole, more susceptible to cold than those belonging to *Vesperugo*, and are consequently less numerously represented in the colder parts of the temperate zone. They also appear later in the spring after hibernation.

The species of *Vespertilio* are difficult to classify and distinguish. Those with larger feet free from the wing are said to be dwellers in caves, whilst the smaller-footed forms, with the wing-membranes from the base of the toes, live mainly in trees. But no definite line can be drawn in the case of either the characters or the habitat.

Synopsis of Indian, Ceylonese, and Burmese Species.

- A. Foot large, measuring from wrist to end of claws more than $\frac{1}{2}$ length of forearm. Calcaneum extending fully $\frac{2}{3}$ the distance from ankle to tail.
- a. Wings from ankles or a little above.
 - a'. Second premolar above and below minute, inside the tooth-row; forearm about 1.6 inches *V. hasselti*, p. 330.
 - b'. Second premolar in the tooth-row, visible from outside; forearm about 1.45. *V. longipes*, p. 331.
 - b. Wings from side of foot immediately below ankle.
 - a'. Ears laid forward extend to end of nose; forearm about 1.45 *V. daubentoni*, p. 331.
 - b'. Ears extend beyond end of nose; forearm about 1.45 *V. megalopus*, p. 332.
- B. Foot moderate, less than $\frac{1}{2}$ the length of forearm. Calcaneum extending about half-way from ankle to tail.
- a. Wings from side of foot, between ankle and base of toes.
 - a'. First upper premolar at least double second in height; forearm about 2.25 *V. murinus*, p. 334.
 - b'. Two anterior upper premolars subequal, both small; forearm about 2.2 *V. dobsoni*, p. 335.
 - b. Wings from base of outer toe.
 - a'. Wing-membranes particoloured orange and black; forearm about 1.9 *V. formosus*, p. 335.
 - b'. Wing-membranes the same colour throughout.
 - a". No postcalcaneal lobe.
 - a. Terminal half of fur on lower surface white; forearm about 1.35 *V. nipalensis*, p. 333.
 - β. Fur of lower surface dark brown with ashy tips; forearm about 1.35 *V. mystacinus*, p. 336.
 - b'. A postcalcaneal lobe; forearm about 1.25 *V. muricola*, p. 337.

203. *Vespertilio hasselti*. *Van Hasselt's Bat*.

Vespertilio hasselti, *Temminck, Mon. Mam.* ii, p. 225, pl. lvi, figs. 7, 8 (1835-41); *Blyth, Mam. Birds Burma*, p. 23; *Dobson, Mon. As. Chir.* p. 126; *id. Cat. Chir. B. M.* p. 291.

Muzzle blunt, glandular area between the eyes and the nostrils rather tumid, and face in front of the eyes almost naked. Ears short, laid forward each extends halfway between the eye and the nostril; tips broadly rounded, the outer margin straight from near the tip to opposite the base of the tragus; there a fold of the conch enters the margin and forms a small terminal convex lobe ending in front of the inner margin, which is convex throughout.



Fig. 105.—Ear of *V. hasselti*.

(*Dobson, Cat. Chir. B. M.*) Tragus moderately long, rather bluntly pointed, inner margin straight; outer slightly convex, with a triangular lobe at the base.

Wings from the ankles; calcaneum very long; feet very long and slender; interfemoral membrane forming an acute angle behind. Fur very short.

The second premolar in both jaws very minute and difficult to see, even with a lens; it is, both above and below, placed in the angle between the first and third premolar.

Colour of fur greyish brown above, dirty white below; all the basal portions of the hairs dark brown on both surfaces.

Dimensions. Head and body 2·1 inches, tail 1·75, ear outside from the crown 0·45, forearm 1·6.

Distribution. Malay Peninsula, Siam, Sumatra, Java, &c. A specimen from Burma, the exact locality not recorded, is in the British Museum.

