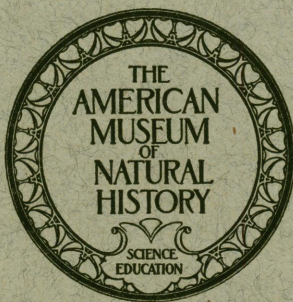


RESULTS OF THE ARCHBOLD
EXPEDITIONS. No. 48

PTEROPODIDAE (CHIROPTERA) OF THE
ARCHBOLD COLLECTIONS

BY G. H. H. TATE

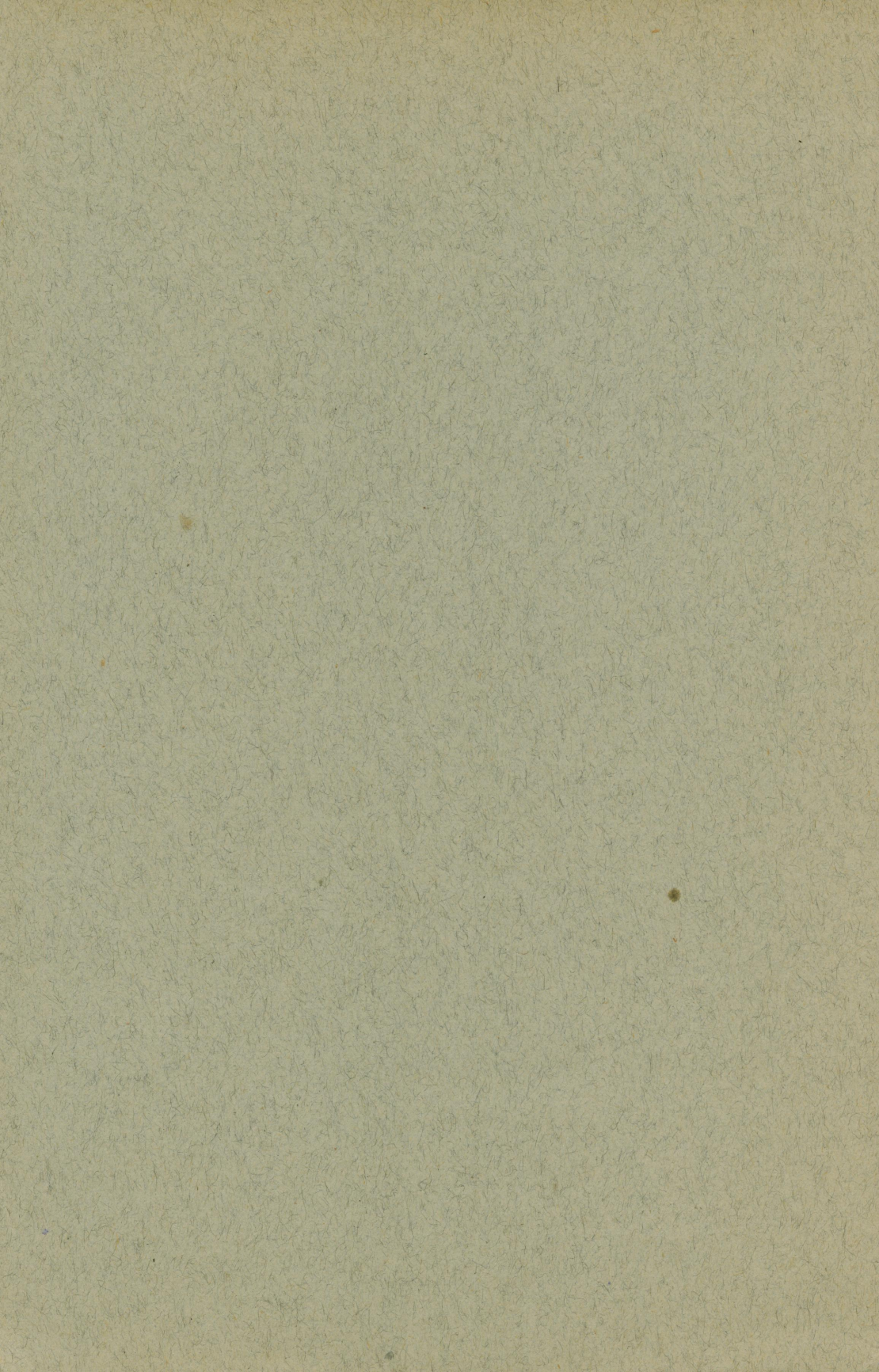


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Article IX.—RESULTS OF THE ARCHBOLD EXPEDITIONS. NO. 48

PTEROPODIDAE (CHIROPTERA) OF THE ARCHBOLD COLLECTIONS

By G. H. H. TATE

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INTRODUCTION

The family Pteropodidae is represented in the collection of Mr. Richard Archbold by approximately 900 specimens, including ten of the twenty-four genera shown by Andersen (1912) to inhabit the oriental region. This partial representation is due to the fact that the material originates from Sumatra, Java, Bali, Borneo, Celebes, New Guinea and Australia only. The collection is nevertheless a substantial one, in many cases providing good series of species hitherto known to science by one or two specimens. Many were previously unrepresented in the collections of The American Museum of Natural History.

Three of the expeditions (to New Guinea), which contributed to the large collection of Indo-Australian mammals now housed at this museum, operated under the personal leadership of Mr. Archbold. The other undertakings were performed by collectors employed by him. The use of airplanes permitted the Archbold Expeditions to penetrate to areas in central New

Guinea not hitherto known to zoologists. It is to be hoped that when the existing world disturbance has ended Mr. Archbold may renew the field research which he has already pushed so far toward its conclusion.

In spite of the wealth of fruit bat material, study has revealed only one new genus and species, *Paranyctimene raptor* (Tate, 1942).

For the sake of convenience the taxonomic system set up by Andersen (1912) has been followed. Andersen's monograph represents the most up to date treatment (in extensive form) of the Pteropodidae. Before him, Miller (1907), Matschie (1899), Dobson (1878), Peters (1867) and Gray (1866) had proposed various classifications. Since the publication of Andersen's work, only partial modifications of individual genera have appeared, Andersen and Kloss (1915) on *Cynopterus*, Dietz (1916) on *Rousettus* and *Dobsonia*. Numerous additional forms have, however, been proposed.

NOTES ON INTERRELATIONSHIPS OF PTEROPODID GENERA

The criteria for determining natural affinities of the Megachiroptera are as complex and contradictory as in the Microchiroptera. Many depend upon disappearing structures: the claw of d2 of the wing, certain of the teeth, the tail. Others represent adaptive changes not necessarily leading to the obsolescence of organs, for example, the degree of bending

of the skull, whereby the facial axis may form an angle with the basicranial axis; or again the two distinct types of premaxillae accompanying long or short nasals and the correspondingly modified anterior portion of the palate. A third example is seen in the modification of the symphyisial region in the Macroglossinae, accompanied by adaptations of adjoining lower incisors,

canines and the anterior premolar, probably in relation to the extrusive function of the tongue.

A combination of shortening of the bones of the face with reduction in the size and number of teeth has led to the short-faced fruit bats, which include *Penthetor*, *Nyctimene*, *Dobsonia* and *Cynonycteris*.

It is found that the genera of short-faced bats are usually those which show little or no bending of the skull and in which intersection of the facial and basicranial axes forms an angle of minimum extent. The long-faced genera, on the contrary, have the skulls more arched and the said angle of intersection more appreciable.

Intermediate states appear. In *Epomophorus*, the rostrum is elongate and the skull unarched; in *Myonycteris* and *Epomops* the rostrum becomes shortened and the skull weakly arched.

To this combination of short face plus unarched skull can be added the third character, premaxilla narrowed above. Bats combining these three characteristics are *Cynopterus*, *Micropterus*, *Dobsonia*, *Nyctimene*, *Penthetor*, *Cynonycteris*, *Megaerops* and the otherwise much aberrant *Scotonycteris* and *Casinonycteris*. Two short-faced genera with incipiently arched skulls, *Myonycteris* and *Epomops*, have similarly formed premaxillae and may be included. No genus of this group of genera is provided with extrusible tongue or with the accompanying symphyseal modifications.

