

**On the systematic status  
 of *Pipistrellus annectans* Dobson, 1871  
 and *Myotis primula* Thomas, 1920 (Mammalia)**

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The so-called Intermediate Bat, known even today in the single holotype specimen only, was described by DOBSON under the name *Pipistrellus annectans* in 1871; the specimen originated from the Naga Hills, formerly a part of the Indian province Assam, now a federate state (Nagaland, India). In 1876, the same author (4) wrote as follows, referring to it under the name *Vesperugo annectens*: "This species unites the external appearance of a *Vespertilio* to the dentition of *Vesperugo*. In the form of the ear and tragus and elevation of the roof of the skull above the face, it very closely resembles some species of the former genus." It could hardly be decided by now whether, in using the synonym of the genus *Pipistrellus*, this change of the specific name was a typographical error or a deliberate act (and if so, why?) of the author? In my opinion, the original spelling should be adhered to, regardless of the fact that later workers — after returning in general to the use of the generic name *Pipistrellus* — listed the species as *Pipistrellus annectens* (DOBSON, 1876) (TATE, 8; ELLERMANN et MORRISON-SCOTT, 5). Though well-known, I should like to note that the majority of the *Vespertilio* species belong, since this generic name is now again used in the Linnean sense, to the genus *Myotis*. Owing to the relative unavailability of the holotype specimen and the presumable lack of further exemplars, nothing could be said on the nearer relationship and systematic position of *Pipistrellus annectans*. Despite this fact, BIANCHI established the subgenus *Megapipistrellus* for DOBSON's species (2), while Tate (8) assigned it, principally in view of its great dimensions, to a special group (the "*Pipistrellus annectens* group"), distinct from all other *Pipistrellus* species.

In 1966–67, I had occasion to study in the course of my trip to India in the frame of the Indo-Hungarian Cultural Exchange Programme, the *Pipistrellus* material preserved in the Mammal Section, Zoological Survey of India (formerly Indian Museum), Calcutta, and also to examine in detail the holotype in alcohol of DOBSON's *Pipistrellus annectans* (Number 155 a in ANDERSON's Catalogue (1); the recent inventory reference is Register Number 15595). The external features, described also by DOBSON and referring indubitably to a *Myotis* taxon, are conspicuous at the first glance. A preparation and thorough study of the skull had even more confirmed my view that we have to do with a true *Myotis* species in spite of

its dental formula, namely  $\frac{2 \ 1 \ 2 \ 3}{3 \ 1 \ 2 \ 3} = 34$ , agreeing with that of a *Pipistrellus* and

not with that of a *Myotis* taxon  $\left(\frac{2 \ 1 \ 3 \ 3}{3 \ 1 \ 3 \ 3} = 38\right)$ . It is rather well known that in many genera of the *Microchiroptera* (e.g. *Rhinolophus*, *Myotis*, *Eptesicus*, *Pipistrellus*) and in species where, as a specific character, the upper and lower small premolars (therefore in some cases  $P^3$  and  $P_3$ , or in other cases  $P^2$  and  $P_2$ ) are minute, there occur individuals in which these teeth are absent from one or both



sides, from above or below. Obviously DOBSON's specimen exhibits a similarly abnormal dentition, an exemplar in which the development of the minute middle premolars ( $P^3$  and  $P_3$ ) failed to occur not only on both sides but also above and below.

Concerning the Oriental *Myotis* species, I first suspected species whose specific characteristics involve minute  $P^3$  and  $P_3$  premolars. One of these species is *Myotis primula* THOMAS, 1920, described from Pashok (Darjeeling District, West Bengal, India), therefore from an area zoogeographically agreeing with that of DOBSON's species (THOMAS, 10). For comparison, I had available a photograph made of the skull of the holotype of *Myotis primula*. (Inventory Number 16. 3. 25. 30, British Museum [Nat. Hist.]). TATE (7), ELLERMAN et MORRISON-SCOTT (5), and HILL (6) discussed THOMAS's species also under this name. Since, owing to Dr. J. E. HILL's extensive help (letter communication), I am now in the possession of the detailed measurement data of not only the holotype but all other specimens preserved in the British Museum (Nat. Hist.), and having studied also the exemplars deposited in the several collections in India, I can safely state that *Pipistrellus annectans* and *Myotis primula* are subjective synonyms, hence the valid name of DOBSON's taxon is *Myotis annectans* (DOBSON, 1871), having priority over the junior subjective synonyms *Vesperugo annectens* DOBSON, 1876, *Pipistrellus annectens* (DOBSON, 1876), and *Myotis primula* THOMAS, 1920. The nominal subgeneric taxon *Megapipistrellus* BIANCHI, 1916, is hereby considered also a junior subjective synonym of *Myotis* KAUP, 1829; furthermore, TATE's (8) grouping and all of his respective remarks made without cognizance of the actual holotype specimen become now also irrelevant.