Externally this species is a *Vesperugo*, and it was long referred to that genus, of which it has the nearly naked face and short ears, whilst the second lower premolar is much more minute than in any other *Vespertilio*. That the distinction of these genera by the dentition is artificial, especially when the teeth are mere rudiments, is shown by such instances as are afforded by the present form and by *Vesperugo annectens*.

V. adversus, Horsfield (not of Temminck), has an extensive range from Siam to South Australia, and may very possibly be found in Burma; indeed it is possible that it may be the *Myotis berdmorei* of Blyth (*Cat.* p. 35) from Schwe Gyeng. This species was, however, so imperfectly described (*J. A. S. B.* xxviii, p. 293), that as the specimens have unfortunately been lost, it is now impossible to identify it, and its being referred to *Myotis* suggests that it was more probably an ally of *V. mystacinus*. The bat called *V. adversus* by Temminck, Blyth, Cantor, Jerdon, and others was *V. muricola*.

The true *V. adversus* has a foot measuring 0·48 inch, wings from the ankles, a very long calcaneum, an oval ear without emargination, a moderately long pointed tragus with the inner margin



straight and the outer slightly convex, and an extremely small second upper premolar, quite inside the tooth-row; the second lower premolar, though small, being in the tooth-row. The coloration of the fur is very dark brown; the length of the forearm 1.5 inches.

204. *Vespertilio longipes*. *The Kashmir cave Bat*.

? *Myotis theobaldi*, *Blyth, J. A. S. B.* xxiv, p. 363; *id. Cat.* 36, note; *Jerdon, Mam.* p. 46.

Vespertilio macropus, *Dobson, P. A. S. B.* 1872, p. 209, *nee Gould*.

Vespertilio longipes, *Dobson, P. A. S. B.* 1873, p. 110; *id. Mon. As. Chir.* p. 131; *id. Cat. Chir. B. M.* p. 204; *Anderson, Cat.* p. 139; *W. Blanford, J. A. S. B.* lvii, pt. 2, p. 269.

Crown of head considerably raised; muzzle narrow, pointed, hairy; nostrils projecting slightly, and opening sublaterally with a hollow between them. Ears extending, when laid forward, to the end of the muzzle, narrow, tapering, the tips narrowly rounded off; upper half of the outer margin concave, lower half convex, inner convex throughout. Tragus long, slender, tapering towards the tip, which is rounded off; the outer margin has two small projecting lobes near the base.

Wings from the ankles. Feet very large, the toes forming more than half the length of the foot; the first and fifth toes shorter than the others. Face very hairy, and the upper lip clothed with long straight hairs.

The first and second upper premolars are both small, the second but slightly more internal in position than the first.

Colour of fur above black, below the same with whitish tips.

Dimensions. Head and body 1.75 inches, tail 1.45, forearm 1.45, foot 0.4.

Distribution. The types were obtained at the caves of Bhima Devi, Kashmir, elevation 6000 feet.

It is probable that *Myotis theobaldi*, obtained from caves near Matur Nag, N. of Islamabad, Kashmir, was the same as *V. longipes*, for the two agree in dimensions and both are characterized by large feet; but it is impossible to identify *Myotis theobaldi*, for the types have been lost, and it was said to be extremely close to the pipistrelle, from which *V. longipes* differs considerably in structure.

205. *Vespertilio daubentoni*. *The water Bat*.

Vespertilio daubentonii, *Leisler, Kuhl, Deutsche Flederm.* p. 51, pl. xxv, fig. 2 (1817); *Dobson, Mon. As. Chir.* p. 132; *id. Cat. Chir. B. M.* p. 297.

The ears laid forward extend nearly or quite to the nostril, tips rounded, not very broadly; inner margin regularly convex from base to tip; outer margin straight or slightly concave throughout

nearly the upper half, then abruptly convex. Tragus about half the length of the ear, subacutely pointed; inner margin quite straight, outer gently convex, with a distinct rounded lobe projecting just above the base.

Wings from the metatarsi; feet large; calcaneum long; last two vertebrae projecting from the interfemoral membrane. The face rather flat, of the eyes half naked; glandular area between eyes and rather tumid.

