

OCCASIONAL PAPER NO. 174

**RECORDS OF THE
ZOOLOGICAL SURVEY OF INDIA**

**Contribution to the knowledge of Bats
(Mammalia : Chiroptera) of North East Hills, India**

YADUNATH PRASAD SINHA

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INTRODUCTION

From the North-East Hills of India, comprising seven sister states *viz.* Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram and Tripura, Kurup (1966, 1968) has mentioned 15 genera and 45 species and subspecies of the four families of bats *viz.* Pteropodidae (2 gen. & 3 spp. & subspp.), Megadermatidae (1 gen. & 2 spp. & subspp.), Rhinolophidae (3 gen. & 18 spp. & subspp.) and Vespertilionidae (9 gen. & 22 spp. & subspp.). Most of them Indo-Chinese elements of Oriental fauna, although the vegetation of this region is very much similar to that of western parts of the western Ghat of India.

In this paper taxonomy, distribution and field observations (only of those species encountered in the field) of 28 genera 62 species and subspecies of the seven families *viz.* Pteropodidae (7 gen. & 8 spp. & subspp.), Rhinopomatidae (1 gen. & 1 sp. & subsp.), Emballonuridae (1 gen. & 1 sp. & subsp.), Megadermatidae (1 gen. & 2 spp. & subspp.), Rhinolophidae (3 gen. & 18 spp. & subspp.), Molossidae (1 gen. & 1 sp. & subsp.) and Vespertilionidae (14 gen. & 31 spp. & subspp.) of North-East Hills have been dealt in detail on the basis of collection made by the author during 1989 to 1994 and previous parties, present in the Eastern Regional Station, Shillong and Zoological Survey of India, Calcutta and available literature. A key for easy identification of bats of N. E. Hills has also been provided.

All measurements mentioned in the text are in millimetres, weights in grammes and the figure in parentheses refer to arithmetic mean values.

The following abbreviations have been used in the text :

ad. : Adult.

cb. : Condylbasal length.

cc. : Condyl canine length.

c' - c' : Distance between upper canine root.

c - m' or *c - m²* or *c - m³* : Length of upper tooth row.

c - m₂ or *c - m₃* : Length of lower tooth row.

CR. : Length of cranial rostrum.

cw. : Width of brain case.

db. : Depth of brain case.

E. : Length of ear.

E. R. S. : Eastern Regional Station, Zoological Survey of India.

ex. : Example.

f. : Length of forearm.

ft. : Length of foot including claws.

fpt. : First phalanx of third finger.

HB. : Length of head and body.

hbc. : Height of brain-case.

iof. : Infraorbital foramen.

iow. : Interorbital width.

hm. : Height of muzzle.

l. : Total length of skull.

ml. : Length of mandible.

$m' - m'$: Maxillary width in fruit bats / Rostral width in Nose-leaf bats of the family Rhinolophidae.

$m^3 - m^3$: Maxillary width in insectivorous bats.

mw. : Mastoid width.

spt. : Second phalanx of third finger.

p. : Penis length.

t. : Length of tibia.

Tl. : Length of tail.

Tr. : Length of tragus.

wbc. : Width of the basioccipital.

ws. : Wing span.

ww. : Width of wings.

wt. : Weight.

Z. S. I. Cal. : Zoological Survey of India, Calcutta.

zw. : Zygomatic width.

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SYSTEMATIC LIST OF THE SPECIES AND SUBSPECIES OF BATS FROM N. E. HILLS

Sl. No.	Systematic List	Statewise distribution
Order – CHIROPTERA		
Suborder : MEGACHIROPTERA		
Family : PTEROPODIDAE		
Subfamily : PTEROPODINAE		
1.	<i>Pteropus g. giganteus</i> (Brünnich)	Assam ; Meghalaya ; Manipur ; Tripura.
2.	<i>Rousettus l. leschenaulti</i> (Desmarest)	Arunachal Pradesh ; Assam ; Meghalaya ; Nagaland ; Tripura.
3.	<i>Cynopterus s. sphinx</i> (Vahl)	Arunachal Pradesh ; Assam ; Manipur ; Meghalaya ; Nagaland ; Tripura.
4.	<i>Cynopterus brachyotis</i> (Müller)	Arunachal Pradesh ; Assam ; Meghalaya ; Nagaland.
5.	<i>Sphaerias blanfordi</i> (Thomas)	Arunachal Pradesh.
6.	<i>Megaerops niphanae</i> yenbutra & Felten	Arunachal Pradesh ; Manipur ; Mizoram.
Subfamily : MACROGLOSSINAE		
7.	<i>Eonycteris spelaea</i> (Dobson)	Arunachal Pradesh ; Assam ; Manipur ; Meghalaya ; Nagaland.
8.	<i>Macroglossus s. sobrinus</i> Anderson.	Arunachal Pradesh ; Meghalaya ; Mizoram ; Tripura.
Suborder : MICROCHIROPTERA		
Family : RHINOPOMATIDAE		
9.	<i>Rhinopoma ? hardwickei</i> Gray	Arunachal Pradesh.
Family : MEGADERMATIDAE		
10.	<i>Megaderma s. spasma</i> (Linnaeus)	Assam.
11.	<i>Megaderma l. lyra</i> Geoffroy	Arunachal Pradesh ; Assam.
Family : EMBALLONURIDAE		
12.	<i>Taphozous l. longimanus</i> Hardwicke	Assam ; Tripura.
Family : RHINOLOPHIDAE		
Subfamily : RHINOLOPHINAE		
13.	<i>Rhinolophus t. trifoliatu</i> s Temminck	Assam.

Sl. No.	Systematic List	Statewise distribution
14.	<i>Rhinolophus l. luctus</i> Temminck	Assam ; Meghalaya ; Nagaland
15.	<i>Rhinolophus p. pearsoni</i> Horsfield	Manipur ; Meghalaya.
16.	<i>Rhinolophus pusillus blythi</i> Andersen	Assam ; Meghalaya
17.	<i>Rhinolophus subbadius</i> Blyth	Meghalaya.
18.	<i>Rhinolophus l. lepidus</i> Blyth	Assam ; Meghalaya ; Mizoram.
19.	<i>Rhinolophus r. rouxi</i> Temminck	Arunachal Pradesh.
20.	<i>Rhinolophus affinis himalayanus</i> Andersen	Meghalaya.
21.	<i>Rhinolophus ferrum-equinum tragatus</i> Hodgson	Arunachal Pradesh.

Subfamily : HIPPOSIDERINAE

22.	<i>Hipposideros fulvus pallidus</i> Andersen	Assam ; Meghalaya.
23.	<i>Hipposideros c. cineraceus</i> Blyth	Arunachal Pradesh ; Assam ; Meghalaya ; Mizoram.
24.	<i>Hipposideros a. ater</i> Templeton	Meghalaya.
25.	<i>Hipposideros pomona gentilis</i> Andersen	Meghalaya.
26.	<i>Hipposideros galeritus</i> Cantor	Assam.
27.	<i>Hipposideros a. armiger</i> (Hodgson)	Assam ; Manipur ; Meghalaya.
28.	<i>Hipposideros larvatus leptophyllus</i> (Dobson)	Arunachal Pradesh ; Assam ; Meghalaya.
29.	<i>Hipposideros lankadiva</i> Kelaart	Manipur ; Meghalaya ; Mizoram ; Tripura.
30.	<i>Coelops f. frithi</i> Blyth	Meghalaya.

Family : MOLOSSIDAE

31.	<i>Tadarida p. plicata</i> (Buchanan)	Meghalaya.
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Family : VESPERTILIONIDAE

Subfamily : VESPERTILIONINAE

32.	<i>Myotis annectans</i> Dobson	Nagaland.
33.	<i>Myotis s. siligorensis</i> (Horsfield)	Meghalaya.
34.	<i>Myotis mystacinus caliginosus</i> (Tomes)	Meghalaya.
35.	<i>Myotis horsfieldi</i> (Temminck)	Meghalaya.
36.	<i>Myotis f. formosus</i> (Hodgson)	Assam ; Meghalaya.
37.	<i>Myotis longipes</i> (Dobson)	Meghalaya.
38.	<i>Pipistrellus c. coromandra</i> (Gray)	Arunachal Pradesh ; Assam.
39.	<i>Pipistrellus mimus</i> Wroughton	Manipur ; Meghalaya ; Nagaland ; Tripura.
40.	<i>Pipistrellus austenianus</i> Dobson	Meghalaya.

Sl. No.	Systematic List	Statewise distribution
41.	<i>Pipistrellus babu</i> Thomas	Assam ; Meghalaya.
42.	<i>Pipistrellus circumdatus</i> (Temminck)	Meghalaya.
43.	<i>Pipistrellus abramus</i> (Temminck)	Arunachal Pradesh.
44.	<i>Pipistrellus k. kuhlii</i> (Kuhl)	Assam ; Meghalaya.
45.	<i>Pipistrellus dormeri</i> (Dobson)	Meghalaya.
46.	<i>Nyctalus noctula labiatus</i> (Hodgson)	Nagaland.
47.	<i>Ia io</i> Thomas	Meghalaya.
48.	<i>Tylonycteris pachypus fulvida</i> (Blyth)	Manipur ; Meghalaya ; Mizoram ; Tripura.
49.	<i>Eptesicus pachyotis</i> (Dobson)	Meghalaya.
50.	<i>Eptesicus serotinus pachyomus</i> (Tomes)	Assam.
51.	<i>Barbastella leucomelas darjelingensis</i> (Hodgson)	Meghalaya ; Mizoram.
52.	<i>Scotomanes o. ornatus</i> (Blyth)	Arunachal Pradesh ; Manipur ; Meghalaya.
53.	<i>Scotophilus k. kuhlii</i> Leach	Assam ; Meghalaya ; Tripura.
54.	<i>Scotophilus h. heathi</i> (Horsfield)	Arunachal Pradesh ; Assam ; Manipur ; Nagaland.
55.	<i>Plecotus auritus homochrous</i> Hodgson	Meghalaya.

Subfamily : **MINIOLPTERINAE**

56. *Miniopterus schreibersi fuliginosus* (Hodgson) Meghalaya.

Subfamily : **MURINAE**

57. *Murina h. huttoni* (Peters) Assam ; Meghalaya.
 58. *Murina tubinaris* (Scully) Arunachal Pradesh ; Meghalaya.
 59. *Murina c. cyclotis* Dobson Meghalaya.
 60. *Harpiocephalus mordax* Thomas Meghalaya ; Mizoram.

Subfamily : **KERIYOULINAE**

61. *Kerivoula p. picta* Pallas Assam.
 62. *Kerivoula hardwickei* (Horsfield) Assam ; Meghalaya ; Nagaland.

KEY TO THE BATS OF N. E. HILLS, INDIAOrder : **CHIROPTERA**

Seven families of the order Chiroptera under two suborders *viz.* Megachiroptera and Microchiroptera, have been known from N. E. Hills, India.

Key to the families of the Chiroptera

1. Neither nose-leaf nor tragus present Pteropodidae
 Either nose-leaf or tragus or both present 2
2. Both nose-leaf and tragus present Megadermatidae
 Either a nose-leaf or tragus present, but not both 3
3. A nose-leaf but no tragus present, Rhinolophidae
 No nose-leaf but a tragus present 4
4. Tail entirely enclosed in interfemoral membrane Vespertilionidae
 A portion of the tail free 5
5. Tail emerging from the upper surface of the interfemoral membrane comparatively short
 and stout Emballonuridae
 Tail emerging from the end of the interfemoral membrane 6
6. Tail very long and slender Rhinopomatidae
 Tail comparatively short and stout Molossidae

Suborder 1. MEGACHIROPTERA

Family 1. PTEROPODIDAE

Two subfamilies of the family Pteropodidae have been recognised from this area.

Key to the subfamilies of the family Pteropodidae

- Tongue moderate, not extensible Pteropodinae
 Tongue long, highly extensible Macroglossinae

Subfamily 1. PTEROPODINAE

Six bats of the subfamily pteropodinae have been known from this area.

Key to the bats of the subfamily Pteropodinae

1. Lower incisors 2-2 2
 Lower incisors 1-1 6
2. Upper incisors 1-1 ; 5 upper post canine teeth on each side 3
 Upper incisors 2-2 ; 4 upper post canine teeth on each side 4

3. Tail absent ; occipital region of skull elongated *Pteropus g. giganteus*
 A short tail present, occipital region of skull not elongated ... *Rousettus l. leschenaulti*
4. Postorbital foramen absent ; calcar absent *Sphaerias blanfordi*
 Postorbital foramen present ; large calcar present 5
5. Ear length 19.0 – 22.5 mm. *Cynopterus s. sphinx*
 Ear length 16.0 – 18.0 mm. *Cynopterus brachyotis*
6. Tail absent ; hind limb not markedly furred ; dorsal surface of rostrum almost horizontal ;
 2nd upper premolar lacking antero-internal cusp *Megaerops niphanae*

Subfamily 2. MACROGLOSSINAE

Two bats of the subfamily Macroglossinae have been known from this area.

Key to the bats of the subfamily Macroglossinae

- 2nd finger lacking claw ; external tail present *Eonycteris spelaea*
 2nd finger having claw ; external tail absent *Macroglossus s. sobrinus*

Suborder 2. MICROCHIROPTERA

Family 2. RHINOPOMATIDAE

Only one doubtful species *viz.* *Rhinopoma hardwickei* Gray of the genus *Rhinopoma* recorded from this area by Chakraborty & Sen (1991) which can be differentiated from *Rhinopoma microphyllum* (Brünnich) on the basis of longer tail than forearm *vs.* Shorter tail than forearm in the latter species.

Family 3. MEGADERMATIDAE

Two bats of the family Megadermatidae occur in this area.

Key to the bats of the family Megadermatidae

- Intermediate portion of nose-leaf broad and chordate ; posterior portion broadly elliptical, slightly rounded above *Megaderma s. spasma*
 Intermediate portion of nose-leaf narrow and subcircular ; posterior portion subrectangular and flattened above *Megaderma l. lyra*

Family 4. EMBALLONURIDAE

Only one genus, species and subspecies *viz.* *Taphozous l. longimanus* recorded from Assam (Sinha 1995) and from Tripura (Agarwal & Bhattacharyya 1977), differs from other species of

the subgenus *Taphozous* by having prominent gular sac and pectoral gland in males and rudimentary in females which are absent in other members of the subgenus *Taphozous*.

Family 5. RHINOLOPHIDAE

3 genera of the family Rhinolophidae viz. *Rhinolophus*, *Hipposideros* and *Coelops* have been found in this area.

Key to the genera of the family Rhinolophidae

1. Noseleaf consisting of a usually triangular or subtriangular posterior vertical cellular lancet ; wide anterior noseleaf almost completely cover the muzzle and central flattened a strap-like transverse sella surrounding the leaf and extending from a point above and behind the nostrils. In majority sella is joined from lower part of the lancet by a median longitudinal connecting process..... *Rhinolophus*
Noseleaf lacking any posterior vertical lancet, the posterior leaf instead with a more or less semicircular edges sometimes with folds, pockets or swollen vertical projections ; anterior-noseleaf lobate or having horseshoe-shaped structure ; central portion having no strap-like sella above and behind the nostril 2
2. Anterior noseleaf lobate ; a small shield-shapped or chordate process at centre of upper margin of anterior leaf *Coelops*
Anterior noseleaf having horseshoe-shapped structure ; not deeply emarginated into two lobes ; central part of leaf supported from rear by two narrow septa *Hipposideros*

Genus 1. *Rhinolophus*

9 species and subspecies of this genus have been found in this area.

Key to the species and subspecies of the genus *Rhinolophus*

1. The base of the sella is expanded, making a trifolium-shaped structure ; frontal depression very deep 2
The base of the sella is not expanded and does not make a trifolium-shaped structure ; frontal depression shallow 3
2. Frontal sac present *R. l. lepidus*
Frontal sac absent *R. t. trifoliatius*
3. Connecting process beneath top of sella *R. p. pearsoni*
Connecting process as high or higher than the top of sella 4
4. Connecting process as high as the top of sella forming a shallow notch between them 5
Connecting process higher than the top of sella forming a deep notch between them 7

5. Sides of the internarial expansion parallel *R. r. rouxi*
 Sides of the internarial expansion arched 6
6. Metacarpal of third phalanx long, more than 69% of the length of forearm
 *R. affinis himalayanus*
 Metacarpal of third phalanx short, less than 69% of the length of forearm
 *R. ferrumequinum tragatus*
7. Connecting process triangular in profile, its front surface straight 8
 Connecting process like a curved horn, its front surface conspicuously concave
 *R. subbadius*
8. Skull narrow, zygomatic width less than 8 mm. ; upper tooth row short, less than 6 mm.
 *R. pusillus blythi*
 Skull broad, zygomatic width more than 8 mm. ; upper tooth row long, more than 6 mm.
 *R. l. lepidus*

Genus 2. *Hipposideros*

8 species and subspecies of the genus *Hipposideros* occur in N. E. Hills.

Key to the species and subspecies of the genus *Hipposideros*

1. Forearm small, 32.0 to 48.0 ; ear rounded or broadly triangular 2
 Forearm long, 58.0 to 95.0 ; ear triangular, moderately or acutely pointed 6
2. Lateral supplementary leaflets none or one 3
 Lateral supplementary leaflets two or three *H. galaritus*
3. Internarial septum thickened and / or bulbous ; anterior half of zygomata slender 4
 Internarial septum not inflated ; anterior half of zygomata massive 5
4. Superior projection of zygomata lacking or low ; shorter forearm (32.0 to 37.0), skull
 (12.6 to 13.9) and upper tooth row ($c - m^3$ 4.8 to 5.5) *H. c. cineraceus*
 A low superior zygomatic projection ; longer forearm (34.5 to 42.5), skull (13.2 to 15.0)
 and upper tooth row (5.1 to 5.9) *H. a. ater*
5. Posterior projecting portion of vomer thickened *H. pomona (gentilis)*
 Posterior projecting portion of vomer blade like *H. fulvus (pallidus)*
6. Smaller forearm (58.0 to 65.0) and skull (18.5 to 21.5) *H. larvatus*
 Longer forearm (76.0 to 95.0) and skull (26.4 to 30.8) 7
7. Skull wide with a flattened rostrum (Rostral width 8.8 to 10.4) ; length of slender bar
 of infra-orbital foramen about 2.0 *H. a. armiger*
 Skull wide with a high rostrum (Rostral width 7.8 to 9.3) ; length of slender bar of infra-
 orbital foramen about 4.0 *H. lankadiva*

Genus 3. *Coelops*

only one species viz. *Coelops frithi* Blyth of the genus *Coelops* is found in North-East Hills.

Family 6. MOLOSSIDAE

Only one genus, species and subspecies viz. *Tadarida plicata plicata* (Buchanan) of the family Molossidae is found in North-East Hills.

Family 7. VESPERTILIONIDAE

Four subfamilies of the family Vespertilionidae have been recognised in North-East Hills.

Key to the subfamilies of the family Vespertilionidae

1. Nostril elongated, tubular Murinae
Nostril not elongated 2
2. Ears funnel-shaped Kerivoulinae
Ears not funnel-shaped 3
3. Second phalanx of third finger nearly three times as long as first Miniopterinae
Second phalanx of third finger not elongated Vespertilioninae

Subfamily 7. VESPERTILIONINAE

Vespertilioninae subfamily is the largest and contains 24 species and subspecies in North-East Hills.

