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Notes on some bats from northern Thailand, with comments on the subgeneric status of *Myotis altarium*

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Abstract

Reported is the occurance of four species of bats from extreme northern Thailand collected by members of the National Speleological Society, USA, Thailand Karst Hydrologic Expedition. Single specimens of *Aselliscus stoliczkanus*, *Ia io*, *Miniopterus macrodens*, and *Myotis altarium* were collected. This is the first record of *M. altarium* outside of China and only the second record for *I. io*. Although known from the area, our specimen of *A. stoliczkanus* does not match published color patterns of this species from Thailand. We provide the first published photograph of the skull of *M. altarium* and an expanded description of this species because previously published descriptions are inadequate to place this species at the subgeneric level. We compared *M. altarium* directly to members of three other subgenera of *Myotis* and conclude it belongs in the subgenus *Myotis*.

Introduction

The Thailand Karst Hydrologic Survey, fielded by members of the National Speleological Society between December 1983 and February 1984, provided several specimens of cave-dwelling bats from the limestone mountains of extreme northern Thailand. We report here three species of Vespertilionidae plus one species of Hipposideridae. We found published descriptions of one of the species collected, *Myotis altarium*, inadequate to properly place it at the subgeneric level. Therefore, we present an expanded description of *M. altarium*, as well as, the first photographs of its skull. Specimens have been deposited in the mammal collection of the Natural History Museum of Los Angeles County (LACM). The rhinolophids collected during this expedition are reported separately (McFarlane and Blood 1986).

Results and discussion

Systematic accounts

Aselliscus stoliczkanus Dobson, 1871 (Hipposideridae)

Specimen collected; LACM 70301; collected by R. Hemperly, 24 Dec. 1983; male, in alcohol with skull extracted. Northern Thailand; Chang Dao Mountain, Chang Dao Cave. 19°23′N, 98°54′E. Some selected measurements (in mm) are head and body length, 43; tail length, 38; forearm length, 41; greatest length of skull, 18; hind foot length, 5; ear length, 8. Lekagul and McNeeley (1977) report this species to be uncommon, but wide spread. They further report that this species occurs in two color phases, a brown-gray phase and a yellow-red phase. The LACM specimen has long dorsal fur (7 mm) which is a creamy white at its base with rich dark brown tips. The ventral fur color is a silvery brown.

Miniopterus macrodens Maeda, 1982 (Vespertilionidae)

Specimen collected: LACM 70323; collected by R. Hemperly 12 Jan. 1984; male, in alcohol with skull extracted. Northern Thailand, Aung Kang Region, Big House Cave; 19°50′N, 99°10′E. Selected measurements (in mm) are as follows; total length, 107; forearm length, 50.5; greatest length of skull, 16.4; ear length 16; tragus length, 4.5; length of third metarcarpal, 47.5; length of first phalanx of digit 3, 11.9; length of second phalanx of digit 3, 34.5. Our specimen is all black in color including the flight membranes. This species is part of the *M. maginater* group (R. Peterson, pers. comm.)

Ia io Thomas, 1902 (Vespertilionidae)

Specimen collected: LACM 70321; collected by R. Hemperly 11 Jan. 1984; in alcohol. Northern Thailand, Aung Kang Region, Big House Cave. 19°50′N, 99°10′E. Some representative measurements (in mm) include head and body length, 90.6; tail length, 71.5; forearm length, 75.3; ear length, 26; tragus length, 8.5; length of metacarpal III, 68.3; length of third phalanx of digit III, 11.9. This specimen was collected by hand near the entrance of Big House Cave. The field notes indicate that it was not in the immediate company of other bats. However, three other species were collected in this same cave: *Rhinolophus malayanus, R. robinsoni*, and *M. altarium* (McFarlane and Blood 1986). Only one other specimen (Museum of Comparative Zoology 3549) is known from northern Thailand, near Chang Dao (Allen and Coolidge 1940).

Myotis altarium Thomas, 1911 (Vespertilionidae)

Specimen collected: LACM 70234, collected by J. Benedict 19 Jan. 1984; Northern Thailand, Aung Kang Region, Big House Cave; male, in alcohol with skull extracted. This single specimen was collected approximately one meter above a stream, on the cave wall. The field notes do not indicate whether or not this specimen was near other bats. This specimen represents the first record for this species outside of mainland China and extends the known range for this species by 1250 km southwest. The two other known localities are Omi San, Szechwan Province, China (the type locality) and 3 mi. east of Kweiyang City in Kweichow Province, China (Stager 1949). Two of Stager's six specimens (LACM 8214 and 8215) compare favorably with the new specimen. Selected measurements of LACM 70234, 8214, 8215, and the type (as given by Thomas 1911) respectively are as follows: head and body length, 55, 60, 58, 55; forearm length, 44, 45.35, 42.90, 45; tibia, 16.50, 18.65, 18.10, 29 (reported as lower leg plus foot), hindfoot length, 11, 12, 12, none repoted for type, ear length, 22, 24, 24, 22; greatest length of skull, 15.50, 15.95, 16, 15.2.