Upper incisors subequal in size, their cusps diverging widely. Second upper premolar in the tooth-row, fully visible from without, and about one third the height of the first.

Colour brown, usually snuff-brown above, dirty white below; basal half or more of all hairs dark brown.

Dimensions. Head and body 1.9 inches, tail 1.7, ear from crown of head 0.4, forearm 1.45.

Distribution. Throughout the greater part of the Palearctic region. This species has not been recorded from the Himalayas, but, strange to say, two specimens were obtained in Tenasserim by Mr. Limborg.

Habits. This bat in Europe is generally found near water, and, in the evening, flies about close to the surface of lakes, ponds, and rivers, and feeds upon the insects that are so common over water. It rests mainly on trees. It appears soon after sunset as a rule, and after hunting over water for a time returns to hang on a branch before it issues again in search of food.

206. *Vespertilio megalopus*. The narrow-eared water Bat.

Vespertilio megalopus, Dobson, A. M. N. H. (4) xvi, p. 261 (1875);
id. Cat. Chir. B. M. p. 298.



Fig. 106.—Ear of *V. megalopus*. (Dobson, Cat. Chir. B. M.)

Very similar to *V. daubentoni*, but the ears are longer, much narrower, and more acute, and laid forwards extend beyond the end of the nose; the upper third of the inner margin of the ear-couch is straight instead of being convex, and the tip is narrowly rounded off. The tragus is longer, narrower, and quite obtuse, the upper third of its inner margin slightly concave, but the extremity is not directed inwards.

Wing-membrane from just below the ankle. The first and second premolars are proportionally smaller, and the second is more inside the tooth-row than in *V. daubentoni*.

Dimensions. Head and body 1.65 inches, tail 1.6, ear from crown 0.5, forearm 1.45.

Distribution. Kashmir. The collection containing this and other species was purchased by the British Museum and supposed at the time to be African, but it has since proved to be from Kashmir. The present is one of the few species included that has not been met with in other Kashmir collections.

207. *Vespertilio nipalensis*. *The Nepal Bat.*

Vespertilio pallidiventris, Hodgson, *Calc. Journ. N. H.* iv, p. 286 (1844) (name only).

Vespertilio nipalensis, Dobson, *P. A. S. B.* 1871, p. 214; *id. Mon. As. Chir.* p. 141; *id. Cat. Chir. B. M.* p. 302; Anderson, *Cat.* p. 140; Scully, *J. A. S. B.* lvi, pt. 2, p. 253.

Muzzle narrow, but with distinct half-naked glandular prominences between the eyes and nostrils. Ears not extending to the nostrils when laid forward, narrow and bluntly pointed; outer margin of the ear-conch hollowed out beneath the tip, which



Fig. 107.—Head of *Vespertilio nipalensis*. (Dobson, *Mon. As. Chir.*)

projects outwards considerably, lower half of outer margin convex, terminating, without any lobe, in front of the base of the tragus. The tragus is long, narrow, pointed, and curved slightly outwards; a small lobule at the base of the outer margin.

Wings from the base of the toes. Fur of the head and back dense and long, the long hair extending on the face to between the eyes.

The canines in both jaws very short, in the lower jaw resembling premolars; the first and second premolars are minute, and in the upper jaw scarcely distinguishable without the aid of a lens.

Colour of fur above black with brown tips; below pure white, the basal two thirds of the hair being black.

Dimensions. Head and body 1·65 inches, tail 1·35, ear from base of outer margin 0·6, forearm 1·35.

Distribution. The only specimen known, now in the Indian Museum, Calcutta, is from Katmandu, Nepal.

The above description is taken from Dobson's. I have not examined the specimen. Scully has shown that Hodgson's *V. pallidiventris* was the same species.

