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The identity of *Vespertilio oreias* Temminck, 1840—solving a taxonomic puzzle

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Abstract

Vespertilio oreias (generally known as *Myotis oreias*) has long been considered an endemic bat species to Singapore but its taxonomic status has been in doubt, and no specimens have been found since its description in 1840. Temminck formally described it based on a mounted skin (now in poor condition and accompanied by some skull fragments). The holotype was re-examined and we found it to be a composite, consisting of two separate individuals representing two distinct genera, the skin belonging to a *Kerivoula* whereas the skull fragments are of a *Myotis*. The mounted skin is accepted herewith as the name-bearing type, as the skull fragments were taken out after Temminck had published his description. Unfortunately, neither the skin nor the dental remains show enough anatomical details to identify the species unambiguously. Hence, the name *Vespertilio oreias* is considered a *nomen dubium* and the name *oreias* should be referred to the genus *Kerivoula.*

Key words: Southeast Asia, Singapore, *Myotis oreias, Kerivoula,* holotype, *nomen dubium*

Introduction

Southeast Asia is a global hotspot of bat diversity, where more than a quarter of the world's bat species are found (Kingston 2013) and bats make up about 30% of the region's mammalian fauna (Kingston *et al*. 2006). It is estimated that about 126 bat species are thought to be endemic at least to a single country in Southeast Asia (Kingston 2010). However, in recent years, the endemic status of some of those species has been rescinded by further taxonomic investigations (*e.g.* Thong *et al*. 2012) or collaborative field research through the network formed by the Southeast Asian Bat Conservation Research Unit (SEABCRU) (*e.g.* Struebig *et al*. 2016). There is still much uncertainty about the taxonomy of many Southeast Asian bat species (Kingston 2010) and even in Singapore, the smallest country of the region with a modest bat fauna, which has suffered extinctions from rapid land use change and habitat loss (Lane *et al.* 2006), some taxonomic challenges remain. One of these is that of a supposedly endemic bat—the Singapore Whiskered Bat commonly called *Myotis oreias* (Temminck, 1840).

The Singapore Whiskered Bat has long been regarded as the only mammal endemic to Singapore. Medway (1978) stated that it was a "… poorly known bat, originally described from one specimen collected on Singapore island over a century ago; never subsequently caught again. In the first edition of the Singapore Red Data Book, it was listed as an endangered species despite not having been encountered for more than 150 years (Ng and Wee 1994), presumably because it was felt that there had been too little survey effort pertaining to bats in Singapore and the species might still exist, thereby avoiding the 'Romeo Error' (Collar 1998). With more bat surveys conducted in Singapore between 1992 and 1994, Pottie *et al*. (2005) considered the species locally extinct and suspected that it "may be totally extinct unless other records from the region emerge. Other authors classified the species as indeterminate owing to its uncertain status (Yang *et al*. 1990, Baker and Lim 2008). Francis and Hill (1998), quoting Temminck's remark on the provenance of the holotype, pointed at the possibility that the type specimen had not been collected in Singapore.

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There is a need to verify the taxonomic status of poorly known and supposedly endemic species, because exact and reliable data are needed for biogeographic studies (see Woodruff and Turner 2009) and objective IUCN red-listing assessments of biodiversity. The endemism of a volant mammal species like *M. oreias* on a continental island that is only separated from its nearest large landmass by a channel, which at its narrowest point is only 600 m wide seems odd—a view held by Csorba and Bates (2008). The purpose of this paper is to review the evidence and clarify the species' taxonomic status and validity by re-examining the holotype.

The taxonomic identity of *Vespertilio oreias* Temminck, 1840

Temminck's *Vespertilio oreias* is only known from the holotype, preserved in the National Museum of Natural History (now Naturalis Biodiversity Center) in Leiden, RMNH 35407. After examining a photograph of the specimen, Tate (1941: 546, 561) placed it in the genus *Myotis* though being uncertain about its subgeneric position, regarding it as "Either a *Selysius* or one of the long-eared groups *Isotus* and *Paramyotis*". The specimen, consisting of a mounted skin in poor condition and accompanied by skull fragments, was investigated in detail by one of the authors (GC).