In addition to *M. altarium*, seven other species of *Myotis* are known from northern Thailand (Lekagul and McNeely 1977): *M. mystacinus, M. annectans, M. rosseti, M. siligorensis, M. horsfieldii, M. chinensis,* and *M. hasseltii*. Published information on the relationships of *M. altarium* are contradictory because so little material is available.

Thomas (1911) stated that the morphology of *M. altarium* most resembled *M. pequinus*, a member of the large footed subgenus, *Leuconoe*. Tate (1941) placed *M. altarium* in the *M. emarginatus* section of the subgenus *Selysius*. The other species in this section of *Selysius* (sensu Tate 1941) are *M. emarginatus, M. peytoni* (= *montivagus*; Honacki et al. 1982), *M. primula* (= *annectans*; Honacki et al. 1982), and *M. saturatus* (= *emarginatus*; Corbet 1978). Findley (1972) also placed *M. altarium* in the subgenus *Selysius*, but this analysis placed *M. altarium* close to a different group of species: *M. mystacinus, M. siligorensis, M. davidii* (= *mystacinus*; Honacki et al. 1982), and *M. ikonnikovi*, Findley's (1972) analysis and later classification placed the species *M. emarginatus* and *M. pequinus* into the subgenus *Myotis*. The relationships of *M. altarium* are

therefore confused, because according to Tate (1941) it should be placed close to *M. emarginatus* and so should be in the subgenus *Myotis* as this subgenus is characterized by Findley (1972).

Based upon the three LACM specimens and Thomas (1911), *M. altarium* can be characterized as follows: a medium sized *Myotis* with ears twice as long as they are wide, and which are distinctively black and translucent. The lateral edge of the ears are folded cranially. When laid forward the ears reach 5 mm beyond the tip of the muzzle. There is a distinct lobule at the base of the ear. The lobule is separated from the ear by a deep notch. The tragus is long, thin, and bluntly pointed. The flight membranes are naked, blackish brown in color and attach to the hind foot at the distal end of the metatarsal of digit one. There are eight striae on the uropatagium, which is naked dorsally, but with scattered hairs ventrally. The dorsal fur is light brownish in color and 12–15 mm in length. The ventral fur color is lighter having dark bases and whitish tips. The calcar is weakly lobed at its mid point. The hind foot measures over 60% of tibial length.

The skull of *Myotis altarium* (Fig. 1) has a short and distinctly upturned rostrum in lateral view. A line drawn along the long axis of the rostrum intersects a line drawn along the long axis of the cranium at approximately 145°. The skull slopes sharply anteriorly to a point above the posterior premolars. The skull profile has a slight convexity at mid-braincase (where the frontal and parietal bones meet). The nasal bones are flattened proximally and slightly arched (lateral to medial) distally and curved upwards distally at the premaxillary-nasal junction. The junction of the premaxillary-nasal bones is at the level of the superior surface of the orbit. The posterior part of the premaxillary bones are arched and display a obvious bump in lateral view. The zygomatic arches are consistant in depth, as seen in lateral view and expand somewhat posteriorly in dorsal view. The anteorbital foramen opens 0.7 mm anterior to the orbit above the anterior labial root of P^3 and is 0.3 mm in diameter. The anteorbital foramen leads to an enclosed basin found above the roots of the premolars.