A bat which will probably be found hereafter in Baluchistan and Southern Afghanistan is *V. desertorum*, Dobson (see *Cat. Chir. B. M.* p. 304), the type of which was obtained at Jalk, within the Persian frontier, and which was subsequently classed by the describer as a subspecies or variety of the European *V. emarginatus*. *V. desertorum* is in any case an extremely well-marked race, larger than the European bat, very pale-coloured, both as regards the fur and the membranes, with very thin ears, extending when laid forward to the nostrils, and with the outer margin of the ear-conch deeply and subangularly emarginate about one third below the tip.

The tragus is long, attenuate, and pointed. Wings from the base of the toes. Forearm 1.75 inches.

208. *Vespertilio murinus*. *The common European Bat.*

- Vespertilio murinus*. *L. Syst. Nat.* ed. xii, i, p. 47, partim (1766); *Schreb. Singeth.* i, p. 165, pl. li; *Dobson, Mon. As. Chir.* p. 137; *id. Cat. Chir. B. M.* p. 309; *Anderson, Cat.* p. 141.
Vespertilio blythii, *Tomes, P. Z. S.* 1857, p. 53; *Jerdon, Mam.* p. 45; *Hutton, P. Z. S.* 1872, p. 709.
Myotis murinus, *Blyth, J. A. S. B.* xxi, p. 360; *id. Cat.* p. 35; *Jerdon, Mam.* p. 46.
Vespertilio africanus, *Dobson, A. M. N. H.* (4) xvi, p. 260 (1875); *id. Cat. Chir. B. M.* p. 310.

Crown of the head slightly raised. Muzzle blunt, area between eye and nostril somewhat tumid, the sides of the face and end of the nose above half naked, but there are some long hairs on the upper



Fig. 108.—Ear of *V. murinus*. (*Dobson, Mon. As. Chir.*)

lip. Ears large, extending to just beyond the end of the muzzle when laid forward, or, in Himalayan specimens, just extending to the nostrils, the tips bluntly pointed; inner margin of the ear-coch moderately convex to the base, where the basal lobe joins at a right angle; outer margin concave below the tip, the upper half wavy, the middle convex; there is a shallow notch opposite the base of the tragus, followed by a convex lobe terminating opposite the base of the inner margin. Tragus of moderate length, narrow, attenuate above and subacutely pointed; inner margin nearly or quite straight; outer with a small basal lobe, then convex for about half its length, becoming straight above.

Wings from the metatarsi. Only the extreme tip of the tail projects from the interfemoral membrane. Basal portion of interfemoral well clad with hair above.

The first upper premolar is about half the height of the third; the second is quite small, but not minute, it is usually somewhat inside the tooth-line, in the angle between the first and third.

Colour of fur greyish to reddish brown, not dark, above, very pale brown to sullied white below, the base of the hairs dark throughout.

Dimensions. Head and body of a male from Kashmir (preserved in alcohol) 2.6 inches, tail 2.2, ear from crown 0.65, forearm 2.25. In fresh specimens, according to Hutton, the head and body measured 3 inches, tail 2½.

Distribution. The Palaearctic region generally, as far north as Southern England, Denmark, &c. This species has been found in Kashmir by Sir O. B. St. John, and at Mussoorie, in the Himalayas, by Hutton. The type of *V. blythii* was said to be from Nusseerabad, in Rajputana, but this locality I think requires confirmation.



The Kashmir variety has somewhat shorter ears, and in some cases a more pointed tragus than the normal form.

Habits. *V. murinus* appears late in the evening, and flies low and slowly. It hides during the day in caves and buildings, and hibernates in similar places in considerable numbers together. According to Hutton, it attacks and kills smaller bats when they are kept with it in confinement, and devours some of the flesh. The female has one young, which is generally found clinging to the mother from the end of May till well into July.

209. *Vespertilio dobsoni*. *The Chamba Bat.*

Vespertilio murinoides, Dobson, *J. A. S. B.* xlii, pt. 2, p. 205 (1873); *id. Mon. As. Chir.* p. 138; *id. Cat. Chir. B. M.* p. 310, *nec Lartet*, 1851.

