

Molecular data from the holotype of the enigmatic Bornean Black Shrew, *Suncus ater* Medway, 1965 (Soricidae, Crocidurinae), place it in the genus *Palawanosorex*

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Abstract

Although Borneo has received more attention from biologists than most other islands in the Malay Archipelago, many questions regarding the systematic relationships of Bornean mammals remain. Using next-generation sequencing technology, we obtained mitochondrial DNA sequences from the holotype of *Suncus ater*, the only known specimen of this shrew. Several shrews collected recently in Sarawak are closely aligned, both morphologically and mitochondrially, with the holotype of *S. ater*. Phylogenetic analyses of mitochondrial sequences indicate that the *S. ater* holotype and new Sarawak specimens do not belong to the genus *Suncus*, but instead are most closely related to *Palawanosorex muscorum*. Until now *Palawanosorex* has been known only from the neighboring Philippine island of Palawan. Additional sequences from nuclear ultra-conserved elements from the new Sarawak specimens strongly support a sister relationship to *P. muscorum*. We therefore transfer *ater* to *Palawanosorex*. The new specimens demonstrate that *P. ater* is more widespread in northern Borneo than previously recorded. Continued sampling of Bornean mammal diversity and reexamination of type material are critical in understanding the evolutionary history of the biologically rich Malay Archipelago.

Keywords

Borneo, *Palawanosorex*, Southeast Asia, Sunda Shelf, ultraconserved elements

Introduction

The biological richness of Borneo inspired the fields of evolutionary biology and biogeography (Wallace 1869). Nevertheless, Borneo's flora and fauna remain woefully understudied. One mammalian group that exemplifies this problem is the white-toothed shrews (Soricidae, Crocidurinae). Currently, five species are recognized from the island, three in the genus *Crocidura* Wagler, 1832 (*C. foetida* Peters, 1870, *C. neglecta* Jenkins, 1888, and *C. baluensis* Thomas, 1898) and two in the genus *Suncus* Ehrenberg, 1832 (*S. ater* Medway, 1965, and *S. hosei* Thomas, 1893). However, uncertainty remains regarding the number of species, particularly due to the presence of three named subspecies of *C. foetida* and the possible presence of *C. nigripes* Miller & Hollister, 1921 (Hinckley et al. 2022). The lack of clarity regarding the diversity of shrews from Borneo is primarily due to the paucity of specimens from the island and, secondarily, a lack of genetic data from type material.

Arguably the most enigmatic shrew from Borneo is the Black Shrew, *Suncus ater*, which, to our knowledge, is known only from the holotype. The holotype (MCZ 36547; Museum of Comparative Zoology, Harvard University, Cambridge, MA, USA) was collected in 1937 around 1675 m (5,500 ft) elevation on Mount Kinabalu, Sabah, Malaysia (Griswold 1939). It was originally identified as *C. foetida*. However, Medway (1965) revisited the shrews of Borneo and determined that this specimen represented an undescribed species of the widespread genus *Suncus*. The generic identification was largely attributed to the presence of a fifth unicuspid that is characteristic of *Suncus* but is lacking in *Crocidura*. Additionally, the dark black pelage, dark hands and feet, and short tail relative to head-body length clearly distinguished the specimen from *C. foetida*. Medway (1965) suggested that this shrew is vastly different from any other Southeast Asian shrew but closely aligned with *Suncus dayi* Dobson, 1888 from southern India.

No other specimens of *S. ater* have been reported in the literature. However, a single specimen labeled as *S. ater* is cataloged in the Field Museum of Natural History, Chicago, USA (FMNH 159012). We inspected this specimen and quickly determined it to be much smaller than the type of *S. ater* (length of skull = 14 mm vs 21 mm in the *S. ater* holotype), and instead it likely represents *S. hosei*, a putative member of the *Suncus etruscus* Savi, 1822 species complex (Corbet and Hill 1992; Hutterer 2005; Omar et al. 2013). We recently sampled small mammals from two locations in northern Sarawak, Malaysia (Fig. 1) and recovered several medium-sized, dark-colored shrews with relatively short tails and a fifth unicuspid that match the physical description of *S. ater* (Medway 1965). We sequenced mitochondrial DNA from the holotype of *S. ater* and mitochondrial and nuclear DNA from the new Sarawak specimens to determine the phylogenetic placement of the holotype and our new specimens.