In studying the problem, however, it was found that a part of the *Myotis annectans* specimens preserved in Indian collections (Inventory Numbers 3804 and 3806, Bombay Natural History Society) have been listed as *Myotis sicarius* THOMAS, 1915, whereas a true *Myotis sicarius* exemplar (Registration Number 17429, Zoological Survey of India) has been identified as *Myotis "primula"*. According to Dr. B. BISWAS (personal communication), these animals, being the property of the Bombay Natural History Society (Mammal Survey of India, Burma and Ceylon), had at that time probably been identified in the British Museum (Nat. Hist.), indeed, a part of them perchance by O. THOMAS himself. These errors in identification might be due to the fact that the heretofore known specimens of the two rather closely related species had been captured partly in the same localities and partly by the same collectors; furthermore the holotype of *M. sicarius* is a subadult individual so that, comparing it with *M. "primula"*, THOMAS himself might not have perceived the relevant differences satisfactorily. THOMAS's description of *M. sicarius*, "The small middle premolar . . . crowded inwards above and in the toothrow, though crushed below . . .", is, so to speak, overly compact. His comparison (10) between *M. "primula"* and *M. sicarius*, namely "small premolar (of *primula*) even smaller in proportion to the anterior one quite internal to the toothrow. Below, this difference is accentuated, for the middle lower premolar is in *sicarius* in the toothrow and of about one third the area in cross section of the anterior tooth . . ." does not, as will be discussed in detail below, hold equally for all specimens. TATE (7) committed several errors in discussing *M. "primula"* and *M. sicarius*. He states for instance (p. 546) that  $P\ 3/3$  of "*primula*" is in the axis of the toothrow. This is an obvious mistake. Nor is it true that "*primula*" is closely related to *M. emarginatus*, but then TATE (p. 548) states rightly that "*Primula* appears to be even further specialized than *sicarius* in degree of reduction of  $P\ 3/3$ ".



His statements on the same page are also not all valid for *M. sicarius*, for example his assumption concerning "the relatively small Himalayan forms *dobsoni* (= *muri-noides*) and *sicarius* (possibly synonymous)". This inference is now completely false, since I know the original specimen of also *M. dobsoni*. On page 563, he writes (obviously not by THOMAS's original description): "The premolars, P<sup>2</sup> and P<sup>4</sup> approximated, P<sup>3</sup> reduced and displaced . . .". Finally, TATE relegates (p. 541) both *sicarius* and "*primula*" to the subgenus *Myotis*, on page 546 "*primula*" to the subgenus *Selysius*, and on page 562 again to the subgenus *Myotis*, whilst *sicarius* is assigned to the subgenus *Myotis* (p. 548), and then to *Selysius* on page 563. Though HILL (6) had already pointed out these problems with regard to "*primula*", I still deem it necessary to call again attention to them. It is partly owing to the above statements that I propose to submit a detailed discussion of the cranial and dental features of *Myotis annectans* and *Myotis sicarius*, as well as their thorough comparison and distinguishing characters. Concerning the specimens preserved in the British Museum (Nat. Hist.), I used naturally Mr. J. E. HILL's very detailed data and remarks (letter communication).

The data of the research and comparative materials, together with my respective remarks, are as follows.