Vespertilio dobsoni, Trouessart, *Cat. Mam.* p. 88 (1879).

"Ears slightly shorter than the head; general form of the ear-conch triangular, with narrow rounded tip; the inner margin very faintly convex, almost straight in its upper third; the outer margin concave beneath the tip; the remaining portion convex, with a faint concavity opposite the base of the tragus. The tragus is slender and acutely pointed, with a quadrangular lobe at the base of the outer margin."

"The first upper premolar is very small, scarcely visible from without, and not much larger than the second."

Colour of fur dark brown above, with light brown tips; beneath dark brown, almost black, with greyish tips.

Dimensions of an adult female:—Head and body 2·5 inches, tail 2·1, ear from base of outer margin 0·85, forearm 2·1.

Distribution. Only a single specimen is known. This was procured at Chamba (N.W. Himalaya), at an elevation of 3000 feet.

The type of this species may possibly be an aberrant individual of *V. murinus*, but the differences appear too great. The description is copied from Dobson's, as I have not examined the specimen. The name *V. murinoides* required to be changed, as it was given by Lartet in 1851 to a species found fossil in the Miocene of Sansan, France.

210. *Vespertilio formosus*. *Hodgson's Bat.*

Vespertilio formosus, Hodgson, *J. A. S. B.* iv, p. 700 (1835); Blyth, *J. A. S. B.* xx, p. 158; Dobson, *Mon. As. Chir.* p. 140; *id. Cat. Chir. B. M.* p. 311; Anderson, *Cat.* p. 142; Scully, *J. A. S. B.* lvi, pt. 2, p. 254.

Kerivoula pallida, Blyth, *Cat.* p. 34 (1863).

Murina formosa and *Kerivoula pallida*, Jerdon, *Mam.* pp. 42, 43.

Vespertilio auratus, Dobson, *J. A. S. B.* xl, pt. 2, p. 186, pl. x, figs. 1, 2 (1871).

Kerivoula formosa, Hutton, *P. Z. S.* 1872, p. 711.

Vespertilio dobsoni, Anderson, *Cat.* p. 143 (1881), *nec Trouessart*, 1879.



Face flat, hairy throughout except at the extreme end of the nose; muzzle conical, the nostrils projecting slightly beyond the upper lip, and opening sublaterally, with a shallow hollow between them. Ears scarcely extending to the nostrils when laid forward; tips rounded, directed outwards; outer margin of ear-conch concave, with a wavy outline in the upper half, then convex, and terminating opposite the base of the tragus in a small lobe folded inwards. Tragus long, narrow, obtusely pointed, inner margin straight, outer with a very small lobule at the base, then convex, becoming straight above.

Wing-membrane very broad, attached to the base of the outer toe. Fur thick and woolly. Nearly half the interfemoral membrane is thickly clad with hair above, backs of toes the same. Dentition as in *V. murinus*, the second upper premolar minute.

Colour of fur above fawn-colour to golden brown, below paler and whitish. Some specimens are tinted with rusty red. The dorsal hairs have sometimes the basal third dark brown. The membranes (including the ears) are orange with the exception of black triangular areas between the third and fourth, and fourth and fifth fingers, and inside the fifth, the fingers themselves and the membrane close to them being orange, as in *Cerivoula picta*. The black triangular areas are sometimes dotted and streaked with orange.

Dimensions. Head and body 2·4 inches, tail 1·9, ear from crown 0·55, forearm 1·9.

Distribution. Himalayas near Mussoorie up to 5500 feet, Nepal, Sikhim, Assam, Khási hills, Bengal (Calcutta, Purneah, Chybassa), and China.

V. dobsoni of Anderson appears to me to be founded on a very large individual of *V. formosus* with the forearm 2·15 inches long.

211. *Vespertilio mystacinus*. *The whiskered Bat*.

Vespertilio mystacinus, *Leisler, Kuhl, Deutsche Floderm.* p. 58 (1817);

Dobson, Mon. As. Chir. p. 133; *id. Cat. Chir. B. M.* p. 314;

Scully, J. A. S. B. lvi, pt. 2, p. 254.