Original description

To make things clear, Temminck's (1840: 270–271) French description of *Vespertilio oreias* is given here in full, followed by a translation.

[p. 270:]

Vespertilion oreiade.—*Vespertilio oreias.*

Remarquable par sa petite taille, qu'accompagnent de très grandes et assez longues oreilles munies d'un tragus long et filiforme; et par l'ample moustache dont les lèvres sont garnies.

Taille et formes du corps de la *pipistrelle* d'Europe, mais les membranes plus larges et plus développées, ces dernières prennent attache à l'origine des doigts; pouce assez long, armé d'un ongle crochu. Oreilles distantes, larges et longues, terminées en pointe fortement arrondie, elles sont d'une couleur claire ou jaunâtre à leur base et totalement nues; le tragus étroit est long, droit et filiforme. Le museau est court et comprimé, se terminant en pointe; les bords de la lèvre supérieure sont garnis d'un double rang de moustaches; les poils qui bordent immédiatement la lèvre sont courts et inclinés vers la mâchoire inférieure, tandis que la seconde rangée est composée de longues soies dirigées en avant; la lèvre inférieure porte aussi quelques poils longs, mais clair-semés. Dents incisives supérieures 4 par paire en haut et 6 en bas. Les molaires n'ont pas été examinés.

[p. 271]:

Pelage abondant, long et bien fourni partout; l'extrême base de la membrane interfémorale très peu poilue et seulement en dessus; toutes les autres membranes nues. Pelage bicolore partout; en dessus, à la base des poils noirâtre, mais tout le reste d'un brun terre d'ombre lustré; les moustaches seules sont noires; en dessous, toute la base des poils est d'un noir mat, et leur pointe est gris, teinté d'isabelle. Les membranes et les oreilles sont d'un brun noirâtre.

Longueur totale 2 pouces, 10 ou 11 lignes, dont la queue, qui est toute enveloppée, prend 1 pouce 2 lignes et demi; hauteur des oreilles 8 lignes; envergure 8 pouces 6 lignes; antibrachium 1 pouce 5 lignes.

Cette jolie espèce, fortement caractérisée et par là facile à reconnaître de ses nombreux congénères, nous est parvenue du continent de l'Inde, dans un envoi d'objets rassamblés à Singapour. Elle fait partie du Musée des Pays-Bas.

La place que nous lui assignons dans la série, est après le *vespertilion exigu*, page 231. [= *Vespertilio brachydactylus*]

Translation: Remarkable for its small size, in combination with very large and fairly long ears with a long and filiform tragus; and by its broad moustache decorating the lips.

Body size and shape as the European *pipistrelle*, but the membranes larger and more developed, the latter attached to the finger bases; thumb fairly long, armed with a curved claw. Ears distant, large and long, with a strongly rounded tip, light-coloured or yellowish at their base and completely naked; the narrow tragus is long, straight and filiform. The nose is short and compressed, with a pointed tip; the edges of the upper lip are decorated by a double row of moustaches; the hairs immediately above the lip are short and inclined towards the lower jaw, whereas the second row consists of long, forward-directed bristles; the lower lip too, has some long, but sparse hairs. There are 4 upper incisors in pairs and 6 lower. The molars have not been examined.

Pelage abundant, long and dense all-over; outer edge of the interfemoral membrane very thinly haired, only below; all other membranes naked. Pelage bicoloured all-over; above, blackish at the base of the hairs, but the rest of a lustrous dark earth-brown; only the moustaches are black; below, the base of the hairs is all dull black, the tips are grey, tinged with Isabella. The membranes and ears are of a blackish brown.

Total length 2 inches, 10 or 11 lines, of which the tail, which is totally enveloped, takes 1 inch 2 and a half lines; height of the ears 8 lines; wingspan 8 inches 6 lines, antebrachium 1 inch 5 lines.

[Note: 1 French "pouce" (inch) is 27 mm; 1 "ligne" (line) is 1/12th pouce = 2.25 mm.]