#### *Myotis annectans* (DOBSON, 1871)

1. BM. 16. 3. 25. 30. + ♂, skin and skull, Pashok, Darjeeling District, 3,500', West Bengal, India, 30 July, 1915, collected by N. A. BAPTISTA.
2. BM. 20. 7. 27. 2. ♂, skin and skull, Teesta Valley, Tea Estate, Assam, India, 3,000', 14 August, 1916, C. PRIMROSE.
3. BM. 20. 7. 27. 3. ♀, skin and skull, Teesta Valley, Tea Estate, Assam, 3,000', 21 July, 1916, C. PRIMROSE.
4. ZSI. 15595 ++ ♀, in alcohol, skull separated, Samoogooting, Nagaland, India, Aug., 1871, J. BUTLER.
5. BNHS. 3774. ♂, skin and skull, Pashok, Darjeeling District, 3,500', 28 Sept., 1915, N. A. BAPTISTA.
6. BNHS. 3804 +++ ♀, skull, C. PRIMROSE.
7. BNHS. 3806 +++ ♀, skull, C. PRIMROSE.

#### *Myotis sicarius* THOMAS, 1915

8. BM. 91. 10. 7. 56. +++++ sex ?, in alcohol, Sikkim, W. T. BLANFORD.
9. BM. 23. 1. 9. 4. ♀, skin and skull, Banso Bahari, Nepal, 20 May, 1922, N. A. BAPTISTA.
10. BM. 23. 1. 9. 5. ♀, skin and skull, Banso Bahari, Nepal, 21 May, 1922, N. A. BAPTISTA.
11. ZSI. 17429 ♀, skull, Banso Bahari, Nepal, 20 May, 1922, N. A. BAPTISTA.
12. BNHS. 3783 ♀, skin and skull, Banso Bahari, Nepal, 17 May, 1922, N. A. BAPTISTA.
13. BNHS. 3784 ♂, skin and skull, Pashok, Darjeeling District, 3,500', 16 July, 1915, N. A. BAPTISTA.

#### Explanation of symbols:

- BM. = British Museum (Natural History), London.  
 ZSI. = Zoological Survey of India, Mammal Section, Calcutta.  
 BNHS. = Bombay Natural History Society, Bombay.  
 + = Holotype of *Myotis primula* THOMAS, 1920.  
 ++ = Holotype of *Myotis annectans* (DOBSON, 1871).  
 +++ = The original labels of these specimens carry no other data than the name of the collector. Their locality is probably the Teesta Valley (Tea Estate), 3,000 ft, and the date of collection assumably 1916, similarly to the data of the material



collected by C. PRIMROSE, now in the British Museum (Nat. Hist.). Incidentally, this locality is, according to Dr. B. BISWAS, not in Assam—as given on the specimens in the British Museum—but in the Darjeeling District, West Bengal. The detailed survey maps also give the same information. It is quite possible furthermore that the locality is near Pashok, indeed they must be rather adjacent to each other (disregarding the 500 feet difference in altitude a.s.l.) since the river Tista (plotted in recent maps), whose watershed area lies in Sikkim, runs here among rapidly decreasing mountains towards the plains. Pashok itself lies in the valley of the Tista.

++++ = Holotype of *Myotis sicarius* THOMAS, 1915.

It is rather interesting that there was captured also a male *Myotis sicarius*, besides the holotype and a further male specimen of *Myotis* "*primula*", in Pashok. The collector had obviously not caught them in the same site and surely not together, as revealed also by the dates of the captures. WROUGHTON (11) recorded already in 1916 that the Bombay Natural History Society, Mammal Survey, had 3 *Myotis* "*sicarius*" from the collection of N. A. BAPTISTA. He also gave the first verbatim citation of O. THOMAS's remarks on these animals. THOMAS's text implies that he received only two of them for study, and later he referred to this fact explicitly (10). Collection Number 500 became later the holotype of *M. "primula"*, whilst No. 391 is identical, as I was able to determine by the original label, with the *M. sicarius* specimen No. 3784 in Bombay (see the list above). Hence the animal bearing Collection Number 861 (that is, No. 3774 in Bombay), a true *M. annectans*, had never been in THOMAS's hands. I was the first to prepare its skull (cooking, clearing) and thus render it measurable for study.

A comparison of the skulls of *Myotis annectans* and *Myotis sicarius* shows that *annectans* is smaller than *sicarius* (cf. Tables I and II). Still, there is an overlap with respect to some cranial measurements, e.g. the least interorbital width, the

MEASUREMENTS OF MYOTIS ANNECTANS

Table 1.