Vespertilio siligorensis (and *V. darjelingensis* ?), *Hodgson, Horsf.*

A. M. N. H. (2) xvi, p. 102 (1855); *Jerdon, Mam.* pp. 44, 45.

Crown slightly raised above the face, which is covered with long hairs throughout down to the edge of the upper lip; muzzle narrow. Ears, when laid forward, extending beyond the end of the nose, tips rounded; upper half of outer margin of ear-conch deeply concave with a wavy outline, lower half abruptly convex, with a distinct small lobe at the base. Tragus attenuate above and subacutely pointed; inner margin straight; outer with a small lobule at the base, then sloping outwards to the broadest part of the tragus, opposite about a quarter the height of the inner margin, thence, after a brief convexity, sloping upwards and inwards to the end.

Wings from the base of the toes. A slight projection from



the interfemoral membrane at the end of the calcaneum. The last caudal vertebra free.

Upper incisors subequal, diverging, all bifid. The first upper premolar is twice the height of the second, and scarcely one third the height of the third; the first two slightly internal.

Colour of fur brown, more or less rufescent above, greyish below, basal portion of hairs dark brown or black throughout.

Dimensions. Head and body 1·8 inches, tail 1·55, ear from crown 0·5, forearm 1·35. These are from a Nepal specimen, European individuals as a rule are smaller.

Distribution. Throughout the greater portion of the Palaearctic region, extending to the Himalayas, where, however, this species has hitherto been found in Nepal and Sikkim only. Scully states that it is one of the commonest species in the Nepal valley.

Habits. The whiskered bat is generally found in hollow trees, wooden roofs, &c. It flies swiftly, often over water, and appears early in the evening.

212. *Vespertilio muricola.* *The mustachioed Bat.*

Vespertilio adversus, *Tenminck*, *Mon. Mam.* ii, p. 221; *Blyth*, *J. A. S. B.* xxi, p. 346; *id.* *Cat.* p. 35; *Jerdon*, *Mam.* p. 45; *Hutton*, *P. Z. S.* 1872, p. 710; *neo Horsfield*.

Vespertilio muricola, *Hodgson*, *J. A. S. B.* x, p. 908 (no description); *Gray*, *Cat. Mam. &c. Nepal and Thibet*, 1846, p. 4; *Dobson*, *Mon. As. Chir.* p. 134; *id.* *Cat. Chir. B. M.* p. 316; *Anderson*, *Cat.* p. 142; *Scully*, *J. A. S. B.* lvi, pt. 2, p. 255.

Vespertilio caliginosus, *Tomes*, *P. Z. S.* 1859, p. 73; *Jerdon*, *Mam.* p. 44.

Vespertilio (*Pteropterus*) *lobipes*, *Peters*, *MB. Akad. Berl.* 1867, p. 706.

Vespertilio blanfordi, *Dobson*, *P. A. S. B.* 1871, p. 214.

Vespertilio moupinensis, *A. Milne-Edwards*, *Rech. Mam.* p. 253, pls. xxxvii a, xxxvii c.

Muzzle narrow; face covered with long hair, on the glandular area between each eye and nostril and on the upper lip the covering is thin, though the hairs are very long; only the tip of the nose is naked. The ears laid forward reach the



The ears laid forward reach the nostrils, the tips are narrowly rounded, the inner margin of the ear-conch is straight for a third of its length below the tip, then convex, straight again towards the base, the angle of the basal lobe somewhat rounded; outer margin deeply concave with a wavy outline below the tip and for about a third of its length, then convex, slightly emarginate opposite the base of the tragus and ending in a short, distinct, convex lobe. Tragus pointed, the

Fig. 109.—Ear of
V. muricola.
(*Dobson*, *Cat.*
Chir. B. M.)

inner margin slightly concave, outer with a well-defined lobe at the base, then strongly convex to above the broadest part of the tragus, and thence sloping in a moderately convex curve to the end.