Pronounced reduction in dentition is to be noted in the *Cynopterus* group, notably in the incisors, anterior premolars and posterior molars, though the remaining teeth, canines, posterior premolars and anterior molars remain large and strongly functional. Loss of incisors has been accompanied by progressive approximation of the canines. A series illustrating this phenomenon passes from *Cynopterus* through *Penthetor* and *Dobsonia* to *Nyctimene*, in which last genus the lower incisors are absent and the lower canines are in contact.

Those genera, in which the rostrum is unshortened, the skull is usually arched, and

the premaxillae, more or less proclivous, are unnarrowed above, include both macroglossine bats with protrusible tongues and modified symphyses and pteropine bats with tongues non-extensible and symphyses not especially modified. The unnarrowed premaxillae in all cases tend to be thrust between the anterior part of the maxillae and the nasals, permitting projection of the tips of the nasals over and beyond the superior part of the premaxillae. Even in the aberrant *Hypsignathus* this condition can be observed in young skulls.

The genera with scarcely extensile tongues include *Rousettus*, *Pteropus*, *Epomophorus*, *Hypsignathus*, *Styloctenium*, *Boneia* and *Eidolon*. The most primitive of these seems to be *Rousettus*, in which the skull is moderately arched; m^2 and m_3 only slightly reduced, being more than half as long (in the tooththrow) as the molar immediately preceding each; upper incisors not enlarged, aggregated at the tips of proclivous premaxillae and remote from canines; lower incisors evenly distributed around the symphyseal arch between the canines. *Epomophorus* is only slightly more progressive. In it the skull is unarched, but m^2 and m_3 are absent, while m_2 is reduced in size. The upper incisors are small and crowded and separated from the upper canines by occlusion of the lower canines; p^{1*} is obsolete.

In *Eidolon*, *Pteropus* (*sensu lato*), *Styloctenium* and *Boneia* close contact is no longer maintained between the dental shelf of the premaxilla and the anterior portion of the palate. In *Rousettus*, *Epomophorus* and *Hypsignathus* a smooth and continuous surface is maintained from the anterior palate to the alveoli of the premaxillae. In the *Pteropus* bats and nearest allies that continuity is broken, and contact between premaxilla and maxilla is made only above the palatal level, anterior to the canine. In *Eidolon* contact between left and right premaxillae is interrupted. In *Pteropus* (at least in certain groups) the incisors are secondarily enlarged. In *Boneia* one pair of upper incisors becomes

* I use Andersen's terminology for the premolars, p^1 , p^2 , p^3 .

obsolete. In *Styloctenium* m_3 and one pair of lower incisors are lost.

Pteropus may develop a postorbital process on the jugal, probably a secondary specialization called forth by the functioning of the ligamentous tissue which connects it and the long postorbital process of the frontal.

The greatly specialized *Hypsignathus*, generally regarded as a branch of *Epomophorus*, possesses, besides the raised inflated rostrum and greatly broadened interorbital region, a singularly shortened braincase, a strong sagittal crest terminating abruptly some 6 mm. in front of the lambdoid crests, minute upper incisors widely separated from each other, a broad flat symphysis and lower incisors much reduced and widely separated. Its dental formula equals that of *Epomophorus*.

Last come the macroglossine bats, those with greatly protrusible tongues. All have long-faced, well-arched skulls, with premaxillae narrowed above, and the coronoid process of the mandible unusually low and weak. In every genus the symphyseal portion of the mandible is significantly modified by means of a projection reaching well beyond the canines which contains a cup-shaped depression serving, possibly, for the attachment of the greatly developed genioglossus muscles whose contraction causes the tongue to protrude. A significant accompaniment of this peculiarity is seen in the adjoining teeth, the lower canines, incisors and anterior premolar (p_1). The lower canines and p_{1-1} are widely divergent; p_1 may be large and double-rooted, as in the case of *Notopteris*. The

incisors show various grades of obsolescence beginning at the center. In *Eonycteris* i_1 is as large as i_2 but placed below the alveolar line of i_{2-2} ; in *Macroglossus* i_1 is only one-half the size (diameter) of i_2 ; in *Nesonycteris* and *Notopteris* i_1 is obsolete, and i_2 is reduced to a tiny cusplule standing in front of the canine.

This progressive reduction of the lower incisors may be correlated with progressive increase in function of the tongue. It is usually accompanied by reduction of the upper incisors as follows: In *Eonycteris*, upper incisors minute in size and widely separated, i^1 very slightly smaller than i^2 ; *Macroglossus*, i^1 and i^2 subequal, proodont, little reduced (although the lower incisors are more specialized, the upper ones are less so than in *Eonycteris*); *Nesonycteris* and *Notopteris*, both with i^1 obsolete, i^2 reduced, peg-like, and placed back on the outer margin of the premaxilla. In *Syconycteris*, on the other hand, the upper incisors are unreduced, or even enlarged.

Notopteris, as can be noted from the foregoing discussion, has unquestionably the skull of a macroglossine, yet it retains an elongate free tail, being the only megachiropteran to do so. On the other hand the claw of d_2 of the wing in *Notopteris* is absent.

I have not seen specimens of *Harpionycteris*. The multicuspid molars and peculiar upper incisors testify to its aberrant status. Anderson (1912, p. 803) regarded it as nearest to *Dobsonia* but followed Miller in giving it subfamily rank.

SYSTEMATIC ARRANGEMENT

Dobson (1878), treating the Megachiroptera, divided the single family "Pteropodidae" into two main groups, the Pteropi and the Macroglossi. The first was characterized by "tongue moderate; molars well developed"; the second by "tongue very long, muzzle narrow, elongated; molars very narrow, scarcely raised above the gum."

Matschie (1899), after preparing an artificial key, dealt with twenty genera,

beginning with *Pteropus*, *Styloctenium*, *Epomophorus*, *Rousettus* and *Boneia*. Next came *Harpionycteris*, then *Scotonycteris*, followed by the short-faced bats *Cynopterus*, *Ptenochirus*, *Balionycteris*, *Gelasinus* (= *Nyctimene*), *Leiponyx* and *Cephalotes* (= *Dobsonia*) and finally the macroglossine bats, *Notopteris* and *Eonycteris* to *Megaloglossus*.

When Miller (1907) dealt with this large assemblage of genera, he increased the

number of main divisions of the Pteropodidae to four by raising *Nyctimene* and *Harpionycteris*, formerly members of Dobson's Pteropi (under other names), to subfamily rank.

Andersen (1912), attacking the problem, combined in part the systems of Dobson and of Miller. Shorn of generic subgroups, his keys show adoption of the following arrangement:

Pteropodidae

Pteropodinae

Rousettus section (including *Pteropus* and *Dobsonia*)

Epomophorus section

Cynonycteris section (including *Nyctimene*)

Macroglossinae

Eonycteris section

Notopteris section

Harpionycterinae ("near *Dobsonia*" Andersen, p. 803)

Pteropodinae

ROUSETTUS SECTION

ROUSETTUS GRAY

Rousettus GRAY, 1821, London Med. Repository, XV, p. 299.

Cynonycteris PETERS, 1852, Reise Mozamb., Zool., I, p. 25.

GENOTYPES.—(*Rousettus*), *P(teropus) aegyptiacus* Geoffroy, from Egypt; (*Cynonycteris*), *Pteropus collaris* Illiger.

The bats of this genus which inhabit the oriental regions appear separable into two main groups:

Larger forms with forearm 75–90 mm., *leschenaulti*, *shortridgei*, *stresemanni*.

Smaller forms with forearm 68–80 mm., *amplexicaudatus* with its races *minor*, *celebensis* and *brachyotis*.

In the former group the toothrow, canine to m^2 , measures 17 mm. \pm , in the latter 12 mm. *R. seminudus* from Ceylon, which I have not seen, appears to occupy an intermediate position.

In specimens from northwest Borneo, the molar teeth are substantially wider than are the teeth of our *amplexicaudatus* from Java and Bali (*R. a. minor*). Widths of m^1 in these forms may be expressed 1.8: 1.3–5 mm.