Key to the bats of the subfamily Vespertilioninae

1. Cheek teeth six in number on each side above and below 2
Cheek teeth less than six in number on each side above and below 7
2. Wings, forearm and interfemoral membrane conspicuously particoloured black, red, orange and yellow *Myotis f. formosus*
Wing, forearm and interfemoral membrane not particoloured black, red, orange and yellow 3
3. Foot including claws less than half of the tibia 4
Foot including claws half to three-fourth of the tibia 6
4. Forearm 30.0–37.0 mm. 5
Forearm about 40.0 mm. *Myotis annectans*
5. Brain-case domed, rising abruptly from the rostrum *Myotis s. siligorensis*
Brain-case flatter, not rising abruptly from the rostrum *Myotis mistacinus caliginosus*

6. Outer margin of tibia with a fringe of moderate hairs *Myotis longipes*
Outer margin of tibia lacking any fringe of hairs *Myotis horsfieldi*
7. Upper premolars two in each side 8
Upper premolars one in each side 20
8. Lower premolars three in each side *Plecotus auritus homochrous*
Lower premolars two in each side 9
9. Upper incisors two in each side 10
10. Ears joined ; upper surface of rostrum concave *Barbastella leucomelas darjilingensis*
Ears separate ; upper surface of rostrum convex 11
11. Forearm less than 45.0 mm. 12
Forearm above 45.0 mm. 19
12. Outer upper incisors not extending beyond cingulum of inner (some times not found due to cleaning defect) *Pipistrellus dormeri*
Outer upper incisors extending beyond cingulum of inner 13
13. Forearm about 41.0 mm. 14
Forearm below 40.0 mm. 15
14. Anterior upper premolar minute and inwardly displaced from tooth-row, posterior upper premolar and canine touch each other *Pipistrellus circumdatus*
Anterior upper premolar small and in tooth-row, posterior upper premolar and canine do not touch each other *Pipistrellus austenianus*
15. Forearm 32.0 to 35.0 mm. 16
Forearm 26.0 to 32.0 mm. 17
16. Interfemoral membrane with white edge *Pipistrellus babu*
Interfemoral membrane not with white edge *Pipistrellus k. kuhlii*
17. Baculum sinuous *Pipistrellus abramus*
Baculum straight 18
18. Forearm 26.0 to 30.5mm. ; skull length 10.8 to 11.5mm. ; zygomatic width 6.5 to 7.8mm.
Pipistrellus mimus
Forearm 27.0 to 32.0mm. ; skull length 12.0 to 13 mm. ; zygomatic width 7.5 to 8.4 mm.
..... *Pipistrellus c. coromandra*
19. Forearm above 70.0 mm. ; skull length around 27.0 mm. *Ia io*
Forearm 48.0 to 57.0 mm. ; skull length 17.0 to 19.4 mm. .. *Nyctalus noctula labiatus*
20. Upper incisors two in each side 21
Upper incisors one in each side 24
21. Skull noticeably flattened ; soles of feet expanded into fleshy pad
..... *Tylonycteris pachypus fulvida*
Skull not noticeably flattened ; soles of feet normal 22

22. Outer upper incisor small, on outer side of inner incisor and separate from canine ; palatal emargination deeper than broad 23
23. Size small, forearm 38.0 to 39.0 mm. ; base of ear thickened *Eptesicus pachyotis*
Size large, forearm 48.0 to 56.0 mm. ; base of ear not thickened
..... *Eptesicus serotinus pachyomus*
24. 1st and 2nd upper molars with reduced mesostyle, the W-pattern of ridges and cusps distorted or nearly absent ; 1st and 2nd lower molars with 2nd triangle smaller than 1st 26
1st and 2nd upper molars with unreduced mesostyle and normal W-pattern of ridges and cusps ; 1st and 2nd lower molars with 2nd triangle larger than 1st 25
25. Larger, forearm 50.0 to 62.0 ; total length of skull 19.1–22.0 mm. ; usually a dorsal pattern of white stripes or spots *Scotomanes ornatus*
26. Larger, forearm 55.0 to 65.0 mm. ; skull length 21.0 to 23.0 mm.
..... *Scotophilus h. heathi*
Smaller, forearm 46.0 to 53.0 mm. ; skull length 18.0 to 19.5 mm.
..... *Scotophilus k. kuhlii*

Subfamily 2. MINIOPTERINAE

Only one genus, species and subspecies viz. *Miniopterus schreibersi fuliginosus* recorded by Sinha (1994) is found in N. E. Hills.

Subfamily 3. MURINAE

Four bats of the subfamily Murinae occur in N. E. Hills.

Key to the bats of the subfamily Murinae

1. Last upper molar normal 2
Last upper molar reduced to a remnant, often deciduous *Harpiocephalus mordax*
2. Upper half of outer margin of ear-conch concave *Murina tubinaris*
Upper half of outer margin of ear-conch convex or straight 3
3. Dorsal body colour brown *Murina huttoni*
Dorsal body colour rufous brown to ferruginous *Murina cyclotis*

Subfamily 4. KERIVOULINAE

Only one genus viz *Kerivoula* with two species of the subfamily Kerivoulinae occurs in N. E. Hills.

Key to the species of the genus *Kerivoula*

- Wing membranes parti-coloured orange and black *Kerivoula picta*
Wing membranes of the same colour throughout *Kerivoula hardwickei*

SYSTEMATIC ACCOUNT

Order CHIROPTERA

Suborder MEGACHIROPTERA

Family PTEROPODIDAE

Subfamily PTEROPODINAE

Genus (1) *Pteropus* Brisson, 17621. *Pteropus giganteus giganteus* (Brünnich)

1782. *Pteropus gigantea* Brünnich, *Dyrenes Hist.* Dyre-Saml. Univ. Natur-Theater, 1 : 45 (Bengal = West Bengal, India).

Common name : Indian Flying Fox (Eng.).

Material examined : Assam : 4♀♀ (ad.) : Dalgaon, Darrang district, Dr. A. K. Mondal, 23 Mar 1964 ; 1♂ (ad.) : Lakhimpur, Lakhimpur district, Z. S. I. (ad.), 2 Nov 1919 ; 1♂ (ad.) : Golaghat district Z. S. I., Cal., 1 Jul 1920. Meghalaya : 1♀ (ad.) : Risa Colony, Shillong, E. Khasi Hills district, Smt. R. Mathew, Mar 1993 (collected dead specimen hanging from electric wire). Manipur : 1♂ (ad.), 1♂ (Subad.) : Imphal town, Imphal district, Z. S. I. Cal., 7 Nov 1945. Tripura : 3♂♂ (ad.), 2♀♀ (ad.) : Dharam Nagar and Dootpur, North Tripura district, (collected dead specimens hanging from electric wire), Y. P. Sinha, 8 & 9 Dec. 1989.

Other observation localities : Assam : Mahuri Para, ca. 6 km. from Gauswar, Kamrup district, 20 Dec 1988, about 200 individuals on Bamboo trees ; Rongjuli, Goalpara Dist., 24 Nov 1990, an individual seen on a bunch of plantains. Tripura : Deochhara, on the bank of Juri River, ca. 6 km. S. E. of Dharam Nagar, North Tripura district, 4 Dec. 1989, about 150 individuals on a Harish tree (Loc. name) ; Dharam Nagar, 4 Dec 1989, 70 individuals on a Mango tree ; Dootpur village, ca. 3 km. S. E. of Kanchanbari, 7 Dec. 1989, about 170 individuals on a semal tree ; Kanchanpur, 12 Dec 1989, about 100 individuals on semal tree ; Kulai Bazar, ca. 3 km. N. of Ambassa, 12 Dec 1989, about 80 individuals on semal and Karai (Loc. name) trees ; North Tripura district.

Measurements : External : 6♂♂ : E. 34.0–36.0 (35.5) ; f. 145.0–175.0 (163.0) ; t. 70.0–85.0 (77.7) ; ft. 44.0–47.0 (46.0). 7♀♀ : E. 32.0–35.0 (34.0) ; f. 140.0–170.0 (153.8) ; t. 68.0–78.0 (75.0) ; ft. 40.0–52.0 (47.2). Skull : 3♀♀ : l. 68.0–72.0 (69.3) ; zw. 37.0, 38.0 (2 ex.) ; cw. 24.0–25.0 (24.3) ; m' – m' 18.0–19.0 (18.7) ; c – m' 26.0–28.0 (27.0) ; c – m₂ 28.0–30.0 (29.2) ; ml. 53.0–56.0 (54.3).

Distribution in N. E. Hills : Assam : Goalpara district, Kamrup district, Darrang district, Lakhimpur district, Golaghat district ; Meghalaya : E. Khasi Hills district, W. Garo Hills district (specimen in AMNH as mention by Das et. at 1995) ; Manipur : Imphal district ; Tripura : North Tripura district.

Remarks on taxonomy : Andersen (1912), Roonwal (1949) and Ellerman & Morrison-Scott (1951, 1966) etc. have considered Nepal, Assam and Manipur populations as *Pteropus giganteus leucocephalus* Hodgson 1835. But most of earlier workers like Blyth (1863) ; Hutton (1872) ; Dobson (1876, 1878) ; Blanford (1891) etc. did not treat Nepal and Assam populations separate

from other parts of India. Hutton (1872) concluded that there is endless variety of colouring in this species. Siddiqi (1961) also identified Shillong specimen from Meghalaya (part of undivided Assam) as *Pteropus g. giganteus*. *P. g. leucocephalus* has been separated from *P. g. giganteus* on the basis of longer and softer fur. Specimens from Assam, Shillong, Manipur and Tripura present in E. R. S. and Z. S. I. Calcutta have been compared with the specimens from other parts of India, present in Z. S. I. Calcutta and according to my findings, this is found overlapping character and individual variation due to size and different season. Recently, Agarwal & Bhattacharyya (1977) have also found overlapping characters between *leucocephalus* and the nominate subspecies. Das *et al.* (1995) treated *P. g. leucocephalus* as a synonym of the nominate species on the basis of the above mentioned findings but without examination of materials which is now confirmed by my finding. However Corbet & Hill (1992) have not recognised any subspecies of *Pteropus giganteus* (Brünnich).

Remarks on biology : On the basis of above materials examined, it can be concluded that a lot of *Pteropus g. giganteus* are found died due to electrocuted in North-East Hills while coming for foraging at night.

Colonies of this bat were observed either near tank or river on bamboo trees (*Bambusa* sp.) in Mahuripara, Kamrup district, Assam ; on Harish tree (loc. name in Tripura), on Mango tree (*Mangifera indica*), on a Semal tree (*Salmonia malabaricum*) and on karai tree (loc. name) in and around, Dharam Nagar and Kailashahar in North Tripura district, Tripura. The size of colonies were 70 to 200 nos.

Time of emergence was recorded at 16.45 hours on 4.xii. 1989 in Dharam Nagar just after sun-set. The complete colony of 70 bats vacated the complete mango tree within fifteen minutes after sunset.

Feeding habit of this animal was studied at two occasions : First in Dharam Nagar, Tripura in the evening of 11 Dec 1989 at 18.00 hours and second, in Rongjuly, Goalpara district, Assam on 24 Nov 1990 at 18.30 hours. On 11 Dec 1989, a flying fox was seen running on a branch of Dumra tree (Loc. name in Tripura) on the claws of plex of forearms and hind feet and move toward a bunch of fruit which was like a bunch of grape. It took a fruit in its mouth and immediately flew away. These observations were made in the torch light. In Rongjuli, Goalpara district, Assam, on 24 Nov. 1990, a bat was found spreading wings over the bunch of banana keeping mouth towards flowering part for about 15 minutes and then flew away.

This bat consumes only the juices after mastication of fruits and other plant materials and discards the waste products. The following trees and their edible parts were observed in the foraging grounds which may indicate its food items : coconut-palm (fibrous drupe)-endosperm ; custard-apple (etario of berries)- pericarp and soft leaves ; Jack (sorosis)- bracts, perianth and seeds. Guava (berry-thalamus and pericarp) ; Litchi (1-seeded nut)- fleshy aril ; Mango(drupe)- mesocarps ; Orange (Hesperidium)- juicy placental hairs ; Papaya (berry)- mesocarp ; Pineapple (sorosis)- outer portion of receptacle, bracts and perianth ; Wood-apple (a special type called amphisacra)- inner endocarp and placentae ; Bamboo-soft leaves ; Tamarind-fleshy a parts ; Semal-complete flower ; Bair-mesocarp including epicarp ; Betal nut (fibrous drupe)- mesocarp ; and Banana (berry)- mesocarp and endocarp. etc.

Although these bats breed generally twice in a year and give birth to a single young at a time, their mortality rate is very low. The causes of their death are only due to illegal hunting and electrocution. Other than man this bat has no natural predators. No fatally diseased bats have been found or reported.

Genus (2) *Rousettus* Gray, 1821

2. *Rousettus leschenaulti leschenaulti* (Desmarest)

1820. *Pteropus leschenaulti* Desmarest, *Encycl. Meth Mammal*, 1 : 100 (Environments of Pondichery, India).

Common name : Indian Fulvous Fruit Bat (Eng.).

Material examined : Assam : 1♂ (*ad.*), Kherkheria, Darrang district, R. K. Ghosh, *Z. S. I. Cal.*, 4 Feb 1976 ; Meghalaya 1♀ (*ad.*), Mahesh-khola, East Garo Hills district, R. K. Ghosh, *Z. S. I. Cal.*, 16 Apr 1986 ; 3♂♂ (*ad.*), 1♀ (*ad.*), Umkiang, Jaintia Hills district, Y. P. Sinha, 22 Apr 1990 ; 1♀ (*Subad.*), Sumer, E. Khasi Hills district, Y. P. Sinha, 6 May 1990 ; 1♂ (*ad.*), Lalilad forest, Ri-bhoi district, Y. P. Sinha, 17 May 1989 ; Nagaland : 1♂ (*ad.*), 1♀ (*Subad.*), Naltoqa, Zunheboto district, Y. P. Sinha, 10 Jul 1991 ; Arunachal Pradesh : 1♂ (*ad.*), Chessa, Papumpare district, 21 May 1993, present in Forest Research Institute, Field Research Station, Govt. of Arunachal Pradesh, Chessa.

Measurements : External : 6♂♂ (*ad.*) : *HB.* 105.0–130.0 (119.0) ; *E.* 19.0–21.0 (20.0) ; *TL.* 13.0–21.0 (18.3) ; *f.* 79.0–83.0 (81.8) ; *t.* 35.0–40.0 (38.3) ; *ft.* 21.0–24.0 (22.5) ; *ws.* 440.0–490.0 (467.5). 3♀♀ (*ad.*) : *HB.* 100.0–115.0 (105.0) ; *E.* 18.0–21.0 (19.0) ; *TL.* 15.0–20.0 (17.7) ; *f.* 71.0–81.0 (77.7) ; *t.* 32.0–40.0 (36.0) ; *ft.* 20.0–23.0 (21.3) ; *ws.* 400.0–460.0 (436.7). Skull : 3♂♂ : *l.* 37.5–38.0 (37.8) ; *zw.* 22.5–23.0 (22.8) ; *cw.* 15.5–16.5 (15.8) ; *m'* – *m'* 12.0 (in all) ; *c* – *m*² 14.0–14.5 (14.3) ; *c* – *m*₃ 15.0–16.0 (15.7) ; *ml.* 29.0–30.0 (29.3) ; 1♀ : *l.* 36.5 ; *zx.* 22.2 ; *cw.* 15.5 ; *m'* – *m'* 11.0 ; *c* – *m*² 13.6 ; *c* – *m*₃ 14.7 ; *ml.* 28.5.

Distribution in N. E. Hills : Arunachal Pradesh (Rookmaaker & Bergmans 1981) : Papumpare district (present material), Dibung valley district (Chakraborty & Sen 1991) ; Assam : Nowgong district (observation and collection made by Author in Kaziranga area), Darrang district (present collection) ; Meghalaya : West Garo Hills district (Specimens in A M N H as mentioned by Das *et. al.* 1995), East Garo Hills district (present material), South Garo Hills district (present material Das 1986 *b*), East Khasi Hills district (present material), Ri-bhoi district (present material), Jaintial Hills district (present material) ; Nagaland : Zunheboto district ; Tripura : North Tripura district (Agarwal & Bhattacharyya 1977).

Remarks : Sinha (in press) has mentioned biological observations of this bat in Siju cave, South Garo Hills district, Meghalaya. Further, he collected this bat in the mist-net, fixed among plantains bearing soft green banana with flower, at Naltoqa, Zunheboto district, Nagaland ; Lalilad forest, Ri-bhai district, Meghalaya together with *Eonycteris spelaea* ; and in Umkiang forest, Ri-bhoi district, Meghalaya with *Cynopterus s. sphinx* and *E. spelaea*. He also observed this bat among plantains mixed with other fruit trees in an orchard in Kaziranga area of Assam.

Genus (3) *Cynopterus* Cuvier, 18243. *Cynopterus sphinx sphinx* (Vahl)

1797 *Vespertilio sphinx* Vahl, *Skr. nat. selsk copenhagen*, 4 (1) : 123 (Tranquebar, Thanjavur district, Tamil Nadu, India).

Common name : Short-nosed Fruit Bat (Eng.).

Material examined : Meghalaya : 2♀♀ (ad.), Baghmara, W. Garo Hills, R. K. Ghose, Z. S. I. Cal., 14 Apr 1986 ; 5♂♂ (ad.), 1♀ (ad.), Rongrengiri, E. Garo Hills, R. K. Ghose, Z. S. I. Cal., Jul. 1988 ; 7♂♂ (ad.), 1♀ (ad.), Umkinag, Jaintia Hills, Y. P. Sinha, 22-26 Apr 1990. Tripura : 4♂♂ (ad.), 1♂ (subad.), 2♀♀ (ad.), 3♀♀ (subad.), Dharam Nagar and Nepali Tila, N. Tripura district, Y. P. Sinha, 6-18 Dec 1989 and 1♀ (ad.), Nepali Tila, V. T. Darlong, 12 Jun 1988 ; 1♂ (ad.), 4♀♀ (ad.), 3♀♀ (Suck.Y.), Abhaya and Subal Singh, Agartala, S. K. Chanda, 20-23 Aug 1978 ; E. R. S. Manipur : 1♀ (ad.), Tipaimukh, Churachandpur district, Y. P. Sinha, 17 Apr. 1989 ; 7♂♂ (ad.), 10♀♀ (ad.), Jiribam, Imphal district, Y. P. Sinha, 28 Aug – 2 Sep 1990, E. R. S. Nagaland : 3♂♂ (ad.), 3♀♀ (ad.), Mon, Mon district, Y. P. Sinha, 14-18 Jun 1990 ; 3♂♂ (ad.), 3♀♀ (ad.), Jharna Pani, Kohima district, Y. P. Sinha, 15-18 Mar 1993 ; E. R. S.

Measurements : External : 30♂♂ (ad.) ; HB. 70.0–99.0 (84.9) ; E. 19.0–22.0 (20.6) ; TL. 7.0–14.0 (11.4) ; f. 67.0–77.0 (71.8) ; t. 24.0–29.0 (26.3) ; ft. 14.0–18.0 (15.8) ; ws. 360–440 (390.6) ; ww. 80.0–85.0 (83.0). 28♀♀ (ad.) : HB. 75.0–98.0 (85.5) ; E. 19.0–22.5 (20.7) ; TL. 10.0–18.0 (13.0) ; f. 66.0–76.0 (68.5) ; t. 25.0–29.5 (26.5) ; ft. 15.0–16.5 (15.8) ; ws. 340.0–420.0 (372.0) ; ww. 82.0–85.0 (83.0). Skull : 8♂♂ : l. 30.5–33.2 (32.1) ; zw. 18.0–20.5 (19.7) ; cw. 13.0–14.0 (13.6) ; m' – m' 9.5–10.0 (9.8) ; c – m' 11.0–11.5 (11.1) ; c – m₂ 12.0–12.5 (12.1) ; CR. 7.0–8.0 (7.6) ; ml. 23.5–25.0 (24.3) ; 5♀♀ : l. 30.0–33.0 (31.6) ; zw. 18.0–21.0 (19.7) ; cw. 13.0–14.0 (13.8) ; m' – m' 9.5–10.0 (9.9) ; c – m' 11.0 (in all) ; c – m₂ 12.0–12.5 (12.3) ; CR. 7.5–8.0 (7.8) ; ml. 23.5–25.0 (24.0).