Serial No. of specimen	1.	2.	3.	4.	5.	6.	7.
Measurements							
Length of right forearm	47.0	46.5	45.2	45.8	-	-	-
Length of left forearm	46.9	46.7	45.3	-	46.0	-	-
Greatest length of skull	17.3	16.7	-	16.9	-	17.1	16.9
Condylbasal length	16.7	15.9	-	16.0	16.8	16.6	16.2
Condylcanine length	15.6	14.9	-	15.2	-	15.5	-
Zygomatic width	11.5	-	-	11.5	11.4	-	11.7
Least interorbital width	4.3	4.3	4.2	4.4	4.4	4.4	4.2
Width of braincase	8.4	8.0	7.8	8.1	8.1	8.1	8.0
Mastoid width	8.6	8.5	8.4	8.6	8.9	8.5	8.6
C-C (alveoli; + = crowns)	4.8	4.8	4.6	4.7	4.9 <sup>+</sup>	4.7	4.9 <sup>+</sup>
M <sup>3</sup> -M <sup>3</sup> (crowns)	7.3	7.4	7.2	7.7	7.5	7.6	7.3
C-M <sup>3</sup> (crowns)	6.9	6.6	6.7	6.9	6.9	6.8	6.6
Length of mandible	12.7	-	-	12.8	12.9	13.0	12.7
C-M <sub>2</sub> (crowns)	7.3	7.1	7.2	7.1	7.3	7.2	6.9



braincase width, the mastoid width, the width measured on the outer margin of the  $M^3$ - $M^3$  crowns, and the length of C- $M_3$ . Though this overlap is mostly slight, it occurs clearly in width measurements. Therefore the skull of *annectans*, as compared to that of *sicarius*, can be considered also slightly wider and squatter.

The interorbital bridge is narrow (0.4-0.5 mm) in *annectans* and wide (0.8 mm) in *sicarius*.

The nasal incision of the rostrum is comparatively wider and conspicuously less extending posteriorad in *annectans*, but deeply decurrent in *sicarius*, nearly to the line connecting the rootknobs of the upper canines. On the dorsal surface of the rostrum in *sicarius* the flat section is wider than in *annectans*, with a deep median groove which is considerably shorter and completely evanescent anteriorad in *sicarius*.

The braincase of *M. annectans* is more inflated, but the sagittal crest is lower, and the occipital region less developed in a lateral view, than in *sicarius*.

In *M. annectans*, the anterior emargination of the palate is wider than long and widening posteriorad, its posterior margin also incised; in *sicarius*, it is quadrate or anteroposteriorly elongate and comparatively narrow. In both species, it extends to about the line connecting the centres of the canine cross sections.

The basal pits project less anteriorad in *annectans* than in *sicarius*, and they become shallower frontally against the sharply delimited form in the latter. The distance between the bullae and cochleae of *annectans* is slightly greater than in *sicarius*, and the bulla is generally more inflated.

The ascending branch of the mandible is proportionately smaller in *annectans* than in *sicarius*, but the processus coronoideus of the mandible is widely rounded and high in *annectans* while that of *sicarius* is conical and more truncate.

MEASUREMENTS OF *MYOTIS SICARIUS*

Table 2.

Serial No. of specimen	8.	9.	10.	11.	12.	13.
Measurements						
Length of right forearm	54.5*	-	51.4	-	-	50.0
Length of left forearm	53.7*	48.2	51.6	-	49.1	-
Greatest length of skull	-	18.5	18.8	-	18.2	18.9
Condylobasal length	-	17.5	18.2	-	17.3	17.4
Condylocanine length	-	16.5	17.0	-	-	-
Zygomatic width	-	-	-	-	12.1	12.3
Least interorbital width	-	4.1	4.4	4.1	4.6	4.7
Width of braincase	-	8.0	8.3	-	8.4	8.6
Mastoid width	-	8.8	9.3	-	9.2	9.5
C-C (alveoli; + = crowns)	5.0	5.0	5.0	5.2 <sup>+</sup>	5.0 <sup>+</sup>	5.5 <sup>+</sup>
$M^3$ - $M^3$ (crowns)	7.6	7.7	8.0	8.0	8.1	8.2
C- $M^3$ (crowns)	7.2	7.2	7.5	7.2	7.3	7.5
Length of mandible	-	13.5	-	13.6	14.0	14.2
C- $M_3$ (crowns)	7.8	7.8	8.2	7.2	7.8	8.0

\* Note the comparatively long forearm, although, according to Thomas (10) and Hill (letter communication), the specimen is immature.