Under the generic term *Cynonycteris*, Peters (1873) attempted to show the differences between *leschenaulti* and *amplexicaudatus*. His conclusions were based upon "original examples" of those two species, lent to him by Milne-Edwards of the Paris Museum. In each type (or co-type?) the forearm length equaled 77 mm.

In Andersen's key (1912, p. 25) *leschenaulti* and *seminudus* are distinguished from the bats of the smaller *amplexicaudatus* group by the elliptical instead of sub-

circular crown outline of m_3 . The large Javanese *shortridgei* agrees with *leschenaulti* in this particular, but *stresemanni*, of whose type skull I have a photograph, has m_3 more nearly like that of *amplexicaudatus* in form, although in size the skull agrees well with *leschenaulti*. It may be noted incidentally that Klein compared *stresemanni* not with *leschenaulti* and *shortridgei* but with *amplexicaudatus* and with geographically remote Cingalese and African species. We may then regard *stresemanni* as annectant between the *leschenaulti* and *amplexicaudatus* groups. *Celebensis*, of which I have only Andersen's description, appears to be a member of the *amplexicaudatus* group with narrower molars.

Andersen recognized eleven species of *Rousettus*, two of them constituting the types of the African subgenera *Stenonycteris* and *Lissonycteris*. The remaining nine species were referred to *Rousettus*, subgenus. Two of those were African, seven Asiatic.

Since 1913 but one new Asiatic form has been added, *stresemanni* from Japan Island, New Guinea.

We may then list the oriental *Rousettus* as follows:

FORM	TYPE REGION
<i>R. leschenaulti</i> group	
<i>R. seminudus</i> Kelaart	Ceylon
<i>R. leschenaulti</i> Desmarest	Pondicherry, India
<i>R. l. shortridgei</i> Thomas and Wroughton	Java
<i>R. stresemanni</i> Stein	Japen Island, New Guinea
<i>R. celebensis</i> Andersen	Mt. Masarang, Celebes

FORM	TYPE REGION
<i>R. amplexicaudatus</i> group	
<i>R. amplexicaudatus</i>	Timor
Geoffroy	
<i>R. a. minor</i> Dobson	Java
<i>R. a. brachyotis</i> Dobson	Duke of York Island, New Guinea Region

Rousettus leschenaulti shortridgei

Thomas and Wroughton

Rousettus shortridgei THOMAS AND WROUGHTON, 1909, Proc. Zool. Soc. London, pp. 19, 374.

TYPE LOCALITY.—Kalipoetjang, Tji-Tandoei River, south Java.

This Javanese form appears to differ from the Indian *leschenaulti* only by its greater size. It has the same type of m³ as *leschenaulti*, thus differing from *stresemanni*, the third member of the group.

R. l. shortridgei is represented in the Archbold Collections by a series of twelve specimens from Cheribon, Java, and seventeen from Bali.

Rousettus amplexicaudatus (Geoffroy)

Pteropus amplexicaudatus E. GEOFFROY, 1810, Ann. Mus. Hist. Nat., Paris, XV, p. 96.

TYPE LOCALITY.—Timor.

This form was held by Andersen to extend from Timor to Cambodia and the Philippines.

A series of eleven specimens from Peleng Island, east of Celebes. A second series of five, taken at Perboewa, northwest Borneo, no doubt corresponds closely to the two males listed by Andersen (1912, p. 43) from Baram, Sarawak.

Rousettus amplexicaudatus minor (Dobson)

Cynonycteris minor DOBSON, 1873, J. Asiatic Soc. Bengal, XLII, p. 203.

TYPE REGION.—Java.

The series in the Archbold Collection from Oboed, Selat and Noesa Penida in Bali are held to represent *minor*, of which we have no topotypical specimens.

The characters employed by Dobson to distinguish *minor* from *amplexicaudatus* (p¹ wedged between c and p³, the lack of hairs on the backs of the tibiae) seem not to be valid.

Andersen's detailed description (1912, pp. 811–812) was based upon a series collected in Java by Shortridge. Pre-

viously he had seen only Dobson's type. He concluded that the three forms *amplexicaudatus*, *minor* and *brachyotis* were "so intimately interrelated as to be distinguishable only by average characters."

Rousettus amplexicaudatus brachyotis (Dobson)

Cynonycteris brachyotis DOBSON, 1877, Proc. Zool. Soc. London, p. 116.

TYPE LOCALITY.—Duke of York Island, between New Britain and New Ireland.

Our collections include but a single specimen of this bat, from Cyclops Mountains, Netherlands New Guinea.

PTEROPUS BRISSON

Pteropus BRISSON, 1762, Regn. Anim., 2nd ed., pp. 13, 153–155.

GENOTYPE.—"*Pteropus pteropus* Brisson (= *Vespertilio vampyrus* Linnaeus, part, = *P. celaeno* Hermann, 1804)" Palmer, 1904. Andersen (1912) indicated *niger* G. Fischer, 1814 (based upon *Vesp. vampyrus niger* Kerr, 1792) as type.

Matschie's (1899) treatment of *Pteropus* may be compared advantageously with that of Andersen (1912).

Both arrangements are based upon keys which appear to be highly artificial. Matschie divided his *Pteropus* into six subgenera, two of which, *Pteralopex* and *Acerodon*, were later admitted by Andersen and raised to full generic status. The remaining four subgenera with their typical species follow:

SUBGENUS	GENOTYPE
<i>Sericonycteris</i> (Matschie)	Not designated, but Palmer (1904) gives <i>Pteropus rubricollis</i>
<i>Eunycteris</i> Gray	<i>Pteropus melanopogon</i>
<i>Pteropus</i> Brisson	<i>Pteropus celaeno</i>
<i>Spectrum</i> Gray	<i>Pteropus vulgaris</i>

Sericonycteris includes *temmincki* and *scapulatus*, two groups widely separated in Andersen's key, also *molossinus* of Andersen's *lombocensis* group.

Eunycteris comprises *melanopogon* (but not the other three species placed by Andersen with it) and the *neohibernicus* group of Andersen, the latter exceptionally specialized in regard to dentition and dorsal pelage.

Pteropus (subgenus) embraces the following groups of Andersen: *vampyrus* (typical;

includes *celaeno*), *mariannus*, *melanotus*, *rayneri* (part), *samoensis* (part), *alecto*, *conspicillatus*.

Spectrum includes Andersen's groups: *rufus* (with typical *vulgaris*), *macrotis*, *pselaphon*, *rayneri* (part), *samoensis* (part), *lombocensis*, *scapulatus*, *hypomelanus*.

The unnatural arrangement of both systems is obvious when one works with specimens. Thus Andersen's two major divisions depend upon the degree of development of "posterior basal ledges" on the large premolars. Although his ideas on this point are illustrated in Figs. 9, 10 (pp. 68-69), actually a complete series demonstrating intermediate development of the said "ledges" exists. Again, because of the arrangement of his key, Andersen is compelled to insert the *neohibernicus* group (giant species with rounded ears and modified teeth and pelage) between the *conspicillatus* and *macrotis* groups (both with elongate, pointed ears and in my opinion more nearly related to each other than either is to *neohibernicus*). The *scapulatus* group, last in Andersen's system, is distinguished from all others by the wide spacing of its elongate, dagger-like canines, but this point is not brought out in the key, although the extreme narrowing of its molars is.

It may be added that because the concept of the geographical race was not thoroughly prevalent when Andersen worked, many of his "species" must be reduced to representative forms. Thus it is reasonably obvious that *Pteropus gouldi* is the Australian representative of *alecto* of Celebes (this opinion was advanced also by Dammernan, 1929). On the other hand his treatment of the species *vampyrus* and *hypomelanus* shows that he recognized geographical representation.

Andersen (1912, pp. 76-79) discusses his seventeen groups, "arranged . . . according to their probable natural affinities" and goes on rightly to question the validity of Matschie's subgenera *Eumycteris*, *Spectrum* and *Sericonycteris*.

He states that his seventeen groups "may be classed in three primary sections," the first including six groups, long-faced;

the second comprising five groups, short-

faced (both sections with strong posterior basal ledges). His third section brings together the last six groups "characterized by the practically complete obliteration of the posterior basal ledges of the cheek teeth."