Distribution in N. E. Hills : Arunachal Pradesh : Tirap district (Saha 1985) ; Assam : Cachar district (Anderson 1881) ; Manipur : Imphal district (present material), Churachandpur district (present material) ; Meghalaya : West Garo Hills district (present material), East Garo Hills district (present material), South Garo Hills district (Sinha in press ; Das *et. al.* 1995), East Khasi Hills district (Dobson 1876), Jaintia Hills district (present material, Das *et. al.* 1995) ; Nagaland (Sinha 1980) : Mon district (present material) ; Kohima district (present material) ; Tripura (Agrawal & Bhattacharyya 1977) : North Tripura district (present material).

Saha (1985) reported *Cynopterus angulatus* (= *Cynopterus sphinx*) from Namdapha, Tirap district, Arunachal Pradesh. According to ear length of specimens given by Saha (*loc. cit.*). These specimens may be divided into two species. Specimens possess ear length 17.0–17.5 may be treated as *Cynopterus brachyotis* and those possess 22–22.4 as *Cynopterus sphinx*. Both species may come in the same mist-net due to same foraging area and feeding habit.

Remarks : This bat was trapped in the mist-net with *Eonycteris spelaea* and *Rousettus leschenaulti* in Umkiang, Jaintia Hills, Meghalaya, among plaintains having green soft banana and flower ; solitary in Nepali Tila, North Tripura district, Tripura, in a garden having papaya (*Carica papaya*), plantains (*Musa* sp.) and betel-nut (*Areca* sp.) trees ladden with unripe or ripe

fruits ; in Dharam Nagar, North Tripura district in a garden near pond having bamboos (*Dandrocalmus* sp.), shirish (*Albizza* sp.), jack fruit (*Artocarpus integrifolia*), plantains (*Musa* sp.), tamarind (*Tamarindus indica*), semal (*Salmonia malabarica*), mango (*Mangifera indica*), bair (*Ziziphus* sp.), guava (*Psidium guajava*) trees ladden with fruits ; in Mon, Mon district and in Jharn Pani, Kohima district, Nagaland among plantains and Guava gardens respectively. In Jiribam, Imphal district, Manipur, caught in the mist-net with *Eonycteris spelaea* among plantains containing green banana and flower and in Tipaimukh, Churachandpur district, Manipur, solitary among guava garden.

This observation shows that guava and banana are its favourite fruits. Besides these, it also takes other fruits available in the garden. These trees, also help them in sheltering during day time as seen under leaves of plantains, coconut and bamboos. It also shows that *C. sphinx*, *E. spelaea* and *R. leschenaulti* visit same foraging ground at night.

4. *Cynopterus brachyotis* (Müller)

1838. *Pachysoma brachyotis* Müller, *Tijdschr. Natuur. Gesch.*, 5 (1) : 146 (Borneo).

Common name : Borneo Short-nosed Fruit Bat (English).

Material examined : Nagaland : 3♂♂, 4♀♀ (ad.), Mon, Mon district, coll. Y. P. Sinha, 11-14 Jun 1990. 1

Measurements : *External* : 3♂♂ (ad.) : *HB.* 78.0–83.0 (80.7) ; *E.* 16.0–17.0 (16.7) ; *Tl.* 10.0–15.0 (12.0) ; *f.* 63.0–65.0 (64.0) ; *t.* 23.0–24.0 (23.7) ; *ft.* 14.0–17.0 (15.3) ; *ws.* 320.0–380.0 (367.0). 4♀♀ (ad.) : *HB.* 76.0–81.0 (79.0) ; *E.* 16.0–18.0 (17.5) ; *Tl.* (3 ex.) 9.0–14.0 (11.3) ; *f.* 62.0–72.0 (67.0) ; *t.* 23.0–27.0 (24.8) ; *ft.* 13.0–16.0 (15.0) ; *ws.* 360.0–400.0 (380.0). *Skull* : 1♂ (ad.) : *l.* 32.0 ; *zw.* 19.5 ; *cw.* 14.0 ; *m' – m'* 10.0 ; *c – m'* 10.5 ; *c – m₂* 11.6 ; *CR.* 7.5 ; *ml.* 24.3♀♀ (ad.) : *l.* 29.0–31.5 (30.0) ; *zw.* 18.0–19.5 (18.8) ; *cw.* 13.0–14.0 (13.3) ; *m' – m'* 9.2–10.0 (9.7) ; *c – m'* 10.0–11.0 (10.5) ; *c – m₂* 11.0–11.5 (11.2) ; *CR.* 7.2–7.5 (7.4), *ml.* 23.0 (in all).

Distribution in N. E. Hills : Arunachal Pradesh : Dibang valley district (Chakraborty & Sen 1991) ; Assam : Cachar district (Sinha 1986) ; Meghalaya : West Garo Hills district (Sinha 1986) ; Nagaland : Mon district (Sinha 1995).

Remarks : These specimens were collected in the mist-nets along with *Cynopterus sphinx* during different hours of night, set among plantains having green bananas with flowers. All the four females collected in June were pregnant ; size of embryo ranging from 8.0 to 25.0 mm. Two old females had well developed teats and mid-staged pregnancy. The other two were newly adult, having early stage of pregnancy and only spots in place of dugs. The tail in one female was not visible externally

Genus (4) *Sphaerias* Miller, 1906

5. *Sphaerias blanfordi* (Thomas)

1891. *Cynopterus blanfordi* Thomas, *Ann. Mus. Ster. nat. Geneva*, 2(10) : 884, 921-922 (Leito, Cheba, Karin Hill, Burma = Myanmar).

Common name : Blandford's Fruit Bat, Mountain Fruit Bat (Eng.).

Material examined : Saha (1985) examined 3♂♂, 5♀♀ from Gibbons land and from chiria ; Namdapha biosphere reserve, Tirap district, *Arunachal Pradesh*, collected between 25 Apr 1981 and 2 May 1981. Besides that author also examined 6♂♂, 2♀♀ and 1♂ (y.) from Tumin, alt. 1800 m., East district, Sikkim (Phambong Lho Wild Life Sanctuary) under leadership of Dr. V. C. Agrawal, then Deputy Director, *Z. S. I. Cal.*, collected between 24 Sep 1988 and 28 Sep. 1988.

Measurements : External (taken from Saha 1985) : 3♂♂ : *HB.* 89.0 (1 ex.) ; *f.* 55.5, 55.0 (2 ex.) ; *E.* 17.3, 18.0, 19.0 ; *ws.* 371.0 (1ex.). 5♀♀ : *HB.* 89.5 (1ex.) ; *f.* 51.7–60.5 (55.0) ; *E.* 16.1–19.5 (17.6) ; *ws.* 414.0 (1 ex.). Taken by me of Sikkim specimens : 7♂♂ : *HB.* 66.0–78.0 (72.2) ; *E.* 15.0–17.0 (16.1) ; *f.* 50.0–52.0 (50.8) ; *t.* 18.0–20.5 (19.4) ; *ft.* 12.0–13.0 (12.3) ; *ws.* 340.0–370.0 (352.0) ; *wt.* 20.0–25.0 (23.0). 3♀♀ : *HB.* 71.0–74.0 (73.0) ; *E.* 15.0–18.0 (17.0) ; *f.* 52.0 (in all) ; *t.* 19.0–20.0 (19.7) ; *ft.* 12.0–13.0 (12.3) ; *ws.* 350.0–360.0 (353.3) ; *wt.* 20.0–25.0 (22.3). Taken from Bhat (1968) of specimens from Himalaya Region of Uttar Pradesh : 3♂♂ : *HB.* 84.0–95.0 (90.3) ; *f.* 48.5–53.5 (51.0) ; *t.* 17.0–18.0 (17.5). 6♀♀ : *HB.* 82.0–92.0 (89.0) ; *f.* 51.0–53.0 (51.8) ; *t.* 16.0–18.0 (17.7). Taken from Chakraborty (1975) from Bhutan : 2♂♂ : *HB.* 84.0, 84.0 ; *E.* 18.0, 19.0 ; *f.* 52.0, 54.0 ; *t.* 19.3 (1 ex.) ; *ft.* 12.0, 12.0. Skull : (Not taken by Saha, 1985 from Arunachal Pradesh). 1♂ (Sikkim) : *l.* 26.5 ; *zw.* 16.2 ; *cw.* 12.3 ; *m' – m'* 7.8 ; *c – m'* 8.0 ; *c – m₂* 8.2 ; *ml.* 19.2. 3♂♂ (Himalayan Region of Uttar Pradesh) : *l.* 26.5–27.5 (27.0) ; *zw.* 16.5–17.0 (16.7) ; *c – m'* 9.5–10.5 (10.0) ; *c – m₂* 10.0–10.5 (10.3) ; *ml.* 19.0–20.0 (19.5). 6♀♀ (Himalayan Region of Uttar Pradesh) : *l.* 26.5–28.0 (27.5) ; *zw.* 15.5–17.5 (16.6) ; *c – m'* 9.5–10.5 (10.0) ; *c – m₂* 10.0–11.0 (10.5) ; *ml.* 19.0–21.0 (20.0). 1♂ (Bhutan) : *l.* 26.2 ; *zw.* 18.0 ; *cw.* 12.8 ; *m³ – m³* 8.2 ; *c – m'* 8.0.

Distribution in N. E. Hills : *Arunachal Pradesh* : Tirap district (Saha 1985).

Remarks : *On status* : Two subspecies viz. *Sphaerias blanfordi blanfordi* (Thomas) from India, Nepal, Bhutan, Burma, North-West Thailand and *S. b. motuoensis* Cai & Zhang from Beibing Motuo region, S. Tibet have been recognised. The latter subspecies differs from the former on the basis of uniform blue brown fur vs rufous in former ; two greyish yellow round patches on underside of neck vs. two buff spots on the chin in the former and lack of odontoid papillae on the inner sides of the lips vs. present in the former. Basal portion of ear white in Sikkim specimens as stated by Chakraborty (1975) for Bhutan specimens. Sikkim specimens were collected in the mist-net in the interior valleys at 1800 metres elevations. Bhat (1968) collected this bat at elevations between 800 to 2710 metres.

The forearm of Arunachal Pradesh specimens measured by Saha (1985) is longer (*f.* 51.7–60.5) than other places (*f.* 48.0–54.0)

Genus (5) *Megaerops* Temminck, 1841

6. *Megaerops niphanae* Yenbutra & Felten

1983. *Megaerops niphanae* Yenbutra & Felten, *Senckenberg. biol.*, 64:2 (Sakaerat Environmental Research Station (14°30' N–101°56' E), Amphoe Pak Thong Chai, Prov. Nakhon Ratchasima, Thailand).

Common name : Niphan's Fruit Bat (Eng.).

Material examined : By Saha (1984) : *Arunachal Pradesh* : 2♀♀, Gibbons land, Namdapha Biosphere Reserve, Tirap district. By Mandal *et. al.* (1993) : *Manipur* : 1♂, Temenglong (c 1280 m), Tamenglong district ; 1♀, Uchathol (c 175 m), Imphal district.

Measurements : 2♀♀ (taken by Saha 1984) : *External* : *HB.* 84.0, 90.0 ; *E.* 18.5, 19.5 ; *f.* 59.6, 62.7 ; *ws.* 424.0. 1♂, 1♀ (taken by Mandal *et. al.* 1993) : *f.* 59.4, 59.0 ; *E.* 19.2, 17.5 ; *t.* 23.0, 22.7 ; *ft.* 14.0, 14.0. *Skull* : 1♂, 1♀ (taken by Mandal *et. al.* 1993) : *I* : 28.0, 26.3 ; *CR.* 6.3, 6.3 ; *c - m³* 8.6, 8.3 ; *c' - c'* 5.7, 5.3 ; *iow.* 5.5, 5.0 ; *cw.* 12.4, 12.0 ; *zw.* 17.8, 17.6 ; *m' - m'* 8.3, 7.9 ; *ml.* 20.0, 19.0.

Distribution in N. E. Hills : *Arunachal Pradesh* : Tirap district (Saha 1984) ; *Manipur* : Tamenglong district and Imphal district (Mandal *et. al.* 1993) ; *Mizoram* : Aizawl district and Lunglei district (Mandal *et. al.*, in press).

Remarks : Some of the earlier records of *M. ecaudatus* Temminck from India, Thailand and Vietnam have been referred to *M. niphanae* Yenbutra & Felten by Corbet & Hill (1992). They have also referred *M. ecaudatus* identified by Saha (1984) more probable to *M. niphanae*. As specimens have not been compared by me, I can not say anything definitely.

Subfamily 2. MACROGLOSSINAE

Genus (6) *Eonycteris* Dobson, 1873

7. *Eonycteris spelaea* (Dobson)

1871. *Macroglossus spelaeus* Dobson, *Proc. Asiat. Soc. Beng.*, 105, 106 (Farm Caves, Moulmein Tenasserim, Myanmar).

Common name : Donson's Long-tongued Fruit Bat (Eng.).

Material examined : *Meghalaya* : Beside Siju Cave, South Garo Hills district (Sinha 1990 ; in press), 2♀♀ (*ad.*), La-ilad forest, Rai-bhoi district, Y. P. Sinha, 26 May 1989 ; 1♂, 1♀ (*ad.*), Umking, Jaintia Hills district, Y. P. Sinha, 22 Apr 1990. *Manipur* : 1♀ (*ad.*), Jeribam, Imphal district, Y. P. Sinha, 30 Aug 1990 ; *Nagaland* : 4♂♂ (*ad.*), 3♀♀ (*ad.*), Naltoqa, Zunheboto district, Y. P. Sinha, 11-13 Jul 1991.

Measurements : 5♂♂ (*ad.*) : *HB.* 95.0–106.0 (100.8) ; *E.* 20.0–22.0 (20.8) ; *TL.* 8.0–15.0 (10.2) ; *f.* 68.0–75.0 (71.4) ; *t.* 32.0–37.0 (33.4) ; *ft.* 18.0–27.0 (21.0) ; *ws.* 340.0, 350.0 (2 ex.) ; *ww.* 78.0, 84.0 (2 ex.). 7♀♀ (*ad.*) : *HB.* 86.0–123.0 (100.5) ; *E.* 16.0–20.0 (18.0) ; *TL.* 8.6–19.0 (14.7) ; *f.* 65.0–78.0 (69.5) ; *t.* 27.0–34.0 (32.0) ; *ft.* 16.0–20.0 (18.0) ; *ws.* 370.0–420.0 (390.0) ; *ww.* 72.0–82.0 (78.0). *Skull* : 2♂♂ : *I.* 35.5, 36.0 ; *zw.* 20.0, 22.0 ; *cw.* 15.0, 15.5 ; *m' - m'* 10.0, 10.0 ; *c - m²* 12.0, 12.5 ; *c - m³* 14.0, 14.0 ; *ml.* 26.5, 25.6.

Distribution in N. E. Hills : *Arunachal Pradesh* (Specimen in Z. S. I. Cal., mentioned by Das *et. al.* 1995) ; *Assam* (Ghosh & Bhattacharyya 1976) ; *Meghalaya* (Sinha 1990) : Rai-bhoi district, South Garo Hills district, Jaintia Hills district ; *Nagaland* (Sinha 1994) : Junheboto district ; *Manipur* (Sinha 1994) : Jeribam, Imphal district.

Remarks : This bat was trapped in the mist-nets fixed among plaintain trees having soft green banana and flower, with *Cynopterus s. sphinx* and *Rousettus l. leschenaulti* in Umkiang, Jaintia

Hills, Meghalaya and with *Cynopterus s. sphinx* in Jeribam, Manipur. This shows that these bats have same feeding ground.

Genus (7) *Macroglossus* F. Cuvier, 1824

8. *Macroglossus sobrinus sobrinus* (Andersen)

1911. *Macroglossus minimus sobrinus* Andersen, Ann. Mag. nat. Hist., 7: 642 (Gonong Igari, 2000 = c 610 m, Perak, Peninsular Malaysia).

Common name : Greater Long-tongued Fruit Bat (Eng.).

Material examined : Meghalaya : 1, Jaintia Hills district, present in Z. S. I. Cal.

Measurements : External : 1♂ : f. 48.3 ; Tl. : - ; E. 17.3 ; t. 18.8 ; ft. 11.9. Skull : 1♂ : l. 30.3 ; CR. 10.8 ; zw. 16.3 ; cw. 12.1 ; m¹ - m¹ 6.5 ; c - m² 0.6 ; c - m₃ 11.03, ml. 22.1.

Diagnosis : Size small (forearm around 50 mm.) ; pelage longish and light reddish brown, chest more brown ; tail rod like and short ; inter femoral membrane narrow ; muzzle long and cylindrical ; nostril upward-pointing and separated by an ill-defined groove ; tongue quite long with feathery tip.

Distribution in N. E. Hills : Arunachal Pradesh (Saha 1995 : as *M. minimus*) ; Meghalaya (Specimen in Z. S. I., Cal.) ; Mizoram : Chintuipui district (Mandal *et. al.*, in press) ; Tripura (Specimen in Z. S. I. Cal. Das *et. al.* 1995).

Remarks : Although Ellerman & Morrison-Scott (1996) have maintained *sobrinus* as a subspecies of *macroglossus minimus* (E. Geoffroy, 1810), however most of the recent authors (Lekagul & McNeely 1977), Honacki *et. al.* 1982, Hill 1983, Corbet & Hill 1986 and Das *et. al.* 1995) consider *minimus* and *sobrinus* as distinct species with which I agree.

Suborder 2. MICROCHIROPTERA

Family 2. RHINOPOMATIDAE

Genus (8) *Rhinopoma* Oken, 1816

9. *Rhinopoma ? hardwickei* Gray, 1831

1831. *Rhinopoma hardwickei* Gray, Zool. Misc., 37. (India).

Common name : Lesser Mouse-Tailed Bat (Eng.).

Material examined : None from North-East Hills, but for further identification of this species from these regions, measurements taken by Sinha (1980, 1986) has been provided here.

Measurements : External : HB. 57.0-70.0 ; f. 56.0-65.0 ; Tl. 60.0-84.0 ; E. 18.0-21.0 ; Tr. 6.0-8.0 ; t. 26.0-33.0 ; ft. 13.0-17.0. Skull : l. 17.0-20.0 ; zw. 11.0-11.7 ; cw. 8.0-9.0 ; m³ - m³ 7.7-9.0 ; c - m³ 6.1-7.0 ; c - m₃ 6.5-7.9 ; ml. 12.2-14.4.

Distribution in N. E. Hills : Distribution of *R. hardwickei* has been given here on the basis of Chakraborty & Sen (1991) who mention its availability in the Mahao wildlife Sanctuary, Dibang valley district, Arunachal Pradesh.

Family 3. MEGADERMATIDAE

Genus (9) *Megaderma* Geoffroy, 1810

10. *Megaderma spasma spasma* (Linnaeus)

1758. *Vespertilio spasma* Linnaeus, *Syst. Nat.* (Ed. 10), 1 : 32 (celebas).

Common name : Lesser False Vampire Bat (Eng.).

Material examined : Assam : 1♂, 2♀♀ : Kalsi and Rajpara, Kamrup district, coll. H. W. Wells, 2 Sep 1920 and 18 Nov 1920, *Z. S. I. Cal.*

Measurements : External : 1♂ : *f.* 60.5 ; *t.* 34.0 ; *ft.* 17.0. 2♀♀ : *f.* 58.2, 62.0 ; *t.* 32.8, 35.0 ; *ft.* 17.2, 18.0. Skull : 1♀ : *l.* 26.6 ; *zw.* 14.9 ; *cw.* 11.7 ; $m^3 - m^3$ 9.1 ; $c - m^3$ 10.2 ; *ml.* 17.5.