This beautiful species, very characteristic and thus easily recognizable among its numerous congeners, has come to us from the Indian continent, with a shipment of objects brought together in Singapore. It is in the Netherlands Museum.

The place to which we assign it in the series, is after the *vespertilion exigu*, page 231. [= *Vespertilio brachydactylus*]

Provenance

The provenance of the holotype has been given as Singapore by most authors. However, Temminck clearly states that it had been received from "the Indian continent" with a consignment of objects assembled in Singapore. Nowadays, the Indian continent is taken to mean the present India with perhaps Pakistan and Bangladesh, but in Temminck's context this may well have meant mainland Southeast Asia. In his catalogues of the Leiden mammalian collection, Jentink (1887, 1888) erroneously gives the locality as Singapore, which is also written on the label (not from Temminck's days) of the mounted skin. The species, along with three others, is described in a supplement to Temminck's 1840 monograph. On p. 265, Temminck writes of this: "Ces quatre espèces ont été obtenues très récemment au musée, et lorsque la plus grande partie du texte de ce mémoire se trouvait déjà imprimée." ("These four species have very recently been received by the museum, when the major part of the text was already printed"). This also explains Temminck's additional arrangement in his systematic treatment of the bats. The year of acquisition therefore must have been 1839 or 1840. Unfortunately, a search in the archives of the Leiden Museum has not revealed further details, so the collection locality, date and collector cannot be traced.

Taxonomic revision

Certain external characters of the specimen mentioned already by Temminck are typical *Kerivoula* features, which distinguish these bats from *Myotis* species. These are the filiform tragus; upper lip with a distinctive row of strong hairs; and large and well-developed wing membranes with a characteristic "wrinkled" appearance (Figs. 1–2). Thus, the mounted specimen corresponds with no doubt to a *Kerivoula*. Although having a tragus similar in shape to that of *Kerivoula*, the genus *Phoniscus* can be ruled out by its characteristically different fur colour (showing no signs of four-banded and golden-tipped dorsal hairs). In size (forearm length 38.25 mm according to the original description; 38.9 mm measured by GC and CS on the mounted specimen) and also by colouration (as given in the original description, but still visible in the specimen though undoubtedly, this has faded over the years), it is comparable to species of the *K. papillosa*-complex occurring from south India to Borneo and currently containing the following species: *papillosa* (including *malayana*), *kachinensis*, *lenis* and at least two undescribed species (Hasan and Abdullah 2011, Khan *et al.* 2010, Vanitharani *et al*. 2003, our own unpublished data). However, based on morphological characters, the species cannot be determined.

The following skull remains are registered under the same entry: two fragments of the upper jaw containing the

left I2-P3 and the right I2-M3 toothrows (Fig. 3); and some insignificant remains (Smeenk, pers. comm. in Francis and Hill 1998). Judging from the wide gap between the second incisor and the canine, and the reduced size of the premolars (where the anterior upper premolar is much smaller basally than the upper canine), these fragments evidently belong to a *Myotis* (no Asian species of *Kerivoula* is known to have these characteristics). This taxonomic identity was already noted by Smeenk who wrote: "There can be no doubt that it is indeed a *Myotis*, but I fear not much more can be said about it." (in Francis and Hill 1998: 250). Unfortunately, due to the missing parts of the skull and lower dentition, no specific determination is possible. The dental measurements are as follows: C-M3 length 5.98 mm, C-P4 length 3.01 mm. Cranially, *Phoniscus* can also be excluded by the shape of the upper canines, which in the Leiden specimen are subcircular in outline without the typical deep lateral grooves on the labial face of *Phoniscus*.

FIGURE 1. The mounted skin of RMNH 35407, holotype of *Kerivoula oreias* (Temminck, 1840) on its pedestal (ventral view).