Treatment of this last section as a unit rather than as a miscellany is the basis of my objection. It consists of at least three groups divergent in regard to the trends of their dental specializations: (a) *vampyrus*, *alecto*, *conspicillatus* and *macrotis*; (b) *scapulatus*; (c) *neohibernicus*.

In the first group (a), although the "basal ledges" are reduced in comparison with such a group as the *pselaphon* group, the cusps of the posterior premolars and anterior molars remain fairly distinct. Indeed *conspicillatus* is so like *geddiei* of the *mariannus* group (remotely placed under Andersen's system) that close relationship may be inferred to exist.

In the second group (b), extreme narrowing of the molariform teeth in combination with increase in length and spacing of the canines is distinctive of *scapulatus*.

In the third group (c), the cusp pattern of the massive teeth has become so greatly degenerate that even in quite young specimens the premolars and molars appear as rounded characterless stumps.

The species of *Pteropus* represented in the Archbold Collections are reported under the "groups" as arranged by Andersen (1912).

Pteropus hypomelanus Group

Pteropus hypomelanus macassaricus Heude

Pteropus macassaricus HEUDE, 1896, Mem. Hist. Nat. Emp. Chinois, III, p. 177 (footnote).

A single, immature male specimen of this race from Peleng Island, east of Celebes.

Pteropus caniceps Group

Pteropus dobsonii Andersen

Pteropus dobsonii ANDERSEN, 1908, Ann. Mag. Nat. Hist., (8) II, p. 370.

TYPE LOCALITY.—"Celebes."

A series of seven specimens from Peleng

Island, east of Celebes, represents this hitherto very rare species.

***Pteropus argentatus* Gray**

Pteropus argentatus GRAY, 1844, Voy. "Sulphur," I, p. 30.

TYPE LOCALITY.—? Amboina.

A considerable series of twenty-four specimens from Boemboelan, Menado, north Celebes. This species was known to Andersen only by the type specimen.

***Pteropus vampyrus* Group**

***Pteropus vampyrus* (Linnaeus)**

Vespertilio vampyrus LINNAEUS, 1758, Syst. Nat., 10th ed., I, p. 31 (part).

TYPE LOCALITY.—"Range: Java."

A fine series of sixteen specimens from Java and sixteen from Bali.

***Pteropus vampyrus malaccensis* Andersen**

Pteropus vampyrus malaccensis ANDERSEN, 1908, Ann. Mag. Nat. Hist., (8) II, p. 368.

TYPE LOCALITY.—Kuala Tembeling, Pahang, Malay Peninsula.

Six specimens from Sumatra.

***Pteropus vampyrus pluton* Temminck**

Pteropus pluton TEMMINCK, 1853, Esq. Zool., p. 56.

TYPE LOCALITY.—"Range: Bali; Lombok."

Six specimens from Bali.

It was Andersen's view (p. 345) that Javanese specimens of *vampyrus* were non-melanistic, and that Balinese were melanistic. This distinction is maintained only imperfectly when a large series is studied.

***Pteropus vampyrus natunae* Andersen**

Pteropus vampyrus natunae ANDERSEN, 1908, Ann. Mag. Nat. Hist., (8) II, p. 369.

TYPE LOCALITY.—Natuna Islands.

Three specimens from Sarawak, Borneo.

***Pteropus alecto* Group**

***Pteropus alecto* Temminck**

Pteropus alecto TEMMINCK, 1837, Monogr. Mamm., II, p. 75.

TYPE LOCALITY.—Menado, north Celebes.

A large series of this bat from Celebes

(twenty from Peleng Island; nineteen from Boemboelan, Menado, north Celebes).

***Pteropus alecto gouldi* Peters**

Pteropus gouldi PETERS, 1867, Monatsber. Akad. Wiss. Berlin, p. 703.

TYPE LOCALITY.—Rockhampton, Queensland.

Four specimens from north Queensland; four from Bugi, mouth of Wassi Kussa, south coast of Papua. Those from New Guinea seem to constitute the first record from that island. They flew to the mainland at dusk from Boigu Island to feed.

***Pteropus conspicillatus* Group**

***Pteropus conspicillatus* Gould**

Pteropus conspicillatus GOULD, 1849, Proc. Zool. Soc. London, p. 109.

TYPE LOCALITY.—Fitzroy Island, northeast Queensland.

Four specimens from the foot of the Cape York Peninsula, Queensland.

***Pteropus conspicillatus chrysauchen* Peters**

Pteropus chrysauchen PETERS, Monatsber. Akad. Wiss. Berlin, p. 576 (footnote).

TYPE LOCALITY.—Batchian Island.

Three specimens (without skulls) from Geelvinck Bay, northwest New Guinea.

***Pteropus neohibernicus* Group**

***Pteropus neohibernicus papuanus* Peters and Doria**

Pteropus melanopogon var. *papuanus* PETERS AND DORIA, 1881, Ann. Mus. Civ. Genova, XVI, p. 690.

TYPE LOCALITY.—Mansinaam, northwest New Guinea.

A very extensive series, ninety-eight specimens from various parts of south and western New Guinea: the Fly River area and the Idenburg River area.

***Pteropus macrotis* Group**

***Pteropus epularius* Ramsay**

Pteropus (*Epomops* ?) *epularius* RAMSAY, 1878, Proc. Linn. Soc. N. S. Wales, II, p. 8.

TYPE LOCALITY.—Katau, south New Guinea (western division of Papua).

A good series of this small species: seven from Idenburg River area, sixteen from Fly River area and three from Central Division of Papua.

Pteropus scapulatus Group**Pteropus scapulatus** Peters

Pteropus scapulatus PETERS, 1862, Monatsber. Akad. Wiss. Berlin, p. 574.

TYPE LOCALITY.—Cape York, northern Queensland.

Two specimens from Coen, Cape York, Queensland.

This species is not only well distinguished by its narrow molars and long slender canines, but it differs from every other species seen by me in the pale buffy hairs along the underside of the upper arms and the proximal parts of the forearms.

STYLOCTENIUM MATSCHIE

Styloctenium MATSCHIE, 1899, Fledermäuse Berlin. Mus. Naturk., I, Megachiroptera, p. 33.

GENOTYPE.—*Pteropus wallacei* Gray.

Resembling *Pteropus* (particularly *P. capistratus* and *P. personatus*, which have rather similar facial color pattern) but differing in the obsolescence of one pair of lower incisors. These may well be the inner pair, as in *Pterolopex*, an allied genus, the inner lower incisors are greatly reduced in size.

Styloctenium wallacei (Gray)

Pteropus wallacei GRAY, 1866, Proc. Zool. Soc. London, p. 65.

TYPE LOCALITY.—Macassar, Celebes.

A series of twenty-four specimens from Malenge, Togian Islands, Gorontalo Gulf, Celebes. Andersen knew of only four specimens of this bat.

DOBSONIA PALMER

Dobsonia PALMER, 1898, Proc. Biol. Soc. Washington, XII, p. 114.

GENOTYPE.—*Cephalotes peroni* E. Geoffroy.

Specialized fruit bats with the hinder part of the back naked and the incisors reduced to a single pair of upper and lower teeth in each jaw.

Andersen recognized four main groups of *Dobsonia* of which the first, *minor*, degenerate as to dentition, is the best defined.

Besides the twelve forms recognized by Andersen, there have been described: *remota* Cabrera from Trobriand Islands; *andersoni* Thomas from Manus and Ruk. G. M. Allen (1935) records a member of the *moluccensis* group from Coen, northern

Queensland, which Troughton (1941) refers to *D. magna*.

The species are rather poorly represented in the Archbold Collection, although those present include numerous specimens.

Dobsonia minor (Dobson)

Cephalotes minor DOBSON, 1878, Proc. Zool. Soc. London, p. 875.

TYPE LOCALITY.—Amberbaki, northwest New Guinea.

This small species was poorly represented in collections until a few years ago. Andersen had but two specimens. We are now able to record seven specimens from the Idenburg River and twenty-one from the upper Fly River.

Dobsonia exoleta Andersen

Dobsonia exoleta ANDERSEN, 1909, Ann. Mag. Nat. Hist., (8) IV, p. 531.

TYPE LOCALITY.—Tomohon, Minahassa, Celebes.