Distribution : Assam : Kamrup district (Present materials & Kurup 1968).

11. *Megaderma lyra lyra* Geoffroy

1810. *Megaderma lyra* E. Geoffroy, *Ann. Mus. Hist. nat.*, Paris 15 : 190 (India).

Common name : Greater False Vampire Bat (Eng.).

Material examined : Assam : 1♀, (*ad.*), Guijar, 11 km. N. E. of Tinsukia, Tinsukia district, coll. D. K. Ghoshal, 14 Dec 1977, *Z. S. I. Cal.* ; Arunachal Pradesh : 1♀ (*ad.*), Chessa, Papumpare district, coll. staffs of state Forest Research Institute, Chessa, 21 May 1993 and present in the Field Station Chessa (examined by me on 12 Aug 1994).

Measurements : External only : 2♀♀ : *HB.* 75.0, 78.0 ; *f.* 61.0, 62.0 ; *E.* 35.0, 38.0 ; *Tr.* 17.0, 18.0 ; *ws.* 390.0, 410 ; *t.* 31.0, 34.0 ; *ft.* 16.0, 18.0.

Distribution in N. E. Hills : Arunachal Pradesh : Dibang valley district (Chakraborty & Sen 1991) ; Papumpare district (present material) ; Assam : Goalpara district, Kamrup district and Tinsukia district (present material).

Remarks : The female specimen collected in May 1993 from Chessa, Papumpare district had well developed dugs and inguinal teats. It was pregnant and had an advance stage of embryo in the right horn of uterus.

Family 4. EMBALLONURIDAE

Genus (10) *Taphozous* Geoffroy, 1818

12. *Taphozous longimanus longimanus* Hardwicke

1825. *Taphozous longimanus* Hardwicke, *Trans. Linn. Soc. Lond.*, 14 : 529 (Calcutta, Calcutta district, West Bengal, India).

Common name : Long-armed Sheath-tailed Bat (Eng.).

Material examined : Assam : 2♂♂(ad), Nari Kuchi village, 7 km E. of Nalbari, Nalbari district, coll. Y. P. Sinha, 22 Dec 1988, E. R. S.

Measurements : Assam : 2♂♂, HB. 75.0, 76.0 ; E. 16.0, 16.0 ; f. 59.0, 62.5 ; Tl. 27.0, 27.0 ; t. 23.0, 26.0 ; ft. 12.0, 14.0 ; ws. 340.0, 340.0. *Skull* : 2♂♂ : l. 20.0, 20.5 ; zw. 13.3, 13.5 ; cw. 10.3, 10.5 ; $m^3 - m^3$ 9.0, 9.0 ; $c - m^3$ 9.0, 9.5 ; $c - m_3$ 10.0, 10.0 ; ml. 16.0, 16.5.

Distribution in N. E. Hills : Assam (Sinha, 1996) ; Tripura (Agrawal & Bhattacharyya 1977).

Remarks : This finding is a significant addition to the mammalian fauna of Assam because this is the first record of the family EMBALLONURIDAE from this area.

Family 4. RHINOLOPHIDAE

Subfamily 1. RHINOLOPHINAE

Genus (11) *Rhinolophus* Lacépède, 1799

13. *Rhinolophus trifolius trifolius* Temminck

1834. *Rhinolophus trifolius* Temminck, *Tijdschr. Natuure Gesch.*, 1 : 24 (Java).

Common name : Trefoil Horseshoe Bat (Eng.).

Material examined : Assam : 1♂ : Sibsagar, presented by S. E. Peal, Esq., 16 Dec 1875, Z. S. I. Cal.

Measurements taken by Sinha (1973) : *External* : 1♂ : E. 20.0 ; f. 51.0 ; t. 23.0 ; ft. 12.0 ; Tl. 37.0. *Skull* : 1♂ : l. 21.5 ; zw. 11.0 ; cw. 9.0 ; $m^3 - m^3$ 7.7 ; $c - m^3$ 8.2 ; $c - m_3$ 9.0 ; ml. 15.0.

Distribution in N. E. Hills : Assam : Sibsagar district. (Anderson 1881 ; Sinha 1973).

14. *Rhinolophus luctus luctus* Temminck

1834. *Rhinolophus luctus* Temminck, *Mon. Mamm.*, 2 : 24, pl. 30 (Java).

1843. *Rhinolophus perniger* Hodgson, *J. Asiat Soc. Beng.*, 12 : 414 (Nepal).

Common name : Woolly Horseshoe Bat (Eng.).

Material examined : Assam : 1♂, Ganjam, N. Cachar district, coll. W. Partridge, 4 Jan 1893, Z. S. I. Cal. 1♂ : Nagaland : Khezabama, coll. B. Nath, 20 Nov 1935, Z. S. I. Cal.

Measurements : *External* : 2♂♂ : HB. 105.0 (1 ex.) ; E. 37.0, 39.0 ; f. 71.2, 74.0 ; t. 35.0, 39.0 ; ft. 17.0, 18.5. *Skull* : 2♂♂ : l. 29.8, 30.5 ; zw. 14.8, 15.5 ; cw. 12.0, 13.0 ; $m^3 - m^3$ 10.4, 11.3 ; $c - m^3$ 11.6, 12.1 ; $c - m_3$ 12.6, 13.2 ; ml. 21.8, 22.5.

Distribution in N. E. Hills : Assam : Ganjam, N. Cachar district (Sinha 1973) ; Nagaland : Khezabama (Sinha 1973) ; Meghalaya : Khasi Hills (Andersen 1891).

Remarks : On the basis of overlapping character, Sinha (1973) felt difficult to separate *perniger* from *luctus*. Corbet & Hill (1992) synonymised *R. perniger* Hodgson with *R. luctus* Temminck.

15. *Rhinolophus pearsoni pearsoni* Horsfield

1851. *Rhinolophus pearsoni* Horsfield, *Cat. Mamm. Mus. E. India. co.*, 33 (Darjeeling, West Bengal, India).

Common name : Pearson's Horse-shoe Bat (Eng.).

Material examined : Meghalaya : 2♂♂, 1♀, Khonshong and Shangpur, Jaintia Hills district, coll. H. W. wells, 22 Jul 1920 to 26 Aug 1920, *Z. S. I. Cal.* 1♂, Mosmai cave, Cherrapunji, East Khasi Hills, coll. Mr. R. Freil, 31 Oct 1914, *Z. S. I. Cal.*

Measurements : *External* : 3♂♂ : *HB.* 58.0–64.0 (61.3) ; *Tl.* 23.0–24.0 (23.7) ; *f.* 52.0–54.0 (53.0) ; *t.* 25.0–26.0 (25.5) ; *ft.* 11.0–13.0 (12.3) ; 1♀ : *HB.* 62.0 ; *Tl.* 24.0 ; *f.* 52.0 ; *t.* 26.0 ; *ft.* 11.0. *Skull* : 2♂♂ : *l.* 22.8, 23.0 ; *zw.* 11.0, 11.3 ; *cw.* 9.0, 9.3 ; $m^3 - m^3$ 8.4, 8.5 ; $c - m^3$ 9.0, 9.5 ; $c - m_3$ 9.7, 10.0 ; *ml.* 15.5, 16.3. 1♀ : *l.* 23.8 ; *zw.* 11.3 ; *cw.* 9.5 ; $m^3 - m^3$ 8.5 ; $c - m^3$ 9.2 ; $c - m_3$ 9.9 ; *ml.* 16.5.

Distribution in N. E. Hills : Meghalaya : Garo Hills (Dobson 1876, Anderson 1881) ; East Khasi Hills district (Hinton & Lindsay 1926) ; West Khasi Hills district (Dobson 1876), Jaintia Hills district (Hinton & Lindsay 1926) ; Manipur : Churachandpur district (Anderson 1881 : Tipaimukh).

16. *Rhinolophus pusillus blythi* Andersen

1918. *Rhinolophus blythi* Andersen, *Ann. Mag. nat. Hist.*, 2 : 376, 377 (Almora, 5,500', Kumaon, Northern India = Almora (c 1,676 m.), Almora district, Uttar Pradesh, India).

Common name : Least Horse-shoe Bat (Eng.).

Material examined : Assam : 1 (unsexed, in spirit) Sibsagar, Sibsagar district, 1875, *Z. S. I. Cal.* ; Meghalaya : 1 (unsexed, in spirit), Siju Cave, South Garo Hills district, (no date), *Z. S. I. Cal.*

Measurements : *External* : 2 ex. : *E.* 14.0, 15.0 ; *f.* 40.0, 40.5 ; *Tl.* 29.5, 31.5 ; *t.* 16.0, 16.0 ; *ft.* 6.5, 7.5. *Skull* : *l.* 15.0 ; *zw.* 7.3 ; *cw.* 6.5 ; $m^3 - m^3$ 5.6 ; $c - m^3$ 5.4 ; $c - m_3$ 6.0 ; *ml.* 10.0.

Distribution in N. E. Hills : Assam : Sibsagar district (present material) ; Meghalaya : South Garo Hills district (Sinha 1973).

Remarks : Kurup (1968) mentions *R. cornutus szechwanus* : Andersen on the basis of specimen from Sibsagar Assam which was treated here as *R. pusillus blythi* Andersen. Corbet & Hill (1992) have also the same opinion.

17. *Rhinolophus subbadius* Blyth

1844. *Rhinolophus subbadius* Blyth, *J. Asiat. Soc. Beng.* 13 : 486 (Nepal)

1872. *Rhinolophus garoensis* Dobson, *J. Asiat. Soc. Beng.* 41(2) : 337 (Garo Hills, Meghalaya (= Assam), India).

Common name : Nepal Horse-shoe Bat (Eng.).

Material examined : Meghalaya : 1♀ (*ad.*, in alcohol), South Garo Hills district : Siju cave, coll. S. W. Kemp & B. N. Chopra, 1921 ; 1♀, Garo Hills. (Holotype of *Rhinolophus garoensis* Dobson, 1872).

Measurements : External : 2♀♀ : *f.* 34.0, 37.3 ; *Tl.* (1) 16.0 ; *t.* 12.6, 13.5 ; *ft.* 6.5, 7.0. Skull : 2♀♀ : *l.* 14.0, 15.9 ; $m^3 - m^3$ 5.6, 5.6 ; $c - m^3$ 5.3, 5.6, $c - m_3$ 5.9, 6.1 ; *zw.* (1) 7.3.

Distribution in N. E. Hills : Meghalaya : South Garo Hills district (Kemp 1924), Garo Hill district (Dobson 1972).

18. *Rhinolophus lepidus lepidus* Blyth

1844. *Rhinolophus lepidus* Blyth, *J. Asiat. Soc. Beng.*, 13 : 486 (Vicinity of Calcutta, Calcutta district, India, according to Das (1986))

1805. *Rhinolophus monticola* Andersen, *Proc. Zool. Soc. Lond.*, (2) : 124 (Mussoorie, Kumaon, Uttar Pradesh, India).

Common name : Little Indian Horseshoe Bat (Eng.).

Material examined : Meghalaya : 1♂, Syndai, Jaintia Hills district, 25 Jun 1920, *Z. S. I. Cal.*, ; 1♀ ; Khondong site, Garam Pani, Jowai, Jaintia Hills district, coll. A. Hussain, 10 Oct. 1983, ERS/V 9589 ; 1 (unsexed) ; Siju Cave, South Garo Hills district, coll. Drs S. W. Kemp & B. N. Chopra, *Z. S. I. Cal.* ; Assam : 1 (unsexed), Sibsagar, Sibsagar district, coll. S. E. Peal, 1875.

Measurements : External : 1♀, 2 (unsexed) : *f.* 39.0, 40.0, 40.5 ; *t.* 15.0, 16.0, 16.0 ; *ft.* 8.0, 6.5, 7.5. Skull : 1♀, 1 (unsexed) : *l.* 15.0 (1 ex.) ; *zw.* 7.3, 7.3 ; *cw.* 6.3, 6.5 ; $m^3 - m^3$ 5.6, 5.5 ; $c - m^3$ 5.8, 5.4 ; $c - m_3$ 7.0, 6.0 ; *ml.* 10.8, 10.0.

Distribution in N. E. Hills : Assam : Sibsagar district ; Meghalaya : South Garo Hills district, Jaintia Hills district ; Mizoram : Aizawl district (Mandal *et. al.*, in press).

Remarks : Corbet and Hill (1992) treated *R. monticola* Andersen as a synonym of *R. lepidus* Blyth and I agree with them.

19. *Rhinolophus rouxi rouxi* Temminck

1835. *Rhinolophus rouxi* Temminck, *Monogr. Mammal.*, 2 : 30 ~~b~~ (Pondicherry and Calcutta, India).

Common name : Rufous Horse-shoe Bat (Eng.).

Material examined : Arunachal Pradesh : 1♂, Siki, ca. 15 kms. from Taliha, coll. J. M. Julka, 24 Nov. 1974, *Z. S. I. Cal.*, (Reg. No. 19780).

Measurements : *External* : 1♂ : *HB.* 45.0 ; *E.* 15.6 ; *Tl.* 22.2 ; *f.* 46.0 ; *t.* 20.0 ; *ft.* 8.9 ; *ww.* 60.0. *Skull* : 1♂ : *l.* 18.6 ; *cw.* 8.0 ; $m^3 - m^3$ 7.6 ; $c - m^3$ 7.7 ; $c - m_3$ 7.8 ; *ml.* 13.3.

Distribution in N. E. Hills : Arunachal Pradesh (Lal 1983).

20. *Rhinolophus affinis himalayanus* Andersen

1905. *Rhinolophus affinis himalayanus* Andersen, *Proc. Zool. Soc. Lond.* (2) : 103 (Mussoorie, Uttar Pradesh, India).

Common name : Intermediate Horseshoe Bat (Eng.).

Material examined : Meghalaya : 1♀, Cherrapunj, coll. H. W. Wells, 17 Apr 1920, *Z. S. I. Cal.* ; 1♂, Mossmai Cave, Cherrapunji, coll. Y. P. sinha, 23 Sep 1991, East Khasi Hills district ; 1♀, Khonshong, coll. H. W. Wells, 30 Jul 1920 ; 1♂, 2♀♀, Shangpung, coll. H. W. Wells, 8-11 Aug 1920 ; Jaintia Hills district.

Measurements : *External* : 2♂♂ : *HB.* 55.0, 60.0 ; *Tl.* 27.0, 29.0 ; *f.* 53.0, 52.0 ; *tr.* 19.0, 21.8 ; *ft.* 11.0, 10.2 ; *E.* 18.5, 19.0 ; *ws.* 250.0 (1 ex.) ; *ww.* 70.0 (1 ex.). 4♀♀ : *HB.* 51.0–60.0 (56.5) ; *Tl.* 24.0–30.0 (25.8) ; *f.* 46.0–51.0 (49.5) ; *t.* 18.0–22.6 (20.8) ; *ft.* 8.5–11.5 (10.5) ; *E.* 17.0–21.0 (18.3) : *Skull* : 2♂♂ : *l.* 22.0, 22.0 ; *zw.* 11.8, 10.0 ; *cw.* 10.0, 9.0 ; $m^3 - m^3$ 9.0 ; $c - m^3$ 9.4 ; $c - m_3$ 10.2, 9.2 ; *ml.* 16.5, 15.0. 4♀♀ : *l.* 20.5–21.6 (21.3) ; *zw.* 10.7–11.2 (11.0) ; *cw.* 8.0–9.1 (8.3) ; $m^3 - m^3$ 7.8–8.3 (8.1) ; $c - m^3$ 7.5–8.5 (8.2) ; $c - m_3$ 8.0–9.1 (8.2) ; *ml.* 13.2–15.0 (14.7).

Distribution in N. E. Hills : Meghalaya : East Khasi Hills district (Hinton & Lindsay 1926), and Jaintia Hills district (Hinton & Lindsay 1926).

Remarks : Among four females, measurements show that one is subadult (*f.* 46.0 ; *l.* 20.5) and as a whole, females are smaller than the males.

21. *Rhinolophus ferrum-equinum tragatus* Hodgson

1835. *Rhinolophus tragatus* Hodgson, *J. Asiat Soc. Beng.*, 4 : 699 (Nepal).

Common name : Greater Horseshoe Bat (Eng.).

Material examined : None from N. E. Hills but to further study of the species from these regions measurements of the specimens from Himachal Pradesh, India have been provided here on the basis of Sinha (1973).

Measurements : (taken from Sinha loc. cit.) : *External* : 1♂, 3♀♀ : *E.* 24.0, 24.0, 25.0, 25.0 ; *f.* 56.5, 56.5, 58.0, 60.0 ; *tl.* 33.0, 35.0, 36.0, 37.0 ; *t.* 23.0, 23.0, 23.5, 24.0 ; *ft.* 11.5, 12.1, 12.6.

Skull : 1♂, 1♀ : *l.*—, 23.1 ; *cw.*—, 10.0 ; $m^j - m^j$ 9.0, 9.6 ; *wbc.* 0.8,— ; $c - m^j$ 9.0, 9.0 ; $c - m_j$ 9.7, 10.0 ; *ml.* 16.5, 16.7.

Distribution in N. E. Hills : Arunachal Pradesh : Dening (680 m.), Mishmi Hills, Lohit district (Kurup 1968).

Remarks : The specimens of this subspecies can easily be differentiated from other subspecies by larger noseleaf and broader horseshoe ; longer ear, forearm and skull as measurements given above.

Subfamily 2. HIPPOSIDERINAE

Genus (12) *Hipposideros* Gray 1831

22. *Hipposideros fulvus pallidus* Andersen

1918. *Hipposideros fulvus pallidus* Andersen, *Ann. Mag. nat. Hist.*, London, 9 (2) : 381 (Junagadh, Gujarat, India).

Common name : Fulvus Leaf-nosed Bat (Eng.).

Material examined : *Assam* : 1♂, 1♀, Sibsagar, Sibsagar district, coll. M. S. E. Peal, 1872, *Z. S. I. Cal.* ; 3♂♂, 1♀, Gauri Sagar temple, Sibsagar district, Mr. J. M. Foster, 1875, *Z. S. I. Cal.* ; 1 (unsexed), Cachar, Cachar district, Indian Museum collector, 1868, *Z. S. I. Cal. Meghalaya* : 1 (unsexed), Cherrapunji, East Khasi Hills district, coll. Dr. F. Stolizka, 15 Dec 1875, *Z. S. I. Cal.*

Measurements : External : 1♀ : *HB.* 52.0 ; *Tl.* 39.0 ; *E.* 24.0 ; *f.* 42.2 ; *t.* 18.5 ; *ft.* 8.6. *Skull* 1♀ : *l.* 17.3 ; *zw.* 9.2 ; *cw.* 8.1 ; $m^j - m^j$ 6.4 ; $c - m^j$ 6.5 ; $c - m_j$ 7.0 ; *ml.* 11.5.

Distribution : *Assam* : Cachar district, Sibsagar district ; *Meghalaya* : East Khasi Hills district.

Remarks : Kurup (1968) mentions this species as *Hipposideros ? bicolor fulvus* Gray.

23. *Hipposideros cineraceus cineraceus* Blyth

1853. *Hipposideros cineraceus* Blyth, *J. Asiat. Soc. Beng.*, 22:410 (near Dadan Khan, Salt Range, Punjab, Pakistan).

Common name : Least Leaf-nosed Bat (Eng.).