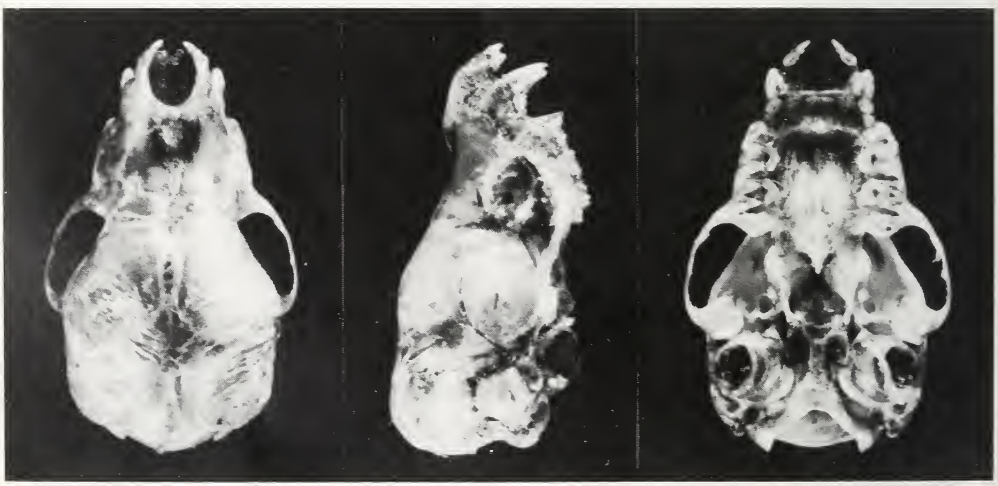

Fig. 1. Dorsal, lateral, and ventral views of the cranium of *M. altarium*. (Approximately 3× life size)

The ventral skull surface displays several distinctive features. The palate is deeply vaulted. An unusual feature of the palate is a sharp ridge running transversely between the canine teeth. The foramen ovale is large and conspicuous in ventral view. The basisphenoid is raised above the floor of the interbullar area resembling a bridge. There is no sagittal crest on any of the specimens. All upper and lower premolars are fully in line with the

toothrow. The dental formula is 2/3-1/1-3/3-3/3. The ratio of the length to width of the M^3 is 1:3. The crown of the M^2 is characterized by not possessing a ridge connecting the hypocone and metacone. Because of the orientation of the rostrum the incisors and canines are directed obliquely anteriorly.

We have examined both Tate (1941) and Findley (1972) in compiling a provisional list of characteristics of these three subgenera of *Myotis*. Although it is not within the scope of this paper to attempt to fully characterize all the subgenera of the genus *Myotis* we briefly list some of the most important characteristics of the subgenera needed to evaluate *M. altarium*.

M. altarium is not a member of the large-footed subgenus *Leuconoe* because it does not possess a protoconule on its upper molars, a key characteristic of this subgenus (Tate 1941). Species within the subgenus *Selysius* possess at least the following: small feet (< 50 per cent of the tibia length), wing membrane to base of first toe, calcar with lobe, ear small, low rostrum with abruptly rising frontal region, length to width ratio of M^3 is 0.8 to 1.5, small overall size, large uropatagial traps, uropatagial hairs restricted to striae, anteorbital foramen diameter near 0.6 mm. The species included within the subgenus *Myotis* possess at least the following: large species with the feet not enlarged (hind foot at least 60 per cent of tibia length), ears can be elongate, broadened or both, rostrum is low with a gradually rising frontal region, uropatagium nearly naked with hairs scattered widely over its surface not restricted to striae, length to width ratio of M^3 is 1 to 2.7, anteorbital foramen is close to orbit.

In order to best compare the above characteristics to *M. altarium* we examined members of each subgenus and compared them directly to *M. altarium* (see specimens examined). The dorsal skull profile and the longitudinal sulcus between the nasal bones in *M. altarium* are intermediate between *M. myotis* and *M. muricola*. This sulcus is deep in *M. emarginatus* and *M. muricola* and essentially missing in *M. myotis*. The structure of the zygomatic arches, crown pattern of M^2, disposition of the anteorbital foreamen, distribution of uropatagial hair, attachment of the wing to the foot, length to width ratio of M^3, relative length of its hind foot, and ear structure most closely resemble the condition of the subgenus *Myotis*.

In conclusion, based upon the comparisons we have made *M. altarium* is best considered closest to the subgenus *Myotis*, but our comparison has been too narrow to place *M. altarium* close to any one species of *Myotis*.

Specimens examined

Myotis altarium (3); LACM 70234, 8214, 8215, localities in text: *Myotis emarginatus* (5); LACM 58397–58401, Portugal: *Myotis thysanodes* (1); LACM 55951, Colima, Mexico: *Myotis daubentoni* (1); LACM 58781, Germany: *Myotis muricola* (6); American Museum of Natural History (AMNH) 102967–102972, Sumatra: *Myotis myotis* (6); AMNH 150102–150107, Bavaria, Germany.

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Zusammenfassung

Über einige Fledermäuse aus dem nördlichen Thailand mit Bemerkungen zur subgenerischen Zugehörigkeit von Myotis altarium

Über folgende, im äußersten Norden Thailands Ende 1983 bis Anfang 1984 gesammelten Fledermausarten wird berichtet: *Aselliscus stoliczkanus, Ia io, Miniopterus macrodens* und *Myotis altarium*. Unser Exemplar von *Myotis altarium* bildet den ersten Nachweis dieser Art außerhalb Chinas. Wie eine ausführliche Beschreibung ergibt, dürfte *M. altarium* in die Untergattung *Myotis* der Gattung *Myotis* gehören.

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