This species is represented in the Archbold Collection by thirty-seven specimens from the Togian Islands, Gorontalo Gulf, east of Celebes.

Dobsonia moluccensis magna Thomas

Dobsonia magna THOMAS, 1905, Ann. Mag. Nat. Hist., (7) XVI, p. 423.

TYPE LOCALITY.—Tamata, Mamberé River, eastern New Guinea.

In his main text Andersen (1912, p. 466) treated *magna* as a full species, but in his "addenda" (*tom. cit.*, p. 825) he concluded, on the basis of study of additional material, that *magna* was merely a subspecies of *moluccensis*.

In the Archbold Collection *magna* is well represented: Ifaer, northwest New Guinea, three; Cyclops Mountains, five; Hollandia, eighteen; Idenburg River, six; southern Papua (Western Division), fourteen; Kemp Welch River, Central Division of Papua, fourteen.

At Daru, at the mouth of the Fly River, specimens of *Dobsonia magna* were frequently shot at night. Their eyes shone reddish under the rays of a flashlight. They were killed while hanging among the crowns of coconut trees, feeding upon the young fruit and were also found hanging in mango trees in the daytime. Those speci-

mens from the Kemp Welch River were taken in a limestone cavern at Javareri. The bats hung from the roof of an outer cavern into which a little daylight filtered. In inner lightless caves I found *Miniopterus*. The nursing young of *Dobsonia magna* (taken in February) had the skin of body and wings almost wholly unpigmented.

Dobsonia peroni (Geoffroy)

Cephalotes peroni E. GEOFFROY, 1810, Ann. Mus. Hist. Nat., Paris, XV, p. 104.
TYPE LOCALITY.—Timor.

This name has been applied by various authors to several of the species and races now recognized as distinct. As restricted by Andersen it occurs on Timor, Alor, Flores and Wetter Islands. The smaller form from Sumba, due south of Flores, was distinguished by Andersen as *sumbana*.

Our series of sixteen individuals from Bali extends the range to the west. The species is probably present also on Sumbawa and Lombok, the islands lying between Flores and Bali.

CYNOPTERUS SECTION

CYNOPTERUS CUVIER

Cynopterus F. CUVIER, 1825, Dents des Mammifères, p. 80.

Pachysoma GEOFFROY, 1828, Dict. Class. Hist. Nat., XIV, p. 703 (homonym).

Cynonycteris PETERS, 1852, Naturw. Reise Mossambique, Zool., I, p. 25.

Niadius MILLER, 1906, Proc. Biol. Soc. Washington, XIX, p. 83.

GENOTYPES.—*Pteropus marginatus* Geoffroy = *Vespertilio sphinx* Vahl (*Cynopterus*); *Pteropus collaris* Illiger (*Cynonycteris*); *princeps* Miller (*Niadius*).

Andersen's revision of *Cynopterus* (1912) resulted in his recognition of six full species, three of which he referred to the "*Cynopterus* section" and three to the "*Niadius* section." The members of the latter group, proposed by Miller, were distinguished by the subrectangular outline of the cheek teeth and the strong development in the lower jaw of surface cusps on p_4 and m_1 .

The surface cusp has been shown always to be present in *Niadius*, but it may be present or absent in *Cynopterus* (Andersen's table, p. 590). In the majority of

cases the outlines of the teeth, if the cusps are developed, suffice for determination of the group to which a specimen belongs.

Andersen admitted three full species in his "*Cynopterus* section": *sphinx*, *brachyotis* and *major*. *Sphinx* was subdivided into three geographical races; *brachyotis* into eight.

One race only was allowed in the "*Niadius* section": *lyoni* (renaming of *minor*, a homonym), a race of *horsfieldi*.

Since publication of Andersen's work, three other names have appeared: *babi* Lyon, apparently an insular race of *brachyotis*; *persimilis* Andersen from Sarawak, a close relative of *C. horsfieldi lyoni*; and *archipelagus* Taylor from Polillo Island, Philippines, which appears from his description to be intermediate between *Cynopterus* and *Niadius*.

Upon examination of a representative series of species of *Cynopterus* one is impressed by the dearth of clearly definable characters. Animals of small and large size are recognizable, but considerable latitude in dimensions is permitted in almost every species, according to Andersen's tables, so that very high percentages of overlap in size appear. Within the subspecies, as defined by Andersen, actual size plays an important part, but even so few races can be so distinguished.

In a series from one locality the color is frequently variable. Generally adult males are provided with a ruff of russet or yellowish brown extending from beneath the ears, meeting across the throat and reaching down either side of the chest to the origin of the wings or even to the thighs. Young males and females usually lack this distinctive color. Occasionally an adult female is seen in which male coloration is assumed, at least in part.

Probably the best characters for separating different forms of *Cynopterus* are found in the teeth. In addition to the differences in the outlines of the crowns of molariform teeth and the presence or absence of the surface tubercle on p_4 and m_1 , slight but seemingly consistent differences may be observed in p_1^1 and in the incisors. The canines of males are larger than those of females in all species.

Cynopterus sphinx (Vahl)

Vespertilio sphinx VAHL, 1797, Skr. Nat. Selsk., IV, Heft 1, p. 123.

TYPE LOCALITY.—Tranquebar, southeast coast of peninsular India.

Andersen recognizes three races of *sphinx*, the typical race, *C. s. gangeticus* and *C. s. titthaecheilus*. The typical race is the smallest, and according to Andersen's table (1912, p. 600) the measurements of the forearm (66–73.5 mm.) scarcely transgress the range of measurements of *gangeticus* (73–78) and *titthaecheilus* (74.5–83). The range of true *sphinx* is shown to include all peninsular India (Ceylon to Bombay) and eastward into northern Siam. The tooththrow is given as 10.8–12.2 (in *gangeticus*, 11.8–12.3), thus showing less distinction.

The American Museum has several specimens from Calcutta which are referable to *C. s. gangeticus*, but none from southern India. A specimen from Tenasserim, A.M.N.H. 54825, ♀, has the tooththrow 10.3 mm., so supports Andersen's view that true *sphinx* reappears east of the Ganges. In a large series from Hainan Island, south China, the relatively small size of *sphinx* also can be noted (c-m¹, 10.5).

The character whereby Andersen separates the third race, *titthaecheilus*, from the two first mentioned, i.e., shorter rostrum, seems to be valid. In addition the Javanese bats are larger and have broader teeth.

Cynopterus sphinx titthaecheilus
(Temminck)

Pteropus titthaecheilus TEMMINCK, 1825, Monogr. Mamm., I, p. 198.

TYPE LOCALITY.—Java.

The Archbold Collection includes a series of three males and nine females from Sauver, Bali, referable to *C. s. titthaecheilus*; also a single female from Cheribon, Java. This last is identical subspecifically with a specimen from Buitenzorg which has been in the American Museum for many years. In all material examined the surface cusps of p₄ and m₁ are either much reduced or absent.

Cynopterus brachyotis (S. Müller)

Pachysoma brachyotis S. MÜLLER, 1838, Tijds. Nat. Gesch., V, Pt. 1, p. 146.

TYPE LOCALITY.—River Dewei, Borneo.

The small size of these animals and the shortness of the ears, combined with their quite small teeth and lack of surface cusps on p₄ and m₁, serve to separate the numerous races of *brachyotis* from *sphinx* and *major*. The ear of *major* is, however, also short (see Andersen's table, 1912, p. 629).

The species is wide, ranging from Assam and Siam down through Sumatra and Borneo to the Philippines and Peleng Island.

The typical form (*vide* Andersen) is restricted to the Malay region, Borneo, Philippines, Celebes, Sumatra. West of *brachyotis*, but partly overlapping in the Malay Peninsula, occurs the race *angulatus*, present from Sumatra to Assam. It is shown by Andersen as slightly larger. The remaining races represent insular forms: *scherzeri* (Nicobars), *brachysoma* (Andamans), *minutus* (Nias), *babi* (Simulur), *pagensis* (Mentawi), *ceylonicus* (Ceylon), *javanicus* (Java) and *insularum* (Kangean).