Material examined : *Arunachal Pradesh* : 1♂, Tiki (C. 425 m.) Mishmi Hills, Lohit district, coll. C. Primrose, 14 Jun. 1921, *Z. S. I. Cal. Meghalaya* : 1♀, Cherra Punji; coll. H. H. Godwin – Austen, 1870, *Z. S. I. Cal.*

Measurements : External : 1♂ : *HB.* 42.0 ; *E.* 14.0 ; *Tl.* 30.0 ; *f.* 34.0 ; *t.* 14.0 ; *ft.* 7.0 : *Skull* measurement taken from Hill (1963) to complete the data as : *cc.* 12.7–13.7 (13.2) ; $m^l - m^l$ 3.5–4.1 (3.8) ; *zw.* 7.0–7.6 (7.3) ; *mw.* 7.6–8.1 (7.8) ; $c - m^j$ 4.8–5.2 (5.0) ; from Das *et. al.* (1995)

: *l.* 15.9 ; *cc.* 14.0 ; *c - m³* 5.2 ; *c' - c'* 2.7 ; *cw.* 6.8 ; *m³ - m³* 5.0 ; *ml.* 8.1.

Distribution in N. E. Hills : Arunachal Pradesh : Lohit district (present material) ; *Assam* : Sibsagar district, Lakhimpur district (Kurup 1968) ; *Meghalaya* : East Khasi Hills district, Jaintia Hills district (Hinton & Lindsay) 1926 ; *Mizoram* : Aizawl and Lunglei districts (Mandal *et. al.* in press).

24. *Hipposideros ater ater* Templeton

1848. *Hipposideros ater* Templeton, *J. Asiat. Soc. Beng.*, 17 : 252. (Colombo, Sri Lanka).

Common name : Dusky Leaf-nosed Bat (Eng.).

Material examined : None from N. E. Hills but 1♂, 2♀♀ from Sri Lanka and Madurai, Chennai, India, *Z. S. I. Cal.* Reg. No. 17278, 17279 & 17281 to complete the data.

Measurements : External : *f.* 35.2–35.8 (33.5) ; *t.* 13.5–15.2 (14.3) ; *ft.* 7.0–8.2 (7.6). *Skull* : *l.* 15.0–15.1 (15.03) ; *zw.* 7.8–8.1 (8.0) ; *cw.* 6.8–7.0 (6.9) ; *m³ - m³* 5.3–5.5 (5.4) ; *wbc.* 1.2–1.5 (1.3) ; *c - m³* 6.1–5.2 (5.17) ; *c - m_j* 5.4–5.5 (5.47) ; *ml.* 9.4–9.5 (9.45).

Distribution in N. E. Hills : Meghalaya : East Khasi Hills (Cherrapunji).

Remarks : Specimen was not seen by me but mentioned here on the basis of Kurup (1968).

25. *Hipposideros pomona gentilis* Andersen

1918. *Hipposideros gentilis* Andersen, *Ann. Mag. nat. Hist. Soc.*, 9, 2 : 380, 381 (Thayetmyo, Myanmar = Burma).

Common name : None.

Material examined : *Meghalaya* : 2♂♂, 1♀ Cherrapunji, (17 Apr 1920) ; 1♀, Laitkynsew (30 Apr 1920) ; East Khasi Hills district, coll. H. W. Wells, *Z. S. I. Cal.*

Measurements : External : 2♂♂ : *E.* 23.0, 24.0 ; *f.* 38.5, 40.0 ; *t.* 18.0, 18.1 ; *ft.* 8.0, 8.5. 2♀♀. *E.* 22.0, 24.0 ; *f.* 40.0, 43.0 ; *t.* 18.5, 18.7 ; *ft.* 8.0, 8.0. *Skull* (to complete, measurements taken from Hill 1963) : *l.* (*cc.*) 14.5–15.9 (15.2) ; *m¹ - m¹* 4.1–4.7 (4.5) ; *zw.* 8.3–9.0 (8.7) ; *mw.* 8.7–9.3 (9.0) ; *c - m³* 5.8–6.2 (5.9).

Distribution in N. E. Hills : Meghalaya : East Khasi Hills district. (Hinton & Lindsay 1926), Garo Hills (Hinton & Lindsay 1926). *Assam* : (Hinton & Lindsay 1926), *Arunachal Pradesh* (Hinton & Lindsay 1926).

26. *Hipposideros galeritus* Cantor

1846. *Hipposideros galeritus* Cantor, *J. Asiat. Soc. Beng.* 15 : 183 (Malayasia, Penang).

Measurements : (to complete, measurements taken from Hill 1963) : *l.* (*cc.*) 15.7–15.8 ; *m¹ - m¹* 4.6–5.2 (4.9) ; *zw.* 9.7–10.1 ; *mw.* 9.0–9.2 (9.1) ; *c - m³* 6.3–6.6 (6.5).

Remarks : This species has not been examined by me from N. E. Hills but mentioned here on the basis of Tate (1941) who recorded it from *Assam* and followed by Ellerman and Morrison-Scott (1951) and Kurup (1968).

I have not seen its haunt but Brosset (1962) observed in dark artificial caves or rooms, hanging isolated in Ellora and Kanheri in Maharashtra.

27. *Hipposideros armiger armiger* (Hodgson)

1835. *Rhinolophus armiger* Hodgson, *J. Asiat. Soc. Beng.*, 4 : 699. (Nepal).

Common name : Himalayan Leaf-nosed Bat (Eng.).

Material examined : Assam : 1♂, 1♀ : Rajapara, S. Kamrup, Kamrup district, coll. H. W. Wells, 14-16 Nov 1920, *Z. S. I. Cal. Meghalaya* : 3♀♀, Shillong, East Khasi Hills, coll. H. H. Godwin-Austen, 1875, *Z. S. I. Cal.* ; 5♂♂, 7♀♀, Khonshong and Shangpung, Jaintia Hills, coll. H. W. Wells, 25 Jul to 12 Aug 1920, *Z. S. I. Cal.* ; 1♂, 1♀, Durabanda, Garo Hills, coll. H. W. Wells, 13 Nov 1920, *Z. S. I. Cal.*

Measurements : External : 7♂♂ : E. 28.0–31.0 (29.0) ; f. 86.0–96.0 (93.0) ; t. 37.0–41.0 (39.0) ; ft. 16.0–17.2 (16.8) ; Tl. 55.0–60.0 (57.1). 4♀♀ : E. 26.0–30.0 (28.3) ; f. 86.0–92.0 (89.0) ; t. 35.0–36.2 (35.4) ; ft. 15.0–17.0 (15.7) ; Tl. 54.0–58.0 (56.0). Skull : 1♂ ; l. 31.0 ; zw. 18.3 ; cw. 14.0 ; $m^3 - m^3$ 13.0 ; $c - m^3$ 13.0 ; $c - m_3$ 14.0 ; ml. 22.5. 1♀ : l. 29.1 ; zw. 17.6 ; cw. 12.2 ; $m^3 - m^3$ 12.2 ; $c - m^3$ 12.2 ; $c - m_3$ 13.4 ; ml. 21.9.

Distribution in N. E. Hills : Assam : Kamrup district (present material ; Hinton & Lindsay 1926 ; Kurup 1969) ; Dobson 1874 ; Kurup 1968), Jaintia Hills district (present material, Hinton & Lindsay 1926 ; Kurup 1968), Garo Hills (present material ; Manipur : Temenglong district (Mandal *et. al.* 1993).

Remarks : In size and shape, it is very similar to *H. lankadiva* and at a glance separation is very difficult. Rostrum ($m^1 - m^1$) broader than *H. lankadiva* ; incisive foramina not enclosed by premaxilla ; zygomata and mastoid area narrower ; sagittal and temporal crest more strongly developed than *H. lankadiva* ; infraorbital foramina smaller, closed by a slender bar, length about 2.0 mm. ; cochleae small, dia. about 3.3 mm. ; noseleaf simple but four lateral leaflets.

28. *Hipposideros larvatus leptophyllus* (Dobson)

1874. *Phyllorhina leptophylla* Dobson, *J. Asiat. Soc. Beng.*, 43,2 : 234. (Khasi Hills, Meghalaya).

1936. *Hipposideros larvatus grandis* G. Allen, *Rec. Ind. Mus.*, 38,3 : 345. (Akanti, Upper Chindurin, 500 ft., Myanmar = Burma).

Material examined : Meghalaya : 2♂♂, Laitkynsao, East Khasi Hills, coll. H. W. Wells, 2 May 1920, *Z. S. I. Cal.* ; 1 (Juv.) Above Tura, West Garo Hills district, coll. S. Kemp *Z. S. I. Cal.*

Measurements : External : 2♂♂ : HB. 74.0 ; Tl. 44.0, 44.0 ; E. 23.0, 23.0 ; f. 61.0, 62.0 ; t. 24.0, 25.0 ; ft. 12.0, 13.0. Skull : 2♂♂ : l. 22.5, 22.8 ; cb. 19.5, 20.5 ; zw. 13.3, 14.0 ; cw. 10.0, 10.5 ; $m^3 - m^3$ 9.3, 9.3 ; $c^1 - c^1$ 6.0, 6.2 ; pl. 8.8, 9.0 ; wbc. 2.2, 2.3 ; $c - m^3$ 9.2, 9.3 ; $c - m_3$ 9.8,

10; *mw.* 11.2, 11.6; *ml.* 16.3, 16.5; For comparison, 7♂♂, 5♀♀ of *Hipposideros larvatus grandis* Allen from Upper Chindurin, W. Sagaing, Irrawaddy, Mount Popa, North Shan States and Tenasserim; Burma (= Myanmar) collected by G. C. Shortridge from 1 May 1913 to 24 Jul 1914, present in *Z. S. I. Cal.* were also examined.

Measurements : External : 7♂♂ : *HB.* 70.0–79.0 (74.4); *Tl.* 34.0–39.0 (37.0); *E.* 21.5–24.0 (22.9); *f.* 60.0–64.0 (62.2); *t.* 21.0, 25.7 (23.7); *ft.* 12.0–13.5 (12.0). 5♀♀ : *HB.* 71.0–78.0 (75.2); *Tl.* 35.0–40.0 (37.0); *E.* 22.5–25.0 (23.8); *f.* 60.0–62.0 (61.3); *t.* 22.0–25.0 (23.2); *ft.* 12.5–13.5 (12.8). *Skull :* 6♂♂ : *l.* 21.1–22.9 (22.3); *cb.* 19.0–20.1 (19.7); *zw.* 13.1–13.5 (13.3); *cw.* 9.5–10.3 (10.0); $m^3 - m^3$ 9.0–9.3 (9.2); $c^1 - c^1$ 5.5 – 5.9 (5.8); *pl.* 8.0 –9.0 (8.7); *wbc.* 2.0–2.3 (2.2); $c - m^3$ 9.1–9.4 (9.2); $c - m_3$ 9.8–10.5 (10.1); *ml* 15.8–16.5 (16.3). 2♀♀ : *l.* 22.6, 23.0; *cb.* 19.7, 20.3; *zw.* 13.0, 13.1; *cw* 10.0, 10.2; $m^3 - m^3$ 8.9; 9.0; $c^1 - c^1$ 6.1; 6.1; *pl.* 8.7, 9.0; *wbc.* 2.0, 2.2; $c - m^3$ 9.3, 9.3; $c - m_3$ 9.8, 10.1; *ml.* 16.3, 16.6

Distribution in N.E. Hills : Arunachal Pradesh : Dibang valley district (Chakraborty & Sen 1991); *Assam :* Goalpara district, Kamrup district (Kurup 1968); *Meghalaya :* West Garo Hills district (Present material), Ri-Bhoi district (Hinton & Lindsay 1926), East Khasi Hills district (Present material; Hinton & Lindsay 1926).

Remarks : Tate (1941) state that *Hipposideros larvatus grandis* is probably a synonym of *H. l. leptophylla*. Hill (1963) has given no comment and treated them as separate species but the measurements given by him of *H. l. grandis* (29 exs.) and *H. l. leptophyllus* (8 exs.) as condylocanine length 19.1–21.5 (20.4) vs. 20.9–21.4 (21.1); Rostral width 6.4–7.3 (6.9) vs. 7.4–7.7 (7.6); inter orbital width 3.0–3.7 (3.3) vs. 2.8–3.3 (3.1); zygomatic width 12.1–13.7 (13.1) vs. 13.4–14.0 (13.6); mastoid width 10.8–11.8 (11.3) vs. 11.6–12.2 (11.9), length of maxillary tooth row 8.3–9.5 (8.9) vs. 8.9–9.4 (9.1), are overlapping, although average measurements of skulls shows that the rostral region of *leptophylla* is slightly wider than *grandis*.

The measurements of the specimens of both the subspecies present in *Z.S.I., Cal.*, taken by me as mentioned above, show, no any significant differences between *leptophylla* and *grandis*. I, therefore, treat *Hipposideros larvatus grandis* Allen as synonym of *H. larvatus leptophyllus* (Dobson).

29. *Hipposideros lankadiva* Kelaart

1850. *Hipposideros lankadiva* Kelaart, *J. Ceylon Brch. R.Asiat. Soc.*, 2, 216 (Kandy, Ceylon (=Sri Lanka)).

Common name : Sri Lanka Gigantic Leaf-nosed bat or Kelaart's Leaf-nosed Bat (Eng.).

Material examined : *Meghalaya :* 1♂, Nongthymmai, Shillong, East Garo Hills district, coll. Mr. Carlton, 26 Jun 1964, *E.R.S.*; 4♂♂, 1♀ Rongmachok, West Garo Hills district, Coll. V.T. Darlong, 28. Sep. 1986, *E.R.S.*

For Comparison among subspecies, 9♂♂, 4♀♀, of *H. lankadive indus* Andersen from Karnataka (Belgaum and kanara) and Maharashtra (Satpura Hills); 1♂, 1♀, of *H. lankadiva* Kelaart from Sri Lanka; 3♂♂, 2♀♀ of *H. lankadiva unitus* Andersen from Orissa (Khandagiri, Puri), Madhya Pradesh (Saugar and Bhopal); and 2♂♂, 1♀ of *H. lankadiva mixtus* Andersen from Andhra Pradesh (Palkona Hills Kurnaul) were also examined.

Comparative measurements of *H. l. indus*, *H. l. lankadiva*, *H. l. unitus* and *H.l. mixtus*.

	<i>H. l. indus</i>	<i>H. l. lankadiva</i>	<i>H. l. unitus</i>	<i>H.l. mixtus</i>
EXTERNAL :	14♂♂, 5♀♀,	1♂, 1♀,	3♂♂, 2♀♀	2♂♂, 1♀
<i>f.</i>	79.5–92.0 (88.1)	87.0, 85.8	83.9–87.8 (86.6)	82.0–87.0 (84.7)
<i>t.</i>	30.0–37.0 (34.4)	37.0, 34.5	30.0–33.5 (32.1)	28.7–33.0 (30.9)
<i>ft.</i>	15.0–19.0 (16.5)	16.3, 14.7	15.0–17.0 (16.6)	16.0–18.5 (16.7)
SKULL :	6♂♂, 2♀♀,	1♂, 1♀,	3♂♂,	2♂♂, 1♀
<i>l.</i>	30.1–32.8 (31.3)	–, 33.0	29.7–30.0 (29.8)	29.0–30.5 (29.9)
<i>cb.</i>	26.5–29.3 (27.9)	–, 29.8	26.7–27.0 (26.9)	26.3–27.2 (26.8)
<i>zw.</i>	19.0–20.6 (19.7)	20.0, 20.0	18.1–18.2 (18.1)	17.5–18.5 (18.3)
<i>cw.</i>	13.2–14.1 (13.5)	13.8, 12.9	12.6–13.0 (12.8)	12.5–13.2 (13.0)
<i>m³–m³</i>	12.8–13.3 (13.0)	13.5, 12.7	12.9–13.0 (12.9)	12.2–12.7 (12.5)
<i>m¹–m¹</i>	10.9–11.2 (11.0)	11.0, 12.0	10.8–11.1 (10.9)	10.5–11.0 (10.7)
<i>c¹–c¹</i>	8.0–9.0 (8.4)	9.2, 8.7	8.0–8.6 (8.3)	7.8–8.7 (8.4)
<i>pl</i>	11.8–13.5 (12.6)	14.3, 13.3	12.8–13.0 (12.9)	12.5–13.1 (12.9)
<i>wbc.</i>	3.0–3.7 (3.3)	3.0, 3.5	3.0–3.8 (3.30)	3.1–3.4 (3.3)
<i>c–m³</i>	13.2–14.5 (13.8)	15, 14.3	13.3–13.5 (13.4)	12.9–13.3 (13.1)
<i>c–m₃</i>	15.0–16.0 (15.1)	16.9, 15.7	14.8–15.2 (15.0)	14.0–14.5 (14.2)
<i>mw</i>	15.0–15.2 (15.1)	15.0, 15.9	14.4–14.6 (14.5)	14.3–14.4 (14.3)
<i>ml</i>	23.2–25.5 (24.3)	25.8, 25.2	23.0–23.3 (23.2)	22.3–23.3 (22.9)

Distribution in N. E. Hills : Meghalaya : S. Garo Hills district ; Manipur : Imphal district (Mandal et.al 1993) ; Mizoram : Aizawl district (Mandel et.al., in press) ; Tripura (Specimen in Z.S.I. Cal., Das et.al. 1995).

Remarks : On the basis of external and skull characters given above, there is no any major differences between *H. l. indus*, *H. l. lankadiva*, *H. l. indus* and *H. l. mixtus* have been found. Hence, all the specimens of the four subspecies have been treated here as *Hipposideros lankadiva* Kelaert. Brosset (1962) had also similar opinion about validity of subspecies of *Hipposideros lankadiva*.

Genus (13) *Coelops* Blyth, 1848

30. *Coelops frithi frithi* Blyth

1848. *Coelops frithi* Blyth, *J. Asiat. Soc. Beng.*, 17 : 251 (Sundarban, Bengal (=W. Bengal), India).

Common name : Tail-less Leaf-nosed bat (Eng.).

Material examined : None from N.E. Hills but for further identification measurements of the species have been mentioned here on the basis of Dobson (1876): of the type from Sundarban, South 24 Parganas district, West Bengal, India and a well preserved adult male from Java in Lyden Museum respectively.

Measurements (taken from Dobson 1876) : *HB.* 2 inch (=50.8 mm), 1.7 inch (43.2 mm.) ; *E.* 0.55 inch (=14.0 mm.), 0.52 inch (=13.2 mm) ; *f.* 1.65 inch (=41.9 mm), 1.6 inch (=40.6 mm.) ; *t.* 0.65 inch (=15.5 mm), 0.65 inch (=16.5 mm), 0.65 inch (16.5 mm) ; *ft.* 0.35 inch (=8.9 mm), 0.35 inch (=8.9 mm).

Diagnosis : Ear funnel-shaped, outer surface of ear-conch thickly clothed with fine hairs ; antitragal lobe very broad ; supplementary lappets of anterior noseleaf come forward beyond end of muzzle ; face and side of noseleaf covered with long hairs ; thumb included in wing almost to base of claw ; Wing from tarsus close to ankle ; tail about 2.0 mm concealed under hairs ; fur brown above and below, base of hair much paler.

Distribution in N. E. Hills : Meghalaya : Cherra Punji, East Khasi Hills district (Hinton and Lindsay 1926).

Family 6. MOLOSSIDAE

Genus (14) *Tadarida* Rafinesque, 1814

31. *Tadarida plicata plicata* (Buchanan)

1800. *Vespertilio plicatus* Buchanan, *Trans. Linn. Soc. Lond.*, 5 : 261, pl. 13 (Bengal = West Bengal, India).

Common name : Wrinkle-lipped Free-tailed Bat (Eng.).

Material examined : None from N. E. Hills but for further study measurements of 11♂♂, 21♀♀ from different places in India and Myanmar (=Burma) have been taken from Sinha (1980).

Measurements : *External* : *HB.* 60.0–64.0 ; *f.* 46.0–50.0 ; *E.* 16.0–19.0 ; *Tr.* 2.0–2.5 ; *t.* 15.0–18.0 ; *ft.* 10.0–12.0 ; *ws.* 310.0–340.0. *Skull* : *l.* 18.0–19.0 ; *zw.* 10.5–11.0 ; *cw.* 8.5–9.0 ; *m³ – m³* 8.0–8.5 ; *c – m³* 6.5–7.0 ; *c – m₃* 7.0–8.0 ; *ml.* 12.0–13.0.