The following features may be considered common in the dentition of both species:  $P^3$ —absent in the holotype of *annectans*—is about one-fourth of the cross-section  $P^2$  in the other examined *annectans* specimens, and only about one-half in *sicarius*, however, the proportion of the two small premolars does not differ in the *M. annectans* specimen marked BNHS. 3774 and the *M. sicarius* individual BNHS 3784. In all examined specimens  $P^3$  is completely internal to the toothrow, hence  $P^2$  and  $P^4$  are in contact (excepting the *annectans* specimen BNHS 3804). According to HILL (letter communication), this small premolar is but slightly displaced in the *sicarius* exemplars of the British Museum (Nat. Hist.), while it is much smaller and completely extruded in the *annectans* specimens.  $P^4$  is in both species more or less flattened antero-posteriorly, it is triangular in cross-section and without any trace of its antero-internal cone. The upper molars lack the protoconule.  $M^3$  is in general longer than wide, hence rather squat and not reduced, but still rather variable.

The cross-section of  $P_3$ —also absent in the holotype of *M. annectans*—is comparatively larger in the other *annectans* specimens than in BNHS 3804, wherein it is merely one-sixth of the cross-section of  $P_2$ . In *M. sicarius*,  $P_3$  is merely one-sixth to one-tenth of the cross-section of  $P_2$ . In all individuals of both species examined by me  $P_3$  is wholly internal to the toothrow, except in the *annectans* specimen BNHS 3804 (where it is still aligned with the dental axis) so that  $P_2$  and  $P_4$  are not in contact here, similarly to the situation in the *sicarius* specimen BNHS 3783; in all other exemplars  $P_2$  and  $P_4$  touch each other. On the other hand,  $P_2$  and  $P_4$  are not in contact in the *sicarius* specimens preserved in London, but very much so in *annectans*, since  $P_3$  is in this latter completely internal to the toothrow. The cross-section of  $P_4$  is in general an anteriorly elongated oblong in both species. The talonide of  $M_3$  is more or less wide in both species, but its width exhibits a discernible variation from individual to individual.

The distinguishing characteristics of the dentition of these two species are, according to my observations, as follows: the bulk of  $I^2$  is smaller than that of  $I^1$  in *annectans*, whereas  $I^2$  is especially bulky in *sicarius*. The upper canines of *annectans* are weaker and smaller (cross-section of crown:  $1.15-1.2 \times 1.0-1.1$  mm) than the bulky canines of *sicarius* ( $1.4-1.5 \times 1.1-1.5$  mm). At the same time, the size of the large upper premolars and upper molars of *annectans* is smaller only proportionately to the size of the skull, if compared to that of *sicarius*. In general, the anterior teeth of *M. sicarius* are disproportionately more robust than the dimensions of the skull, while its other teeth are larger only in proportion to the size of the skull, in contrast with the respective ratios in *M. annectans*. As a further difference in features, the talone of the upper molars in *annectans* is more angular (owing to the more robust and projecting hypocone) than the rounded talone of the molars in *sicarius*.

In *M. annectans*,  $I_1$  and  $I_2$  are trilobate; in *sicarius*, they are quadrilobate or at least incipiently so. The cross-section of  $P_2$  is more elongate in *annectans* but antero-posteriorly compressed and shortened in *sicarius*. The cingulum of  $P_4$  in *annectans* is strikingly declivous posteriorad in the buccal lateral view, and in general also strongly sinuous, whereas it is only slightly sloping in *sicarius*, and forming merely two fine lobes.

As is to be seen from the above description, the characteristics of both species, and especially those of *Myotis annectans*, vary to a great degree. In any case, its holotype specimen represents one of the extremes with respect to the small premolars whose morphological differences appear to be insufficient for the separation



of the two species. On the other hand, a number of other features allow the satisfactory delimitation and identification of *M. annectans* and *M. sicarius*.

In HILL's opinion, as put forth in his letter, *M. sicarius* is to be relegated to the nominal subgenus *Myotis*, but *annectans* to the subgenus *Selysius*, as he had already pointed out (6), at least partly, in the case of *M. "primula"*.

It should also be borne in mind that we have to do with really rare, or at least seldom captured, species whose range and populations are probably very limited. Beside the specimens listed in the present paper, there is only one *M. sicarius* exemplar known in literature (TATE, 7).

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