A single specimen, A.M.N.H. 24147, ♂, labeled "India" probably represents northern *angulatus* (see beyond). The tooththrow, c-m¹, measures 8.1 mm. It is very much smaller than specimens of *C. s. gangeticus* from Calcutta and lacks any trace of surface cusp.

Besides the foregoing, true *brachyotis* is represented in the Archbold Collection from Borneo by six specimens from Badang; fifteen from Parit, Tjempaga, south Borneo; sixteen from Ngabang, Landak, northwest Borneo; and one from Pelehen, northeast Borneo.

Seven specimens from Peleng Island, east of Celebes, are distinguishable from *brachyotis* only by their slightly more saturate color. They approach in this respect *pagensis* of the Mentawi Islands.

Cynopterus brachyotis angulatus
Miller

Cynopterus angulatus MILLER, 1898, Proc. Acad. Nat. Sci. Phila., p. 316.

TYPE LOCALITY.—Trong, lower Siam.

To *angulatus* are referred large series of specimens in the Archbold Collections from Kalianda and Macarah Doewa, south Sumatra, also four individuals from Boekit Sanggoel, Benkoelen, Sumatra.

Cynopterus brachyotis pagensis

Miller

Cynopterus pagensis MILLER, 1906, Proc. Biol. Soc. Washington, XIX, p. 62.

TYPE LOCALITY.—North Pagi Island, Mentawai Islands.

Our series of nineteen individuals from North Pagi has a generally darker color tone than true *angulatus*. *Pagensis* was synonymized by Andersen with *angulatus* from lower Siam, but the darker color seems consistently present.

Cynopterus brachyotis javanicus

Andersen

Cynopterus brachyotis javanicus ANDERSEN, 1910, Ann. Mag. Nat. Hist., (8) VI, p. 624.

TYPE LOCALITY.—Buitenzorg, Java.

A single individual, A.M.N.H. 101896, ♀, from Cheribon, Java, and two from Tjerimai may be considered to represent *javanicus*. They appear to me no larger than true *brachyotis*. The forearms measure \pm 61 mm. The same may be said of twenty-five specimens taken from Koeta and from Noesa Penida, Bali.

This brings to a conclusion the "*Cynopterus* section." Of the "*Niadius* section" the Archbold Collections contain less material.

Cynopterus horsfieldi Gray

Cynopterus horsfieldi GRAY, 1843, List Mamm. Brit. Mus., p. 38.

TYPE LOCALITY.—Java.

From Tjerimai, Java, fourteen specimens, also two from Peleben, northeast Borneo.

Cynopterus horsfieldi persimilis

Andersen

Cynopterus persimilis ANDERSEN, 1912, Ann. Mag. Nat. Hist., (8) X, p. 640.

TYPE LOCALITY.—Sarawak, Borneo.

Three females, larger and duller colored than true *horsfieldi*, from Perboewa, northwest Borneo, must be nearly topotypical of *persimilis*.

It may be added that a young specimen,

A.M.N.H. 24148, from Nicobar, formerly identified as *C. b. scherzeri*, which has perfect, unworn molars is unmistakably a member of the *Niadius* section and should probably be referred to *C. h. lyoni*.

PENTHETOR ANDERSEN

Penthetor ANDERSEN, 1913, Cat. Chiropt. Brit. Mus., 2nd ed., I, Megachiroptera, p. 665.

GENOTYPE.—*Cynopterus (Ptenochirus) lucasi* Dobson.

This specialized monotypic genus of the *Cynopterus* group is readily recognized by the combination of one single pair of lower incisors and the extreme thinness of the otherwise not greatly reduced tail.

Andersen (p. 645) wrote that the "true characters and affinities [of *Ptenochirus jagori*] have been largely obscured and misunderstood by confusion with those of" *lucasi*, which last he separated as *Penthetor lucasi*. In Andersen's diagram (p. lxi), *Penthetor* and *Thoopterus* are shown rising from the *Cynopterus* stem by a branch quite distinct from that leading to *Cynopterus* and *Ptenochirus*. *Penthetor* and *Thoopterus* were set off by their lack of postorbital foramina. Obsolescence of *i*₂ was regarded as liable to occur in relatively unrelated genera of the *Cynopterus* group.

Penthetor lucasi (Dobson)

Cynopterus (Ptenochirus) lucasi DOBSON, 1880, Ann. Mag. Nat. Hist., (5) VI, p. 163.

TYPE REGION.—"Sarawak."¹

The Archbold Collection contains eighteen specimens of this bat from Perboewa (Landak), northwest Borneo.

NYCTIMENE BORKHAUSEN

Nyctimene BORKHAUSEN, 1797, Deutsche Fauna, I, p. 86.

GENOTYPE.—*Vespertilio cephalotes* Pallas.

Although Andersen placed *Nyctimene* in his "*Cynopterus* section" of the Pteropinae it must not be forgotten that it is in reality a highly specialized genus, so strongly divergent indeed that Miller had earlier (1907) segregated it as a subfamily distinguished by the high degree of obsoles-

¹ Andersen (1912) states that the type is in the British Museum Collection (B.M.80-8-13-1). It was one of four sent to Dobson by F. A. Lucas, from Wards' Natural Science Establishment, Rochester, N. Y. Wards write that they no longer have any of those specimens.

cence of the incisors, the tubular structure of the nostrils (analogous to that of the Murinae), the broad fusion of the premaxillae, etc.

The discovery of *Paranyctimene* with its high-cusped molariform teeth (possibly a secondary modification connected with change of function) but generally *Nyctimene*-like facies adds force to Miller's view that *Nyctimene* is strongly divergent from *Cynopterus*.

The four "groups" distinguished by Andersen are not entirely satisfactory, because forms described later than the twelve recognized by Andersen have tended to minimize distinguishing characters. Later described forms are *celaeno* Thomas, *certans* Andersen, *draconilla* Thomas, *tryoni* Longman. Troughton (1941) considers *tryoni* a synonym of *robinsoni* Thomas. *Draconilla* may be a *Paranyctimene*; the teeth of the type were greatly worn. *Certans* was stated to be closely related to *cyclotis*. *Celaeno* is near *aëlo*.

Nyctimene papuanus Andersen

Nyctimene papuanus ANDERSEN, 1910, Ann. Mag. Nat. Hist., (8) VI, p. 621.

TYPE LOCALITY.—Milne Bay, eastern tip of New Guinea.

The range of this small species (forearm 54.5–59 mm.) includes the whole of New Guinea, and Andersen records one specimen from Cape York, northern Queensland.

A substantial series represents the species in the Archbold Collections: forty-four specimens from the upper Fly River, Papua, and one individual from the Idenburg River, Netherlands New Guinea. The only observable difference is that the Idenburg River specimen has wider molars, but even so their width comes within the upper range given by Andersen in his table (p. 721).

Nyctimene celaeno Thomas

Nyctimene celaeno THOMAS, 1922, Ann. Mag. Nat. Hist., (9) IX, p. 262.

TYPE LOCALITY.—Geelvinck Bay, Netherlands New Guinea.

Nyctimene celaeno and *major*, from Duke of York Island, seem to be closely allied forms but differ as follows: in *N. celaeno*

the dorsal stripe extends from occiput to tail and attains a width of 10 mm. (similar to that of *aëlo*); in *major* the stripe extends from the scapular region to the tail but reaches a width of only 5 mm. In *celaeno* the forearm is slightly longer and the teeth are slightly smaller. The tooth-rows of *celaeno* converge slightly toward the front of the palate; those of *major* form an arc, such that p^{4-4} are as close to one another as are p^{3-3} .

N. aëlo was founded upon a single specimen from Milne Bay. It was separated by Dobson from *major* by its broad dorsal stripe and by the elongate transverse diameter of its orbits. To these characters Andersen (1912) added "premaxillae more proclivous than in other species." He treated it as the "*aëlo* group," distinct from the *papuanus*, *cyclotis* and *cephalotes* groups. The species *celaeno* was unknown to Dobson and Andersen.

Two specimens in the Archbold Collection from Cyclops Mountains, northern Netherlands New Guinea, must be considered typical of *celaeno*. In addition we have a fine series of forty-one skins and skulls taken in the head waters region of the Fly River which appear inseparable from *celaeno*.