Diagnosis : Muzzle broad and thick ; upper lip overhanging the lower, marked by pronounced vertical wrinkles ; ears large, thick and rounded, joined in front of orbits by band of skin ; antitragus well defined ; tragus small ; lower part of legs free from wing and ankle connected by raphe.

Distribution in N. E. Hills : Meghalaya : Cherrapunji, East Khasi Hills district (Blyth 1852).

Remarks on habitat : Colony of this bat has not been seen by me anywhere in India. Sinha (1976) saw colony (size 10–12 examples) of *Tadarida aegyptiaca* in the crevices of the ceiling of open corridor of a temple exposed to the light near Chambal river in Kota district of Rajasthan. Kashyap (1982) saw the colony of *Tadarida plicata* in the warm parts of the room whether on the ceiling or in a crack in the Anand Talkies at Khandwa. In rainy season these bats were observed by the author in clusters on rough surface of the walls in the highest part of the room.

He also saw the migratory colony of this bat in East Nimar, Madhya Pradesh (varied from 200 to 500 at different forms) from 26th May to September 16, were absent from their roosts during the rest of the year but there was not any evidence of shift in their population during Autumn to the following summer. According to him it is very likely that they migrate to other roosts during this period. He also recorded a single embryo with large number of females in July and so developed that the delivery was expected in October.

Family (7) VESPERTILIONIDAE

Subfamily 1. VESPERTILIONINAE

Genus (15) *Myotis* Kaup 1829

32. *Myotis annectans* Dobson

1871. *Pipistrellus annectans* Dobson, *Proc. Asiat. Soc. Beng.* 213 (Samoogooting, Nagaland, India).
 1920. *Myotis primula* Thomas, *J. Bombay nat. Hist. Soc.*, 27 : 248 (Pashok, near Darjiling, N. E. India, 3,500 ft.).

Common name : Hairy-faced Bat (Eng.).

Material examined : Nagaland : 1♀, specimen with skull in spirit ; Samagooting, Naga Hills, India, J. Butler collector, Holotype, Z. S. I. Cal. Reg. No. 15595.

Distribution in N. E. Hills : Nagaland.

Remarks : It was previously known as *Pipistrellus annectans* Dobson but Topal (1970a) transferred the species to *Myotis* from *Pipistrellus* on the basis of characters and synonymised *Myotis primula* Thomas with this species.

33. *Myotis siligorensis siligorensis* (Horsfield)

1855. *Vespertilio siligorensis* Horsfield, *Ann. Mag. nat. Hist.*, 16 : 102 (Siligori, Nepal = Siligori, Darjeeling district, West Bengal, India).

Common name : Himalayan whiskered Bat (Eng.).

Material examined : None.

Distribution in N. E. Hills : Meghalaya : Konshnong, Jaintia Hills district (Hinton & Lindsay, 1926).

Remarks : Very rare bat ; smaller in size (forearm around 33.0 mm.) ; antitragal lobe distinct ; tragus long (about) half the length of ear, narrow and pointed ; tip of tail tree.

34. *Myotis mystacinus caliginosus* (Tomes)

1859. *Vespertilio caliginosus* Tomes, *Proc. Zool. Soc. Lond.* : 73 (India).

Common name : Whiskered Bat (Eng.).

Material examined from N. E. Hills : None.

Measurements : Nil.

Distribution in N. E. Hills : Meghalaya : Konshnong, Jaintia Hills district as mentioned by Kurup 1968.

Remarks : The specimen from N. E. Hills, was not seen by me but according to Ellerman & Morrison-Scott (1951) it is not supposed to occur in this area. Corbet & Hill (1992) have synonymised *caliginosus* Tomes with *muricola* Gray.

35. *Myotis horsefieldi* (Temminck)

1840. *Vespertilio horsfieldi* Temminck, *Monogr. Mammals*, 2 : 226 (Mount Gede, Java).

Material examined : Meghalaya : 1♀, Khonshong, Jaintia Hills district, coll. H. W. Wells, 29 Jul 1920, *Z. S. I. Cal.*

Measurements : *f.* around 37.0 mm.

Distribution in N. E. Hills : Meghalaya : Jaintia Hills district.

Remarks : Hinton & Lindsay (926) reported the above specimen as *Leuconoe* sp. but Das *et. al.* (1995) after careful examination identified it as *M. horsfieldi* and recorded first time from *Meghalaya* and according to him this specimen constitute the basis for the first authentic record for India.

36. *Myotis formosus formosus* (Hodgson)

1835. *Vespertilio formosa* Hodgson, *J. Asiat. Soc. Beng.*, 4 : 7; ; (Nepal).

Common name : Hodgson's Bat (Eng.).

Material examined : Meghalaya : 1♀, Cherrapunji, East Khasi Hills district, coll. Lt. Col. H. H. Godwin-Austen, *Z. S. I. Cal.* ; *Assam* : 1♀, Goalpara, Goalpara district, coll. H. L. Haughton, 1870, *Z. S. I. Cal.*

Measurements : See Sinha (1986).

Distribution in N. E. Hills : Assam (Blanford 1891, Sinha 1986) : Goalpara district ; *Meghalaya* (Dobson 1876, Andeson 1891) : East Khasi Hills district.

Remarks : This species is very difficult to find and may be treated rare.

37. *Myotis longipes* (Dobson)

1872. *Vespertilio Macropus* Dobson, *Proc. Asiat. Soc. Beng.*, 209. Not of Gould 1854. (Caves of Bhima Devi, 6000 ft., Kashmir, India).

1873. *Vespertilio longipes* Dobson, *Proc. Asiat. Soc. Beng.*, 110. Renaming of *macropus*, preoccupied.

Common name : The Kashmir Cave Bat (Eng.).

Material examined besides Siju Cave, Garo Hills from *Meghalaya* : 1♂, Mausami Cave, Cherrapunji, East Khasi Hills district, coll. Y. P. Sinha, 23 Sep 1991, *E. R. S.*

Measurements : *External* : 1♂ : *HB.* 41.0 ; *E.* 12.5 ; *Tr.* 7.0 ; *Tl.* 30.0 ; *f.* 35.0 ; *t.* 16.0 ; *ft.* 10.0 ; *ws.* 180.0 ; *ww.* 40.0. *Skull* : *l.* 13.0 ; *zw.* 8.0 ; *cw.* 7.0 ; $m^3 - m^3$ 6.0 ; $c - m^3$ 5.5 ; $c - m_3$ 6.3 ; *ml.* 10.6.

Distribution in N. E. Hills : Meghalaya : Siju cave, South Garo Hills district (Sinha, 1994) ; Mausmai cave, Cherrapunji, E. Khasi Hills (new record, from E. Khasi Hills district).

Remarks : This bat was collected in the mist net set on the mouth of Mausmai cave.

The dorsal surface of specimen is black and that of ventral black with white tip. Foot including claws very large, 10.0 mm. in length ; toes 6.5 mm. more than half of the foot. The first and fifth toes 5.0 mm. shorter than the rest (6.5 mm.).

Genus (16) *Pipistrellus* Kaup, 1829

38. *Pipistrellus coromandra coromandra* (Gray)

1838. *Scotophilus coromandra* Gray, *Mag. Zool. Bot.*, 2 : 498. (Pondicherry, Coromandel coast, India).

Common name : Indian Pipistrelle (Eng.).

Material examined : Assam : 1♀, Rongjully, Goalpara district, coll. Y. P. Sinha, 24. Nov. 1990, E. R. S. ; 1♂, 1♀, Goalpara, Goalpara district, coll. H. L. Houghton ; Meghalaya : 1♂, Sonapur, Jaintia Hills district, no date, E. R. S. ; 1♀, Garo Hills, coll. H. H. Godwin-Austen, 1872, Z. S. I. Cal. ; Nagaland. 2♂♂, 4♀♀, : Sattsu village, Zunheboto district, coll. Y. P. Sinha, 12. Jul. 1991. Manipur : 1♀, Manipur Hills, coll. H. H. Godwin-Austen, 1872, Z. S. I. Cal.

Measurements : External : 4♂♂ : HB, 41.0, 42.0 (2 ex.) ; Tl. 27.0, 29.0 (2 ex.) ; E. 11.0–12.5 (12.0) ; Tr. 5.5–7.0 (6.2) ; f. 29.5–31.0 (30.5) ; t. 11.0–12.7 (11.9) ; ft. 6.0–8.0 (7.0) ; ws. 190.0–190.0 (2 ex.) ; ww. 37.0, 39.0 (2 ex.). 8♀♀ : HB. 40.0–43.0 (41.5) ; Tl. 26.0–29.0 (28.4) ; E. 11.0–13.0 (12.2) ; Tr. 5.0–6.5 (5.5) ; f. 30.0–31.5 (30.9) ; t. 11.5–12.0 (11.9) ; ft. 7.0–8.0 (7.4) ; ws. 185.0–200.0 (187.0) ; ww. 38.0–41.0 (39.8). Skull : 3♂♂ : l. 12.0–12.4 (12.2) ; zw. 8.0 (1 ex.) ; cw. 6.0–6.5 (6.3) ; $m^3 - m^3$ 5.5–6.0 (5.9) ; $c - m^3$ 4.4–4.6 (4.5) ; $c - m_3$ 5.0–5.2 (5.1) ; ml. 9.0–9.2 (9.1). 4♀♀ : l. 12.0–12.5 (12.2) ; zw. 7.6–8.0 (7.8) ; cw. 6.3–6.5 (6.4) ; $m^3 - m^3$ 5.5–5.8 (5.6) ; $c - m^3$ 4.3–4.6 (4.5) ; $c - m_3$ 5 (in all) ; ml. 9.0–9.4 (9.2).

Distribution in N. E. Hills : Arunachal pradesh (Subansiri district : Barthakur 1971 mentions in Census of India 1971 : series 24-Arunachal Pradesh ; Assam : Goalpara district (present material) ; Manipur (present material) ; Meghalaya : Jaintia Hills and Garo Hills (present material) ; Nagaland : Zunheboto district (present material) ; Tripura (Agrawal & Bhattacharyya 1977).

Remarks : This bat was collected from the bamboo holes of the thatched houses with the help of forceps and sticks. Among four females collected on 12 July 1991, three were pregnant ; one had only one embryo in the left horn while others had two, one in each horns of uterus. Size of embryo 8.0–12.0 mm. Both males had well developed testes and scrotal in position.

39. *Pipistrellus mimus* Wroughton

1899. *Pipistrellus mimus* Wroughton, *J. Bombay nat. Hist. Soc.*, 12 : 722. (Maheshkatri, Dang district, Gujarat, India).

Common name : Indian Pygmy Pipistrelle (Eng.).

Material examined : *Arunachal Pradesh* : 1♂, 1♀ : Seijosa Inspection Bunglow, e. Kameng district, coll. Y. P. Sinha, 3 Aug 1994, *E. R. S.*, *Meghalaya* : 1♀, Phulbari, Garo Hills, coll. A. S. Rajagopal, 20 Nov 1965, *E. R. S.* ; *Assam* : 1♂, Mahuri Para, ca. 6 Km. from Gauswar, Kamrup district, coll. Y. P. Sinha, 20 Dec 1988, *E. R. S.* ; *Manipur* : 3♂♂, 2♀♀ including 1♂ (*Subad.*) and 1♂ (y.), Jiribam, Imphal district, coll. Y. P. Sinha, 27 Aug 1990 ; *Nagaland* : 2♂♂, 3♀♀, Satakha village, Zunheboto district, coll. Y. P. Sinha, 13 Jul 1991, *E. R. S.*

Measurement : *External* : 4♂♂ : *HB.* 36.0–39.0 (38.0) ; *Tl.* 25.0–29.0 (27.0) ; *E.* 8.0–10.0 (9.1) ; *Tr.* 4.0–5.0 (4.5) ; *f.* 27.0–29.0 (27.9) ; *t.* 10.0–11.0 (10.8) ; *ft.* 6.0–7.0 (6.8) ; *ws.* 170.0–180.0 (173.0) ; *ww.* 33.0–34.0 (33.7). 6♀♀ : *HB.* 36.0–41.0 (38.4) ; *Tl.* 25.0–29.0 (26.8) ; *E.* 9.0–11.0 (9.8) ; *Tr.* 5.0–6.5 (5.3) ; *f.* 27.0–30.0 (29.0) ; *t.* 11.5–12.5 (12.1) ; *ft.* 6.0–7.0 (6.8) ; *ws.* 150.0–190.0 (174.0) ; *ww.* 37.0–39.0 (37.7). *Skull* : 4♂♂ : *l.* 11.0–11.5 (11.4) ; *zw.* 6.1–7.3 (7.0) ; *cw.* 6.0–6.5 (6.1) ; *m³ – m³* 5.0–5.5 (5.2) ; *c – m³* 3.5–4.0 (3.7) ; *c – m₃* 4.0–5.0 (4.1) ; *ml.* 7.2–7.6 (7.4). 5♀♀ : *l.* 11.0–11.3 (11.1) ; *zw.* 7.0–7.5 (7.1) ; *cw.* 6.0–6.5 (6.2) ; *m³ – m³* 4.3–5.5 (5.0) ; *c – m³* 3.5–3.7 (3.6) ; *c – m₃* 4.0–4.3 (4.1) ; *ml.* 7.4–7.6 (7.5).

Distribution in N. E. Hills : *Arunachal Pradesh* : E. Kameng district (present material) ; *Assam* : Kamrup district (present material) ; *Manipur* : Imphal district (present material) ; *Maghalaya* : Garo Hills (present material) ; *Nagaland* : Zunheboto district (present material) ; *Tripura* (Agrawal & Bhattacharyya 1977).

Remarks : This bat was collected from the bamboo holes of the houses in Assam, Manipur and Nagaland and from erect pipe attached to the wall of a house in Arunachal Pradesh. All the three females collected on 13th July 1991 were pregnant. Having two embryos in each horn of uterus (Size of embryo 8–14 mm.). Separate young from mother was found on 27th August, 1990.

Corbet and Hill (1992) synonymised Indian species *P. mimus* Wroughton with Sumatran species *P. tenuis* Temminck but due to lack of comparative material, I treat Indian *P. mimus* Wroughton as a separate species.

40. *Pipistrellus austenianus* Dobson

1871. *Pipistrellus austenianus* Dobson, *Proc. Asiat. Soc. Beng.*, 213 (Cherrapunji, E. Khasi Hills district, Meghalaya).

Material examined : *Meghalaya* : 1♂, Cherrapunji, East Khasi Hills district, coll. H. H. Godwin–Austen, 1871 (Holotype), *Z. S. I. Cal.*

Measurements : *External* : 1♂, *f.* 40.0 ; *Tl.* 34.0 ; *E.* 12.2 ; *Tr.* 6.0 ; *t.* 15.0 ; *ft.* 7.9. *Skull* : *l.* 15.5 ; *zw.* 9.2 ; *cw.* 7.9 ; *c – m³* 5.8 ; *c – m₃* 6.8 ; *ml.* 11.4.

Distribution in N. E. Hills : *Maghalaya* : East Khasi Hills district.

Remarks : *P. austenianus* Dobson has been treated here as a distinct species closely related to *P. savi* (Bonaparte, 1837).

41. *Pipistrellus babu* Thomas

1915. *Pipistrellus babu* Thomas, *J. Bombay nat. Hist. Soc.*, 24 : 30 (Murree, c. 2, 438 m, Rawalpindi, The Punjab, Pakistan).

Common name : Babu Pipistrelle (Eng.).

Material examined : Assam : 1♂, Lohra (Balipara Frontier Tract), Darrang district, coll. S. L. Hora, 12 Nov 1939, *Z. S. I. Cal.* ; 1♂, 1♀, Sibsagar, Sibsagar district, S. E. Peal, 1872, *Z. S. I. Cal. Meghalaya* : 2♂♂, 4♀♀, Khasi Hills, coll. J. H. Bourne, 1872, *Z. S. I. Cal.*

Measurements : External : 3♂♂ : *f.* 32.5–33.5 (32.8) ; *t.* 11.8–12.7 (12.4) ; *ft.* 6.8–8.0 (7.3). 5♀♀ : *f.* 32.5–35.0 (33.9) ; *t.* 11.1–13.0 (12.0) ; *ft.* 5.6–7.0 (6.5). Skull : 1♂ : *l.* 13.2 ; *zw.* 9.2 ; *cw.* 6.9 ; $m^3 - m^3$ 6.4 ; $c - m^3$ 4.7 ; $c - m_3$ 5.1 ; *ml.* 9.7. 3♀♀ : *l.* 12.9–13.5 (13.1) ; *zw.* 8.0–8.8 (8.3) ; *cw.* 6.8–7.0 (6.9) ; $m^3 - m^3$ 5.9–6.1 (6.0) ; $c - m^3$ 4.9–5.1 (5.0) ; $c - m_3$ 5.4 (1 ex.) ; *ml.* 10.0 (1 ex.).

Distribution in N. E. Hills : Assam : Kamrup district (Kurup 1968), Darang district, Sibsagar district ; Meghalaya : Khasi Hills.

Remarks : Status : The specimens from Sibsagar and Khasi Hills were catalogued by Anderson (1881) as *Pipistrellus abramus* have been identified by me as *Pipistrellus babu* Thomas. According to Tate (1942) this species appears to be too large to *coromandra* group and a little small for the *affinis* group. He suggested that it is best to regard as a member of *Kuhlii* group. Corbet & Hill (1992) has considered it much common with *Pipistrellus javanicus* and suggest conspecific. But due to unavailability of specimens of *javanicus* from type locality hasty decision can not be taken.

Biology : Nothing special has been recorded about the habits or ecology of this species.

42. *Pipistrellus circumdatus* (Temminck)

1840. *Vespertilio circumdatus* Temminck, *Mon. Mamm.* 2 : 214. (Tapos, Java).

Common name : Large Black Pipistrelle (Eng.).

Material examined : Meghalaya : 1♀, Risa colony, Shillong, East Khasi Hills district, coll. R. Mathew, 25. May 1988, *E. R. S.*

Measurements : External : 1♀ : *HB.* 42.0 ; *TL.* 33.0 ; *E.* 11.4 ; *f.* 40.3 ; *t.* 15.0 ; *ft.* 9.5 ; *ws.* 220.0 ; *ww.* 47.0. Skull : Broken.

Distribution in N. E. Hills : Meghalaya : E. Khasi Hills district (Dobson 1978).

Remarks : Muzzle broader ; colour black.

43. *Pipistrellus abramus* (Temminck)

1840. *Vespertilio abramus* Temminck, *Monogr. Mammal.* 2 : 232, pl. 58, fig. 1, 2 (Nagasaki, Kyushu, Japan).

Common name : Japanese Pipistrelle (Eng.).

Material examined : Arunachal Pradesh : 1♂, 1♀, (study skins and skulls ; skull of male badly damaged), Rotung (396 m.), Abor Hills (=Adi Hills), West Siang district, coll. S. W. Kemp, 10 Mar 1912.

Measurements : External : 1♂, 1♀ : *f.* 31.4, 30.6 ; *t.* -, 10.8 ; *ft.* -, 6.4. Skull : 1♂, 1♀ : *l.* -, 12.1 ; *zw.* -, - ; *cw.* -, 6.5 ; $m^3 - m^3$ 5.0, 5.2 ; $c - m^3$ 4.2, 4.4 ; $c - m_3$, 4.6, 4.7 ; *ml.* 8.6, 9.1.

Distribution in N. E. Hills : Arunachal Pradesh : West Siang district (Das & Sinha 1995).

Remarks : Authentically this species has been reported first time from Uttar Pradesh, and Arunachal Pradesh, India and northern Myanmar (North Shan states) by Das and Sinha (1995).