Nomenclatural act

As pointed out above, RMNH 35407, the holotype of *Vespertilio oreias*, is composite, consisting of two separate individuals representing two different genera. In his description, Temminck (1840) used only external characters to distinguish his new species from related taxa; he obviously counted the incisors *in situ* in the skin, but explicitly stated that "the molars have not been examined". Apparently, the skull was extracted afterwards, after which specimens must have become mixed and the wrong skull remains were coupled to the skin. Thus, they were erroneously catalogued by Jentink (1887: 281; 1888: 188) as belonging together and constituting the type of *Vespertilio oreias* Temminck. The mounted skin—on which the description was based—is accepted herewith as the holotype in accordance with Article 73.1.5 of the Code (International Commission on Zoological Nomenclature 1999); the skull fragments including the remaining teeth are excluded as part of the name-bearing type.

The holotype cannot be identified on geographical evidence, and the skin does not show enough anatomical

details to identify the species unambiguously. Hence, the name *Vespertilio oreias* is considered a *nomen dubium*. In monographic works, it should be listed as belonging in the genus *Kerivoula*.

FIGURE 2. Head of *Kerivoula* cf. *papillosa* from Cambodia (left) and details of ear and tragus of the holotype of *Kerivoula oreias* RMNH 35407 (right).

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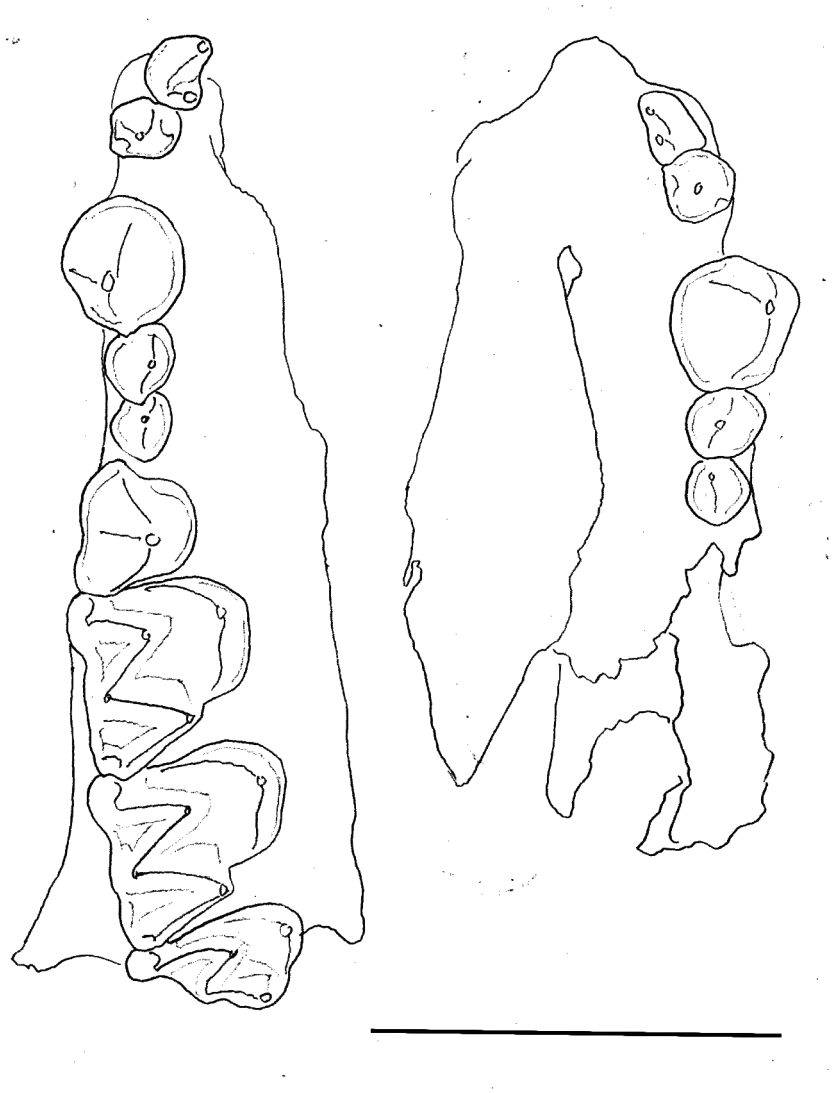

FIGURE 3. The remaining upper dentition of RMNH 35407 associated with the skin, showing its identity as *Myotis* sp. Scale bar = 3 mm.

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