It seems probable that the bats from Mysol Island listed by Andersen (1912, p. 716) as referable to *aëlo* were in reality specimens of *celaeno*. He showed only the orbital diameter of the type specimen of *aëlo* (11 mm., *tom. cit.*, p. 720). The same measurements on *robinsoni* were 9.3–9.5.

I have fairly good photographs of the skull of the type of *aëlo*, from which it appears that the proclivous nature of the canines stressed by Andersen is somewhat exaggerated in his figure (64), but the position of the postorbital processes, farther back than usual, seems to be correct.

The forms *scitulus*, *geminus*, *robinsoni*, *tryoni* and *lullulae* appear, from pictures and measurements of their skulls, to belong near the present group.

Of *N. scitulus* this museum possesses one specimen, from Malapa Island (Guadalupe), in which the characteristic V-

shaped posterior margin of the palate is clearly to be seen.

A specimen of *N. geminus* from Good-enough Island (D'Entrecasteaux group) is also represented. The tooththrow is a little longer, and the back of the palate is rounded, but otherwise the two, both males, appear remarkably similar, *geminus* being somewhat larger. Forearms: *geminus*, 74 mm.; *scitulus*, 68. The foramen magnum of *scitulus* is unusually small.

Nyctimene cephalotes (Pallas)

Vespertilio cephalotes PALLAS, 1767, Spicill. Zool., fasc., 10, p. 10.

TYPE REGION.—"Moluccas."

A fine series of this species, type of the genus, is present in the Archbold Collections, comprising twenty specimens from Peleng Island, east of Celebes.

Andersen placed *cephalotes* in the same group as *geminus*, *major*, *et al.* It differs in appreciable ways. It is much smaller. Its teeth and skull are far more delicately built. The postorbital processes are slender and weak. Nevertheless, *cepha-*

lotes cannot be said to stand so close to any other group. The specimens from Peleng average very slightly smaller than is indicated by Andersen's measurements. The difference in color between the sexes is less obvious.

PARANYCTIMENE TATE

Paranyctimene TATE, 1942, Amer. Mus. Novitates, No. 1204, p. 1.

GENOTYPE.—*Paranyctimene raptor*.

Distinguished from *Nyctimene* by its high molar and premolar cusps, very long canines and lack of dorsal stripe.

Paranyctimene raptor Tate

Paranyctimene raptor TATE, 1942, Amer. Mus. Novitates, No. 1204, p. 1.

TYPE LOCALITY.—Oroville Camp, Fly River, Papua.

This small bat, as small as *N. draconilla* (forearm, 47 mm.), appears externally a *Nyctimene* in which no dorsal stripe is developed. The nostrils are tubular as in *Nyctimene*, the wings similarly spotted with amber color.

MacroGLOSSINAE

EONYCTERIS DOBSON

Eonycteris DOBSON, 1873, Proc. Asiatic Soc. Bengal, p. 148.

GENOTYPE.—*Macroglossus spelaea* Dobson.

This generalized macroglossine genus is remarkable because of the external resemblance of some of its species to certain *Rousettus*. *Eonycteris* can be distinguished by the absence of a claw on the index finger; by the presence of a pair of kidney-shaped glands on either side of the anus, stated, however, to be absent in *E. robusta*; by the widely spaced upper incisors, peculiar spout-shaped symphysis (a macroglossine character); the compressed form of the molar series and the reduced size of m_3 .

The status of *Callinycteris* Jentink (type *rosenbergi*, from Celebes) seems still to be doubtful. By Andersen (1912) it was treated as a synonym of *Eonycteris*, but other authors have recognized it as distinct because of the absence of m_3 . Because the posterior molars of many genera of fruit bats are obsolescent, and because

C. rosenbergi was based upon the type only (and no additional specimen seems to have been taken) there may be reason for including it with *Eonycteris*. Miller, after studying a photograph of the type, believed it "well characterized by its heavier dentition and by the absence of the small m_3 ." Andersen studied the type at Leyden and concluded that it was virtually equal to *spelaea* with the exception of the absent m_3 .

The species of *Eonycteris*, excluding *rosenbergi*, are

FORM	TYPE LOCALITY
<i>spelaea</i> Dobson	Moulmein, Burma
<i>spelaea glandifera</i> Lawrence	Montalban Caves, Luzon, Philippines
<i>major</i> Andersen	Mount Dulit, Borneo
<i>robusta</i> Miller	Montalban Caves, Luzon, Philippines

The key given by Andersen (1912, p. 734) to the two species *spelaea* and *major* is rather unsatisfactory. The principal difference resides in the larger size of *major*,

but like *rosenbergi*, *major* was based upon a single specimen.

Robusta, described next by Miller, was considerably larger than *spelaea*, but its author was less certain of its distinctness from *major*, although it had smaller teeth.

Taylor's (1934) species *longicauda* was, according to Miss Lawrence (1939), a synonym of *robusta* Miller, but a second form in Montalban Caves, whence *robusta* (= *longicauda*) came, was recognized by her and named *glandifera*.

When discussing her subspecies *E. s. glandifera*, Miss Lawrence referred (1939, p. 39) to "tawny," "russet" and "ochraceous tawny" colors of the pelage of the throat in males. The same condition prevails in the adult males of our large series from Bali, females and young males showing no such differentiation. On the contrary males of true *spelaea* and those of our series from southern Sumatra (which appear entirely referable to *spelaea*) show no indication of such throat coloring.

It is suggested, following reexamination of material and of the opinions given by various authors, that the following may express the true situation in *Eonycteris*: that but two true species exist, *spelaea* and *major*, which differ strongly by characters to be pointed out later; that *spelaea* includes true *spelaea* reaching from Tonkin (Osgood) south through Siam, Burma (type region), Malay Peninsula (Chasen), Sumatra, east and central Java, and possibly Borneo (Moulton, 1911); that *spelaea* includes also an eastern subspecies characterized by rufescent throat pelage in the males, i.e., *glandifera*, present in Philippines, Bali, perhaps eastern Java, and probably in Borneo (Moulton's series and those referred to *spelaea* by Hose and Everett may be *glandifera*); and that *rosenbergi* from north Celebes, of whose skull I have photographs, is also in all likelihood an anomalous specimen of *glandifera* (in such case *glandifera* would become a synonym of *rosenbergi*). In regard to *major*, it is further suggested that we are dealing with a rare but widely distributed species, namely, *major* from Borneo, represented in the Philippines by *robusta* (= *longicauda*) and by a large

specimen (A.M.N.H. 103319, ♀) from north Pagi in the Mentawi Islands south of Sumatra.

Eonycteris major Andersen

Eonycteris major ANDERSEN, 1910, Ann. Mag. Nat. Hist., (8) VI, p. 625.

Eonycteris robusta MILLER, 1913, Proc. Biol. Soc. Washington, XXVI, pp. 73-74.

Eonycteris longicauda TAYLOR, 1934, Philippine Land Mammals, pp. 131-134.

TYPE LOCALITIES.—(*Major*), Mt. Dulit, Borneo; (*robusta* and *longicauda*), Montalban Caves, Luzon, Philippines.

The Archbold Collection includes only A.M.N.H. 103319, ♀, from Mentawi Islands.

These large *Eonycteris* are distinguished from the smaller species, *E. spelaea*, by a number of characters: absence or obsolescence of the anal glands; less reduced tail; markedly pointed ears; rather dense, deep brown pelage (in typical *spelaea* mouse gray, in *spelaea glandifera* rufous brown); by relatively massive incisors, canines and anterior premolar; by the strongly flattened dorsal surface of the combined nasals; by the squarish outline (instead of rounded) of the suture between premaxilla and maxilla; also by small differences in the foramina of the base of the skull.

In the teeth one of the outstanding features is the fact that p^1 almost fills the space between the canine and p^3 , whereas in true *spelaea* it occupies from one-fourth to one-third of the space. In the lower jaw corresponding enlargement of p_1 may be noted, and the incisors are so much increased in size that i_2 almost touches the lower canine.