44. *Pipistrellus Kuhlii* (Kuhl)

1819. *Vespertilio Kuhlii* Kuhl. *Ann. Wetteran. Ges. Naturk.*, 4, 2 : 199. (Trieste, Italian-yugoslavian border).

Common name : Kuhl's Pipistrelle (Eng.)

Material examined : Assam : Two skins of adult from Cachar, cachar district, collected by Indian Museum collector, Calcutta in 1867, present in *Z. S. I. Cal.*; besides that specimens (7♂♂, 12♀♀) from Kashmir, Jacobabad district, Sind, PAKISTAN, collected by S. H. Prater between March and May, 1915, present in *Z. S. I. Cal.*

Measurements : External : *f.* 34.5–36.1 (35.2) ; *t.* 12.5–14.3 (13.3) ; *ft.* 5.6–7.6 (6.1). Skull : *l.* 13.2–13.9 (13.7) ; *zw.* 8.0–9.0 (8.4) ; *cw.* 6.5–7.4 (7.2) ; $m^3 - m^3$ 6.0 (in all) ; $c - m^3$ 5.0 (in all) ; $c - m_3$, 5.0–5.4 (5.3) ; *ml.* 8.6–10.0 (9.5). *wt.* about 5.5 gramme.

Distribution in N. E. Hills : Assam : Cachar district (Anderson 1881) and Meghalaya : East Khasi Hills district (Kurup 1968).

Remarks : Colony of this species not seen by the author. Robert (1977) mentions that they are gregarious in their diurnal roost. It roosts in hollow trees and under loose bark, as well as using wooden huts; roofs and attics where hundred of individuals may be found in a single roost (Barak & Yom-Tov 1989). It is swift flier and emerges fairly early in the evening. Most of its foraging is carried out during the first 3–4 hours of the night generally in permanent feeding areas (Mendelssohn & Yom-Tov-1987). It commonly hunts near the street lights found around human habitation which attract aggregations of photo tactic insects, mainly moths (Haffnor & Stutz 1985). One to two yongs are born in April or May (Harrison, 1964).

45. *Pipistrellus dormeri* Dobson

1875. *Scotozous dormeri* Dobson, *Proc. Zool. Soc. Lond.*, 373. (Bellary Hills, Bellary district, Karnataka, India).

Common name : Dormer's Bat (Eng.)

Material examined : Meghalaya : 1♂, Risa colony, Shillong, East Khasi Hills district, coll. Surendra Singh, 6 Feb 1993, *E. R. S.*

Measurements : External : 1♂ : HB. 42.0 ; E. 11.0 ; Tr. 6.0 ; f. 34.5 ; t. 13.0 ; ft. 7.0. Skull : 1♂ : l. 13.0 ; zw. 8.5 ; cw. 7.0 ; $m^3 - m^3$ 5.3 ; $c - m^3$ 5.0 ; $c - m_3$ 5.5 ; ml. 9.0.

Distribution in N. E. Hills : Meghalaya : E. Khasi Hills district (Sinha 1995).

Remarks : According to Corbet & Hill (1992) *Scotozous* differs from *Pipistrellus* in the large, massive unicuspid inner upper incisor (i^2) and the outer upper incisor (i^3) when present no more than a minute, pointed specular but they also found i^2 unicuspid and i^3 small in *kuhlii* group of Subgenus *Pipistrellus*. I have examined about 100 specimens of *dormeri* from Rajasthan, Bihar and other places in India and found i^3 , although small but present in almost all the specimens. It is not found only those specimens which have been not cleaned carefully. Therefore, in my opinion, this species should be retained in the genus *Pipistrellus*, may be treated as separate subgenus on the other different characters. Hence, I kept here specimen of *dormeri* under the genus *Pipistrellus* as *Pipistrellus dormeri* Dobson. Detailed study of the genus *Pipistrellus* is needed.

Genus (17) *Nyctalus* Bowditch 1825

46. *Nyctalus noctula labiatus* (Hodgson)

1835. *Vespertilio labiata* Hodgson, *J. Asiat. Soc. Beng.*, 4 : 700. (Nepal).

Common name : Noctule (Eng.).

Material examined : None from N. E. Hills but 2♂♂ from Myanmar (=Burma, No detail History) present in *Z. S. I. Cal.*

Measurements : External : f. 50.0, 54.0 ; t. 20.0, 20.5 ; ft. 11.5, 12.0. Skull : 1♂ : l. 19.0 ; zw. 12.0 ; cw. 10.0 ; $m^3 - m^3$ 8.2 ; $c - m^3$ 7.0 ; $c - m_3$ 7.3 ; ml. 13.4.

Distribution in N. E. Hills : Nagaland : Naga Hills (Mills 1923).

Remarks : Specimens from N. E. Hills are not examined by me ; mentioned here on the basis of (Mills 1923).

Genus (18) *Ia* Thomas 1902

47. *Ia io* Thomas

1902 *Ia io* Thomas, *Ann. Mag. nat. Hist.*, 10 : 164. (Chungyang, Southern Hupeh, China).

Common name : Great Pipistrelle (Eng.).

Material examined : Nil, but one specimen was seen in the mist net set on the mouth of Mosmai cave on 23. Sep. 1990 but could not be collected.

Distribution in N. E. Hills : Meghalaya : East Khasi Hills district : Cherrapunji (Mosmai cave), recorded by Topal (1970b).

Remarks : It was very big in size touched twice the mist net but in attempt to capture, flew back in the cave and could not come out again.

Ellerman & Morrison–Scott (1951) Kept it under genus *Pipistrellus* but Corbet & Hill (1992) have kept it under separate genus *Ia*.

Genus (19) *Tylonycteris* Peters, 1872

48. *Tylonycteris pachypus fulvida* (Blyth)

1859. *Scotophilus fulvidus* Blyth, *J. Asiat. Soc. Beng.*, 28 : 293. (Schwegyin, Sittang River, South-Eastern Burma).

Common name : Club-footed Bat (Eng.).

Material examined : Meghalaya : 1♀ (Subad.), Kherapara, c. 1000 ft., West Garo Hills, coll. R. K. Ghosh, 21 Jul 1988, *Z. S. I. Cal.*

Measurements : 1♀ : HB. 34.0 ; Tl. 26.0 ; E. 6.0 ; f. 23.2 ; t. 9.2 ; ft. 5.6 ; ws. 120.0 ; ww. 32.0.
Skull : 1♀ : l. 10.2 ; zw. 7.4 ; cw. 5.8 ; $m^3 - m^3$ 4.9 ; $c - m^3$ 3.6 ; $c - m$, 4.1 ; ml. 7.2.

Distribution in N. E. Hills : Manipur (Blanford 1891) ; Meghalaya (present material) ; Mizoram : Aizwal district (Mandal *et. al.* in Press) ; Tripura (Specimen in *Z. S. I. Cal.*).

Remarks : Its size is very much near to *Pipistrellus mimus* but skull is much flat so that it can be easily identified from *P. mimus*. Soles of feet and base of thumbs with broad fleshy pads.

Genus (20) *Eptesicus* Rafinesque, 1820

49. *Eptesicus pachyotis* (Dobson)

1871. *Vesperugo (Verperus) pachyotis* Dobson, *Proc. Asiat. Soc. Beng.*, 211. Khasi Hills, Assam (= Meghalaya).

Common name : Thick-earned Bat (Eng.).

Material examined : Meghalaya : 1♂, 1♀, Khasi Hills, coll. J. H. Bourne, 1872 (Syntypes of *Vesperugo pachyotis*), *Z. S. I. Cal.*

Measurements : External : 1♂ : f. 40.8 ; Tl. 41.3 ; E. 13.0 ; Tr. 4.7 ; t. 16.9 ; ft. 8.6. 1♀ : f. 41.2 ; Tl. 39.6 ; E. 14.0 ; Tr. 4.6 ; t. 17.1 ; ft. 8.6.

Distribution in N. E. Hills : Meghalaya : Khasi Hills.

Remarks : Colour above dark brown and below a lighter shade of brown.

50. *Eptesicus serotinus pachyomus* (Tomes)

1857. *Scotophilus pachyomus* Tomes, *Proc. Zool. Soc. Lond.*, 50 (Rajputana = Rajasthan, India).

Common name : Indian Serotine (Eng.)

Material examined : Assam : 1♂, Darrang, Darrang district, coll. Lt. Colonel H. H. Godwin–Austen, 1875, *Z. S. I. Cal.*

Measurements : External : 1♂ : *HB.* 72.1 ; *Tl.* 50.6 ; *E.* 21.6 ; *f.* 53.1. Skull measurement of Kashmir specimens of this species (1♂, 1♀) to complete the data, taken from Chakraborty (1983) as : *l.* 22.7, 22.1 ; *cw.* 10.1, 9.8 ; *c - m³* 8.3, 8.5 ; *m³ - m³* 9.1, 9.7 ; *ml.* 16.7, 16.9.

Distribution in N. E. Hills : Assam : Darang district (Anderson 1881; Blanford, 1891).

Remarks : Head flat ; muzzle thick and flat, sides swollen and glandular ; face naked in front, but upper lip fringed with hairs ; thumb with a callosity at the base ; Post calcaneal lobe very narrow ; last two caudal vertebrae free. Chakraborty (1983) has given forearm length of this species from Kashmir ranging from 49.0–58.0 and the colour of dorsum seal brown with pale tips to hairs and that of venter Broccoli brown.

51. *Barbastella leucomelas darjelingensis* (Hodgson)

1855. *Plecotus darjelingensis* Hodgson, in Horsfield, *Ann. Mag. nat. Hist.*, (2) 16 : 103. (Darjeeling, North-Eastern India = Darjiling, Darjiling district, West Bengal, India).

Common name : Eastern Barbastelle (Eng.).

Material Examined : Nil.

Measurements given by Blanford (1891) of Khasi Hills specimen as : *HB.* 2 inch = 50.6 ; *Tl.* 1.9 inch = 48.1 ; *E.* 0.45 = 11.4 ; *f.* 1.65 inch = 41.7. Chakraborty (1983) has given measurements of 2♂♂, 1♀ Specimens of Kashmir as : *f.* 40.5, 41.4 ; 43.3 ; *E.* 16.0, 17.2 ; 16.1.

Distribution in N. E. Hills : Meghalaya : Khasi Hills district (Dobson 1874 ; Blanford 1891; Anderson 1881 ; Kurup 1968) ; Mizoram : Lunglei district (Mandal *et.al.*, in press).

Remarks : Rare species. Chakraborty (1983) mentions general colour blackish gray but the extreme tip of fur whitish.

Genus (22) *Scotomanes* Dobson, 1875

52. *Scotomanes ornatus ornatus* (Blyth)

1851. *Nycticejus ornatus* Blyth, *J. Asiat. Soc. Beng.*, 20 : 517. (Cherra Punji, Khasi Hills, Assam = Cherra Punji, E. Jhasi Hills district, Meghalaya, India).

1921. *S. O. sinensis* Thomas. *J. Bombay nat. Hist. Soc.*, 27 : 772 (Khonsh-nong, Jaintia Hills, Assam = Khonsh-nong, Jaintia Hills, Meghalaya, India, 3000 ft.).

Common name : Harlequin Bat (Eng.).

Material examined : None from N.E. Hills but Sinha & Chakraborty (1971) examined 2♂♂ from yunnan, China ; 1♂ ; 2♀♀, 2(unsexed in alcohol) from Pashok, Sivok and Darjiling, Darjiling district, West Bengal all present in *Z. S. I. cal.*, has been mentioned here for further study of this bat from N.E.Hills.

Measurements : Given by Blanford (1891) : *HB* 3.1 inches = 78.4 mm ; *Tl.* 2.5 inches = 63.2 mm ; *E.* 0.55 inch = 13.9 mm ; *f.* 2.3 inches = 58.2 mm. Given by Thomas (1921) of Type of *S. O. imbreensis* from Khonsh-nong, Jaintia Hills : *f.* 56.0 mm ; *cb.* 18.2 mm ; *zw.* 13.5 mm ; of

S. O. ornatus from Sivok, W. Bengal : *f.* 58.0–60.0mm. reaching 63.0 mm. ; of *S. O. sinensis* *f.* 50.0–56.0, rarely reaching 60.0 mm and of type specimen *f.* 55.0 mm ; *cb.* 18.2 mm ; *zw.* 15.0 mm. Given by Sinha & Chakraborty (1971) of 1♂ 2♀♀ from Darjiling district, West Bengal : *f.* 58.5, 58.0, 64.0 ; *t.* 22.3, 20.5, 24.0 ; *ft.* 15.0, 14.0, 14.5 ; *l.* 20.5, 21.1, 21.1 ; *zw.* 16.0, 17.0, 17.0 ; *cw.* 11.0, 11.0, 11.2 ; $m^3 - m^3$ 9.5 ; 10.0 (2♀♀) ; $c' - c'$ 6.8 ; 7.0, 7.0 ; $c - m^3$ 8.0; 8.0, 8.2 ; $c - m_3$ 8.6, 9.0, 9.0 ; *ml* 16.2, 17.0 ; 17.2. Corbet & Hill (1992) gives range of variation of forearm of a long series of *S. ornatus* in British Museum Natural History : 50.5–60.9.

Distribution in N.E. Hills : Arunachal Pradesh : Mishmi Hills (Robinson, 1913) ; *Manipur* (Anderson 1881) ; *Meghalaya* : East Garo Hills district (Hinton & Lindsay 1926), East Khasi Hills district (Cherra Punji, Type-loc. of *Nycticejus ornatus* Blyth 1851), Jaintia Hills district (Thomas 1921), Nagaland : Head of Iril vallery (Kurup 1968).

Remarks : Ellerman & Morrison-Scott (1951) and Kurup (1968) have recognised two subspecies in the non-Chinese range of *Scotomanes ornatus*, viz. *S.O. imbreensis* Thomas, 1921 apparently for the Jaintia Hills population and *S. O. ornatus* (Blyth 1851) for other areas, including Khasi Hills. Das *et.al.* (1995) synonymised *S. O. imbreensis* with *S.O. ornatus* mentioning that Thomas (1921) while reviewing *Scotomanes ornatus* erroneously took Darjiling as type-locality of *S.O. ornatus* instead of Cherra Punji, Khasi Hills. Thomas (*loc. eit.*) also stated that *imbreensis* (from Jaintia Hills) was also found in “Assam Hills” and also referred specimens from the Khasi Hills and the Garo Hills to it. Further, Measurements mentioned above of both the subspecies tally very much.

Therefore, I agree with the view of Das *et. al.* (*Loc.cit*) and as per Corbet & Hill (1992) statement, there should be two subspecies of *S. ornatatus* as : (1) *S. o. sinensis* having specimens from the eastern part of range are slightly smaller (*f.* 50.0–56.0) and darker coloration and (2) *S. o. ornatus* having bigger specimens (*f.* 56.0–64.0) from more westernly locations.

Genus (23) *Scotophilus* Leach, 1821

53. *Scotophilus kuhlii kuhlii* Leach

1822. *Scotophilus kuhlii* Leach, *Trans. Linn. Soc. Lond.*, 13 : 72 (India, according to Hill & Thonglongya 1972).

Common name : Lesser yellow Bat (Eng.).

Material examined : None from N. E. Hill but for further study measurements of specimens from other places in India and Burma (=Myanmar) have been mentioned here on the basis of Sinha (1980).

Measurements : *External* : HB 63.0–66.0 ; *f.* 45.7–51 ; *E.* 12.0–15.0 ; *Tr.* 6.0–8.0 ; *ws.* 270.0–290.0 ; *t.* 18.0–20.0 ; *ft.* 9.0–11.0. *Skull* : *l.* 18.0–19.0 *zw.* 12.5–13.0 ; *cw.* 9.0–9.4 ; $c - m^3$ 6.0–6.5 ; $c - m_3$ 7.0–7.5 ; *ml.* 13.5–14.0.

Distribution in N.E. Hills : Assam : Goalpara, Kamrup and Guwahati districts (Kurup 1968) ; Meghalaya : Garo Hills (Hinton & Lindsay 1962) ; Tripura (Agrawal & Bhattacharyya 1977)

54. *Scotophilus heathi heathi* (Horsfield)

1831. *Nycticejus heathi* Horsfield, *Proc. zool Soc. Lond.* : 113 (Madras = Chennai, Madras district, Tamilnadu, India).

Common name : Greater yellow Bat (Eng.).

Material examined from N.E. Hills : Arunachal Pradesh : 1♀ (*ad.*), Daban, Tirap Dist., 8 Feb 1982, C. Radha Krishnan, E.R.S. *Assam* : 1♀ (*ad.*), Dudhnai I.B., Goalpara dist., 8 Apr 1971, R.S. Pillai ; 3♂♂ (*ad.*), Mahuripara, c. 6 km. of Gauswar, Kamrup Dist., 20 Dec 1988, Y. P. Sinha, E.R.S. 1♂ (*ad.*), Guwahati, Guwahati Dist., 1870, Indian Mus. collector, Z.S.I. *Cal. Manipur* : 2♂♂, 4♀♀ (*ad.*), Jeribam, Imphal Dist., 2 Sep 1990, Y. P. Sinha. *Nagaland* : 1♂ (*ad.*), Naltoqa village, Zunheboto Dist., 14 Jul 1991, Y.P. Sinha, E.R.S.

Measurements : External : 7♂♂ (*ad.*) : *HB.* 67.0–80.0 (74.3) ; *E.* 15.0–20.0 (16.7) ; *Tr.* 10(1 ex.) ; *Tl.* 55.0–60.0 (57.7) ; *f.* 57.0–62.0 (59.5) ; *t.* 23.0–25.0 (23.5) ; *ft.* 13.0–15.0 (14.0) ; *ws.* 300.0–360.0 (377.0) ; *ww.* 73.0 (1 ex.). 6♀♀ (*ad.*) : *HB.* 74.0–76.0 (74.8) ; *E.* 15.0–17.0 (16.4) ; *Tl.* 48.0–62.0 (54.0) ; *f.* 59.0–62.5 (60.9) ; *t.* 23.0–25.0 (24.0) ; *ft.* 11.5–15.0 (13.1) ; *ws.* 320.0–350.0 (328.0) ; *ww.* 70.0 (1 ex.). *Skull* : 5♂♂ (*ad.*) : *l.* 21.5–22.3 (22.1) ; *zw.* 15.7–17.0 (16.3) ; *cw.* 11.0–11.6 (11.2) ; *m¹–m²* 10.0–11.0 (10.4) ; *c – m¹* 8.0 (in all) ; *c – m₂* 9.0–9.6 (9.2.) ; *ml.* 15.6–17.0 (16.1). 3♀♀ (*ad.*) : *l.* 21.0–22.3 (22.1) ; *zw.* 15.5–16.4 (16.0) ; *cw.* 11.2–11.5 (11.3) ; *m¹ – m²* 10.0–10.5 (10.2) ; *c – m¹* 8.0–8.3 (8.1) ; *c – m₂* 9.0–9.3 (9.1) ; *ml.* 15.4–17.2 (16.2).

Ditribution : *Arunachal Pradesh* : Dibang Valley district (Chakraborty & Sen 1991), Tirap District (present material) ; *Assam* : Goalpara district, Guwahati district, Kamrup district ; *Manipur* : Imphal district ; *Nagaland* : Zunheboto district.

Remark : In Gauswar, Kamrup district, Assam, this species was collected from a hollow in the stem of a betal nut tree (*Araca* sp.). The size of the colony was 10 exs. Only three males were collected with the help of butterfly net. In Jiribam, Imphal district, manipur, this bat was collected from gaps between two wood-logs of a ceiling of a wooden watch-tower with the help of mist-nets. The size of colony was c. 25 exs. Both sexes were obtained from this colony. In Naltoqa village, Zunheboto district, Nagaland, this bat was found entangled in the upper tier of mist-net in the morning, about 3 metres above the ground along with the *Rousettus l. leschenaulti*. The mist-net was set in the fruit garden containing plantains. coconut, betal-nut, mango etc.

One female collected on 8th April, 1971 from Goalpara district of Assam was pregnant having an embryo in the Rt. horn of uterus (size of foetus : 22 mm.).

Genus (24) *Plecotus* E. Geoffroy 181555. *Plecotus auritus homochrous* Hodgson

1874. *Plecotus homochrous* Hodgson, *J. Asiat. Soc. Beng.*, 16 : 895 (Central region of sub-Himalayas = Darjiling, Darjiling district, West Bengal, India).

1907. *Plecotus puck* Barret-Hamilton, *Ann. Mag. nat. Hist.* 20 : 521 (Murree, c. 2150 m, Pakistan).

Common name : Long-eared Bat (Eng.).

Material examined : None from N. E. Hills but to complete data 4♂♂ from yumthang, N. Sikkim, Coll. S. M. Ali, 26 Aug 1978 and 1♂, coll. R.K. Ghose, 1 May 1980, *Z. S. I. Cal.* 1♀ from Darjiling district (skull damaged). coll. W. S. sherwill, 1853, *Z.S.I.Cal.* were examined.

Measurements : *External* : 1♂ : *HB.* 44.00 ; *Tl.* 55.0 ; *E.* 35.0 ; *Tr.* 16.0 *f.* 42.0 ; *t.* 20.0 ; *ft.* 10.0 ; *ws.* 220.0 ; *ww.* 55.0. 5♀♀ : *HB.* 35.2–42.0 (39.0) ; *Tl.* 46.0–50.0 (48.0) ; *E.* 31.0–37.0 (34.0) ; *Tr.* 14.0–18.0 (15.6) ; *f.* 38.4–44.0 (42.6) ; *t.* 19.0–21.0 (20.2) ; *ft.* 8.0–10.3 (9.3). *Skull* : 4♀♀ : *l.* 16.9–17.4 (17.1) ; *zw.* 8.6–8.9 (8.7) ; *cw.* 7.6–8.1 (7.8) ; *m³ – m³* 5.9–6.1 (6.0) ; *c – m³* 5.5–5.8 (5.6) ; *c – m₃* 5.7–6.1 (5.9) ; *ml.* 10.6–11.0 (10.8).

Distribution in N. E. Hills : Meghalaya ; Khasi Hills (Dobson 1876).

Remarks : Comparative study of external body parts and skull measurements and other characters of *Plecotus auritus homochrous* (examined by author), *P. a. puck* Barrett-Hamilton (examined by Chakraborty 1983) and *P.a. wardi* Thomas (examined by Chakraborty 1983) :

Characters	<i>P. a. homochrous</i>	<i>P. a. Puck</i>	<i>P. a. wardi</i>
Forearm length	38.4–44.0	38.0–42.0	43.0–46.0
Ear length	31.0–37.0	36.0–40.0	35.0–37.7
Tragus. length	14.0–18.0	15.0–17.0	15.6–17.1
Tibia length	19.0–21.0	19.0–22.0	20.7–22.3
Skull length	16.9–17.4	16.5–17.0	17.2–17.8
Cranial width	7.6–8.1	8.2–8.7	8.8–9.4
Maxillary tooth row	5.5–5.8	5.6–6.0	5.7–6.0
Mandibular length	10.6–11.0	–	11.1–11.8
Colour of fur :	Dorsum greyish ; ventrum dirty white	Dorsum Isabella Broccoli brown ; Ventrums whitish	Dorsum Pale ; Ventrums greyish white.

Analysis of above data show that there is no any major differences in size and shape of body and skull of *P. a. homochrous* and *P. a. puck* except slightly variation in colour of fur which may be individual variation (specimens examined are in spirit). On the other side *P. a. wardi* Thomas is clearly larger in size and shape of body and skull than the former two subspecies. Hence, I agree with Corbet (1978) and others who have considered *P. a. puck* as a synonym of *P. a. homochrous*.

SUBFAMILY 2. MINIOPTERINAE

Genus (25) *Miniopterus* Bonaparte, 1837.56. *Miniopterus schreibersi fuliginosus* (Hodgson)1835. *Vespertilio fuliginosa* Hodgson, *J. Asiat. Soc. Beng.*, 4 : 700 (Nepal).

Common name : Schreiber's Long-fingered Bat or Long-winged Bat or Bent-winged Bat (Eng.).

Material examined : Meghalaya : 33♂♂, 23♀♀, Siju Cave, South Garo Hills district ; 26-30 Jun 1991, 23-26 Oct 1991, 17 Feb 1992, 3 June 1992 and 7-9 Aug 1992 ; Y. P. Sinha ; *E.R.S.*

Measurements (taken from Sinha, 1994) : *External* : *HB.* 50.0-62.0 ; *Tl.* 55.0-67.0 ; *f.* 47.0-53.0 ; *fpt.* 10.8-13.5 ; *spt.* 35.0-43.0 ; *E.* 11.0-14.0 ; *Tr.* 5.0-7.0 ; *t.* 20.0-23.0 ; *ft.* 10.0-12.0 ; *ws.* 300.0-350.0 ; *ww.* 52.0-61.0. *Skull* : *l.* 16.3-17.7 ; *zw.* 9.4-10.0 ; *cw.* 8.0-9.0 ; $m^3 - m^3$ 7.3-8.5 ; $c - m^3$ 6.9-7.0 ; $c - m^3$ 7.0-7.6 ; *ml.* 12.1-13.5 ; *hbc.* 9.0-10.5 ; *hm.* 5.0-6.2.

Distribution N.E. Hills : Recently recorded only from Siju Cave, South Garo Hills district, Meghalaya (Sinha 1994).

Remarks : See Sinha (1994).

Subfamily 3. MURINAE

Genus (26) *Murina* Gray, 184257. *Murina huttoni huttoni* (peters)

1872. *Harpyiocephalus huttoni* Peters, *Mber. pressus. Acad. Wiss. Berl.* : 257 ; *Proc. zool. Soc. Lond.* : 711 (Jeripanee, below Mussoorie, Dehra Dun district, Uttar Pradesh, India).

Common name : Peters Tube-nosed Bat (Eng.).

Material examined : Meghalaya : 1♀ (*ad.*), Risa Colony, Shillong, E. Khasi Hills Dist., 15 Jul. 1989, Y.P. Sinha, *E.R.S.*

Measurements : *External* : 1♀ : *HB.* 41.0 ; *Tl.* 33.0 ; *E.* 14.0 ; *Tr.* 7.0 ; *f.* 33.0 *t.* 15.0 ; *ft.* 8.0 ; *ws.* 220.0. *Skull* : 1♀ : *l.* 16.0 ; *zw.* 9.2 ; *cw.* 7.2 ; *mw.* 8.0 ; $c^1 - c^1$ 4.0 ; $m^3 - m^3$ 6.0 ; $c - m^3$ 5.5 ; $c - m$, 6.0 ; *ml.* 11.0.

Distribution in N. E. Hills : Assam (Kurup 1968) ; Meghalaya : East Khasi Hills district (present material).

Remarks : The above material (may not be fully adult) has been collected and identified by me as *Murina huttoni huttoni* (Peters) on the basis of characters mentioned by Hill (1962 ; 1964) and Corbet & Hills (1992).

Comparative measurements of my specimen given in parentheses and the specimens studied by Hills present in British Museum : *f.* (33.0), 33.2-35.2 ; *l.* (16.0) 16.9-17.7 ; *zw.* (9.2) 9.4-9.8 ; *cw.* (7.2) 7.5-7.9 ; $c^1 - c^1$. (4.0) 4.2-4.6 ; $m^3 - m^3$ (6.0) 5.7-6.0 ; $c - m^3$ (5.5) 5.8-5.9 ; *mw* (8.0) 7.9-8.4.

Besides measurements the above specimen has very much similar characters as given by Hill (1964) : Ears long, broad and bluntly pointed without emarginated posterior margin ; presence of small lobe at the base of anterior margin ; tragus spear-shaped ; outer wing memberane start from base of claw ; nostril elongate and tubular. Skull large and elongate ; last upper molar normal, not reduced in the form of remnant ; canine normal much higher than anterior premolar.

$$\text{Dental formula : } \frac{i2, c1, pm2, m3}{i3, c1, pm2, m3} = 34.$$

Habitat : Two specimens of this species were present in the basal hollow part of leaves of a plantain tree. when the tree was cut, both specimens flew in which one was caught with the help of a towel while the other flew away.

58. *Murina tubinaris* (Scully)

1881. *Harpiocephalus tubinaris* Scully, *Proc. zool. Soc. Lond.* : 200, fig 1.(Gilgit district, Jammu & Kashmir, India).

Common name : Scully's Tube-nosed Bat (Eng.).

Material examined : None from N.E. Hills but for comparative study measurements taken from Hill (1964) and Corbet & Hill (1992).

Measurements : *f.* 28.5–33.0 ; *l.* 15.0–15.7 ; $m^3 - m^3$ 5.0–5.3 ; $c - m^3$ 4.7–5.3 ; *mw.* 7.1–7.5.

Distribution in N.E. Hills : *Arunachal Pradesh* : Dening, Mishmi Hills (Hinton & Lindsay 1926) ; *Meghalaya* : Jaintia Hills district (Hinton & Lindsay 1926).

Remarks : Ellerman & Morrison-Scott (1951) listed this species as a tentative subspecies of *M. huttoni*. But the above measurements show that this species can be easily separated from *M. huttoni* by smaller size of body (*f.* 28.5–33.5 Vs. 33.0–35.2) and skull (*l.* 15.0–15.7 vs. 16.0–17.7) ; broader muzzle $m^3 - m^3$ 5.0–5.3 vs. 5.7–6.0 ; *mw.* 7.1–7.5 vs. 7.9–8.4). Further it differs from *huttoni* and *cyclotis* in the presence of slight emargination in the posterior margin of the ear which is absent in the latter two species. Hence, the present author is agree with Hill (1964) who has mentioned that *tubinaris* should be treated as a distinct species from *huttoni*.

59. *Murina cyclotis cyclotis* Dobson

1872. *Murina cyclotis* Dobson, *Proc. Asiat. Soc. Beng.* : 210 (Darjiling, Darjiling district, West Bengal, India).

Common name : round-eared Tube-nosed Bat (Eng.).

Material examined : None from N.E. Hills but for comparative study measurements of this species taken from Hill (1964).

Measurements : *f.* 31.5–34.8 (33.4) ; *l.* 16.4–17.0 (16.7) ; $m^3 - m^3$ 5.2–5.9 (5.5) ; *zw.* 9.0–10.2 (9.6) ; *cw* 7.4–7.8 (7.5) ; *hbc.* 5.9–6.4 (6.2) ; *mw.* 7.9–8.3 (8.1) ; $c' - m'$ 4.1–4.6 (4.2) ; $c - m^3$ 5.0–5.7 (5.4).

Distribution in N. E. Hills : Meghalaya : Konshnong, Jaintia Hills district (Hinton & Lindsay 1926).

Remarks : On the basis of measurements, it is very difficult to separate *M. cyclotis* with *M. huttoni* but it can be differentiated on the basis of ear which is anteriorly round in *M. cyclotis* while bluntly pointed in *M. huttoni*. Both have small lobe at anterior margin of ear and posterior margin without emargination while posterior margin is emarginated in *M. tubinaris*. Cranially *M. cyclotis* differs from *M. huttoni*, in having narial and anterior palatal emargination rather narrower which is slightly broader in *M. huttoni*. The mesostyles of the first and second upper premolars less developed in *M. cyclotis* than *M. huttoni*.

Genus (27) *Harpiocephalus* Gray, 1842

60. *Harpiocephalus mordax* Thomas

1923. *Harpiocephalus mordax* Thomas, *J. Bombay nat. Hist. Soc.* 29 : 88 (Mogok, northern Myanmar = upper Burma).

Common name : Broad-skulled Hairy-winged Bat (Eng.).

Material examined : *Meghalaya* : 1♀, cherra Punji, E. Khasi Hills district, 1868 H.H. Godwin-Austen, present in *Z. S. I. Cal.*

Measurements : External : 1♀ : *f.* 50.3 ; *E.* 18.0 ; *Tr.* 10.8 ; *t.* 21.9 ; *ft.* 10.1. *Skull* : 1♀ 22.9 ; *zw.* 14.5 ; *cw.* 10.7 ; $m^3 - m^3$ 7.9 ; $c - m^3$ 7.3 ; $c - m_3$ 8.4 ; 15.3.

Comparative measurements of *H. harpia* and *H. mordax* mention by Corbet & Hill (1992).

Range	India	<i>H. harpia</i> Moluccas	<i>H. Mordax</i> NE India-Borneo
Zygomatic width :		12.1 – 13.9	14.3 – 14.9
Width across supraorbital tubercles :		7.0 – 7.8	7.9 – 8.3
Width across anteorbital foramina :		5.8 – 6.5	6.8 – 7.3
$c' - c'$ (external) :		5.8 – 6.8	6.9 – 7.5
Incisor and canine teeth massive :		0	+

Distribution in N. E. Hills : Meghalaya : East Khasi Hills district (Dobson 1876, as *H. harpia* ; Das 1986a, as *H. harpia lasyurus* and Das *et. al.* 1995, as *H. mordax*) ; *Mizoram* : Lunglei district (Mandal *et.al.* in press).

Remarks : Ellerman & Morrison-Scott (1951) considered *mordax* a possible subspecies of *H. harpia* but Hill & Francis (1984) have regarded it as a valid species. The measurements given by Das (1986a, b.) and Corbet & Hill (1992) show that *mordax* has wider zygomata, rostra and massive incisors and canine than the *harpia* and hence the above specimen from Meghalaya has been identified as *H. mordax*.

Subfamily 4. KERIVOULINAE

Genus (28) *Kerivoula* Gray, 184261. *Kerivoula picta picta* Pallas1767. *Vespertilio picta* Pallas, *Spicil. Zool.*, 3:7 (Ternate Island, Molucca Islands, Indonesia).*Common name* : Painted Bat (Eng.).*Material examined* (By Chaturvedi 1969) : Assam : 1♀, Hapjan Tea Estate, Lakhimpur, Lakhimpur district, 12 Oct. 1960, coll. Peter styen, *Z. S. I. Cal. Reg. No.* 14454.*Measurements* taken from Chaturvedi (1969) : *External* : 1♀ : *HB.* 34.0 ; *E.* 11.7 ; *Tl.* 33.0 ; *f.* 34.5 ; *ft.* 6.2. *Skull* : 1♀ : *l.* 15.0 ; *c' - c'* 2.5 ; *iow.* 3.5 ; *cw.* 7.3 ; *m³ - m³* 4.0 ; *ml.* 11.4.*Distribution in N. E. Hills* : Assam : Lakhimpur district (Chaturvedi 1969).62. *Kerivoula hardwickii* (Horsfield)1824. *Vespertilio Hardwickii* Horsfield, *Zool. Res. Java* (unpaginated) (Java).*Common name* : Hardwicke's Bat (Eng.).*Material examined from N. E. Hills* : Meghalaya : 1♀, Siju Cave, S. Garo Hills District, 18 Feb. 1982, A. S. Rajagopal, *E. R. S.* ; 10♂♂, 5♀♀, Kekrima (= Chekrimi, c. 1,635 m.), c. 16 km. from Kohima, Kohima district, 17 Feb. 1935, *Z. S. I. Cal.* ; Assam : 1♂, 1♀ : Sibsagar, Sibsagar district, 1872, S. E. Peal, *Z. S. I. Cal.**Measurements* : *External* : Meghalaya : 1♀ : *E.* 13.0 ; *f.* 34.5 ; *t.* 16.7 ; *ft.* 7.4 ; *ws.* 210.0 ; *ww.* 54.0. Assam : 1♂, 1♀ : *f.* 30.0, 31.0 ; *t.* 15.0, 15.0 ; *ft.* 7.0, 8.0 ; *ws.* -, 180. Nagaland : 10♂♂ : *f.* 32.0-34.0 (33.0) ; *t.* 15.0-17.0 (16.1) ; *ft.* 7.0-9.0 (8.0) ; *ws.* 200.0-230.0 (210.0). 5♀♀ : *f.* 31.0-34.0 (32.6) ; *t.* 15.0-16.0 (15.8) ; *ft.* 7.0-8.0 (7.8). *Skull* : Meghalaya : 1♀ : *l.* 14.0 ; *zw.* 8.7 ; *cw.* 6.9 ; *db.* 5.5 ; *m³ - m³* 5.4 ; *c - m³* 5.6 ; *c - m₃* 5.9 ; *ml.* 9.9. Assam : 1♂, 1♀ : *l.* 13.1, 13.2 ; *cw.* 7.1, 7.0 ; *m³ - m³* 5.1, 5.2 ; *c - m³* 5.1, 5.3 ; *c - m₃* 5.9, 6.1 ; *ml.* 9.1, 9.3. Nagaland : 5♂♂ : *l.* 13.5-14.0 (13.7) ; *zw.* 8.1-8.4 (8.3) ; *cw.* 7.1-7.4 (7.2) ; *m³ - m³* 5.2-5.5 (5.3) ; *c - m³* 5.0-5.6 (5.3) ; *c - m₃* 5.7-6.0 (5.9) ; *ml.* 9.4-10.0 (9.8). 5♀♀ : *l.* 13.7-14.1 (13.9) ; *zw.* 8.4-8.8 (8.6) ; *cw.* 7.0-7.3 (7.1) ; *m³ - m³* 5.0-5.7 (5.3) ; *c - m³* 5.2-5.7 (5.4) ; *c - m₃* 5.8-6.0 (5.9) ; *ml.* 10.0-10.2 (10.1).*Distribution in N. E. Hills* : Assam : Sibsagar district ; Meghalaya : South Garo Hills district, East Khasi Hills district (Dobson 1876). Jaintia Hills district ; (Hinton & Lindsay 1926) ; Nagaland : Kohima district (Khajuria 1953 and above material).*Remarks* : Although Ellerman & Morrison-Scott (1951) recognised three subspecies viz. *K. h. hardwickei* (Horsfield), *K. h. depressa* Miller and *K. h. crypta* Wroughton & Ryley from India but according to Corbet & Hill (1992) there is no consistent variation in size in specimens from western part of the range from India to Vietnam. I also examined three Indian subspecies and found no significant differences. Hence I agree with Corbet & Hill (1992) who have

synonymised *K. depressa* Millar and *K. crypta* Wroughton with the nominate species *K. hardwickii* (Horsfield).

SUMMARY

A total of 62 species and subspecies of bats classified under 7 families and 28 genera are reported from seven sister state of N. E. Hills, India. Of these, 45 species and subspecies are recorded on the basis of materials available in the National Zoological collections of Eastern Regional Station, Shillong and Zoological Survey of India, Calcutta and the rest are recorded from literature. 21 species and subspecies, namely *Pteropus g. giganteus*, *Rousettus l. leschenaulti*, *Cynopterus s. sphinx*, *C. brachyotis*, *Sphaerias blanfordi*, *Megaerops niphanae*, *Eonycteris spelaea*, *Macroglossus s. sobrinus*, *Megaderma l. lyra*, *Taphozous l. longimamus*, *Hipposideros lankadiva*, *Myotis longipes*, *Pipistrellus dormeri*, *P. circumdatus*, *P. abramus*, *P. mimus*, *P. c. coramandra*, *Tylonycteris pachypus fulvida*, *Scotophilus h. heathi*, *Miniopterus schreibersi fuliginosus* and *Murina huttoni* are reported recently from different places in N. E. Hills.

Measurements, common name in english, distribution and taxonomical and ecological remarks have been added under most of species and subspecies. Further, Keys are provided to subfamilies, genera and species of bats of N. E. Hills, India for easy identification.

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