The greater depth of mandible beneath m_3 , mentioned by Miller for *robusta*, male (4.2 mm., instead of 3.2), measures in our female Mentawi specimen 3.8 mm. In our *spelaea* it is usually less than 3 mm. Neither Andersen nor Taylor gave this dimension for his material. Andersen's single specimen was a female; Taylor had ten males. Miss Lawrence, who pointed out that in *longicauda* Taylor had re-described *robusta*, did not give the depth of ramus in her several specimens of *robusta*.

To prove or disprove the identity of these three names conclusively it will probably be necessary to get the material together and make direct comparisons.

Eonycteris spelaea (Dobson)

Macroglossus spelaeus DOBSON, 1871, Proc. Asiatic Soc. Bengal, XL, pp. 105, 261, Pl. x, figs. 3, 4.

TYPE LOCALITY.—Farm Caves, Moulmein, Burma.

This is the classical species of *Eonycteris* and of the two here recognized is the more specialized, since the anal glands (formerly believed of generic importance) are developed in both sexes, and the incisors and front premolars are more reduced. True *E. spelaea* is represented in our collections by a single specimen from Pegu, Burma (near the type area), by a series of fifteen from Kalianda in south Sumatra and by a unique specimen from Cheribon, Java.

Eonycteris spelaea glandifera Lawrence

Eonycteris spelaea glandifera LAWRENCE, 1939, Bull. Mus. Comp. Zool., LXXXVI, pp. 38-40.

TYPE LOCALITY.—Montalban Caves, Rizal Province, Luzon, Philippines.

In the American Museum collections are two specimens of this form in alcohol from "Philippines" which formerly were recorded as "*robusta*." However, they are smaller than *robusta* and possess well defined anal glands.

An extensive series of twenty-two specimens taken in Bali, from Soka and Oboed, are tentatively referred to *glandifera*. Adult males possess the rufescent throat pelage referred to by Lawrence, and I have been unable to find any points of differentiation. Whether *glandifera* is equal to the Celebes *bernsteini*, as has been suggested, or whether our Balinese bats are in reality *bernsteini* instead of *glandifera* can be determined after more topotypical material representing *bernsteini* has been collected.

MACROGLOSSUS F. CUVIER

Macroglossus F. CUVIER, 1824, Dents des Mammifères, p. 248.

*Kiodotus*¹ BLYTH, 1840, Cuvier's Animal Kingdom, p. 69 (footnote).

Odontonycteris JENTINK, 1902, Notes Leyden Mus., XXIII, p. 140.

GENOTYPES.—*Macroglossus*, *Pteropus minimus*; *Odontonycteris*, *O. meyeri* = ? *Macroglossus lagochilus*.

Odontonycteris with three upper premolars was separated by Jentink from *Macroglossus* which has only two upper premolars, but Andersen (p. 765) regarded the extra tooth as a supernumerary, "an anomaly not infrequently observed in both species [*minimus* and *lagochilus*] of *Macroglossus*."

Macroglossus, compared with *Syconycteris*, is specialized through the greater degree of reduction of the teeth. In retaining a small external tail (about 3 mm. in length) it is less specialized than *Syconycteris*.

Andersen recognized two species, *minimus* with two subspecies and *lagochilus* with four.

Macroglossus minimus (Geoffroy)

Pteropus minimus E. GEOFFROY, 1810, Ann. Mus. Hist. Nat., Paris, XV, p. 97.

TYPE LOCALITY.—Java.

According to Andersen (1912, pp. 756-757) true *minimus* has the rostrum relatively short (orbit to nares, 7.8-8.8 mm.), while the race *sobrinus*, which occurs from Sumatra northward (but also in Java), has the rostrum considerably longer (orbit to nares, 9.5-10.5).

The Archbold Collections contain fifteen specimens from Cheribon, Java, and ten from Bali, all of which appear to be typical *minimus* with short rostrum.

Macroglossus minimus sobrinus Andersen

Macroglossus minimus sobrinus ANDERSEN, 1911, Ann. Mag. Nat. Hist., (8) VI, p. 642.

TYPE LOCALITY.—Gunong Igari, Perak, Malay Peninsula.

The distribution given by Andersen for this larger race includes Malay Peninsula, Sumatra, Nias and various parts of Java.

¹ *Kiodotus* Blyth, 1840, *Rhynchocyon* Gistel, 1848, and *Carponycteris* Lydekker, 1891, all with type *Pteropus minimus* Geoffroy, were successively proposed to replace *Macroglossus*, then believed to be a homonym of *Macroglossum* Scopoli, 1777.

He expected that it would occur also in Burma, Siam and Darjeling.

The Archbold Collection includes a series of eleven specimens from the Mentawi Islands (North Pagi), some of which even transgress the dimensions given for *sobrinus* by Andersen (in some specimens the length, orbit to nares, reaches nearly 12 mm.).

Macroglossus lagochilus Matschie

Macroglossus lagochilus MATSCHIE, 1899, Fledermäuse Berlin. Mus. Naturk., I, Megachiroptera, pp. 96-97.

TYPE LOCALITY.—Buru.

M. lagochilus was distinguished from *minus* by the presence of a deep vertical median groove on the upper lip and the fact that the nostrils were turned half forward instead of outward (difficult to see in dried skins).

The typical race of the four admitted by Andersen is represented in the Archbold Collections by a fine series of twenty-four specimens from Peleng Island, east of Celebes.

Macroglossus lagochilus nanus Matschie

Macroglossus nanus MATSCHIE, 1899, Fledermäuse Berlin. Mus. Naturk., I, Megachiroptera, pp. 96, 98.

TYPE LOCALITY.—Lamellana, New Pomerania (New Britain).

This race is distinguished from true *lagochilus*, according to Andersen, by its narrower premolars, from *M. l. microtus* by its longer ears, and from *M. l. pygmaeus* by its longer rostrum.

The range includes the whole of New Guinea, Bismarck Archipelago, Kei and Aru Islands, yet Andersen had only a few specimens, from Mysol, New Ireland and Aru.

The Archbold Collections include five from the Fly River and one from Weyland Mountains.

SYCONYCTERIS MATSCHIE

Syconycteris MATSCHIE, 1899, Fledermäuse Berlin. Mus. Naturk., I, Megachiroptera, pp. 94, 98 (subgenus of *Macroglossus*).

GENOTYPE.—*Macroglossus australis* Peters.

As pointed out under *Macroglossus*, the incisors remain large and in contact in

Syconycteris; particularly do i_2 and p_1 remain unreduced and approximated to the lower canine. There is no trace of external tail.

Matschie proposed four "species" which Andersen has reduced to two, *crassa* and *australis*, by making Matschie's *papuana* and *finschi* races of *crassa*. Andersen proposed a third full species, *naies*.

Syconycteris crassa papuana (Matschie)

Macroglossus (Syconycteris) papuanus MATSCHIE, 1899, Fledermäuse Berlin. Mus. Naturk., I, Megachiroptera, p. 99.

Described originally as a full species, *papuana* was reduced to a subspecies of *crassa* by Andersen (1912, p. 777).

True *S. crassa* has type locality at Fergusson Island, D'Entrecasteaux Islands; *papuana* occupies, according to Andersen, the whole of New Guinea (see *australis*).

The Archbold Collections include three from Balim River, central Netherlands New Guinea and one from Weyland Mountains. A fifth specimen is from Mafulu, Central Division, Papua.

Syconycteris australis (Peters)

Macroglossus australis PETERS, 1867, Monatsber. Akad. Wiss. Berlin, p. 13.

TYPE LOCALITY.—Rockhampton, Queensland.

Skulls of this species are readily distinguished from those of *crassa* and its races by the much narrower molars and premolars. At the same time these bats are separable from *Macroglossus* by their enlarged incisors and the total absence of the tail.

The Archbold Collection contains ten specimens from the Fly River, one from Mt. Tafa and one from Kagi. The two last named localities are near together on the south side of the Central Range, Central Division, Papua. In addition there are six skulls (without skins) from northern Queensland which are to be considered almost topotypical.

It is to be noted that in the lowlands of the Western Division, Papua, I took the above mentioned ten specimens of *australis* and not a single example of *crassa*. In

the Central Division behind Port Moresby, on the contrary, both species of *Syconycteris* were captured.

S. australis was the only species of bats which was readily taken in bird nets at night.

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