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Nyctomyia biunguiculata, a new cavernicolous species of tribe Aedini (Diptera: Culicidae) from southern Thailand

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Abstract

Nyctomyia biunguiculata, **sp. n.**, is described from a unique male reared from a pupa (exuviae partially decomposed and over cleared) collected from a rimstone pool deep inside Wat Sumano cave located in Phatthalung Province of southern Thailand. The genitalia of the holotype are illustrated, and the species is compared with *Nc. pholeocola*, the type species of the genus described from a cave in another province of southern Thailand. The species has not been found outside the cave and appears to be a true troglobite.

Key words: *Nyctomyia biunguiculata* **sp. n.**, *Nc. pholeocola*, mosquito, taxonomy, troglobite

Introduction

Caves harbour a number of distinct and interesting mosquito species. These are true cavernicolous species that are restricted to specific caves and have no apparent close relatives in the outside environment. They seemingly evolved from ancestors which had a propensity for entering caves in search of food sources, used cavernicolous water bodies for oviposition and gave rise to isolated cave-dwelling populations that evolved independently from the epigeal parental stocks. These species became troglobites, i.e. they only live in caves and do not leave them (Chapman, 1982). Unlike other troglofauna, cavernicolous mosquitoes do not seem to have evolved any obvious physical adaptations to life in the subterranean environment, such as loss of eyes or pigmentation. However, it is likely that they have evolved physiological adaptations and characteristics for continued survival underground.

Seven apparently true troglobite mosquito species are known, including *Anopheles (Cellia) hamoni* Adam (DR Congo), *An. (Cel.) vanhoofti* Wanson & Lebiec (DR Congo), *Borichinda cavernicola* Rattanarithikul & Harbach (Thailand), *Culex (Culiciomyia) harrisoni* Sirivanakarn (Thailand), *Isoaedes cavaticus* (Reinert) (Thailand), *Nyctomyia pholeocola* (Linton & Harbach) (Thailand) and *Uranotaenia (Pseudoficalbia) cavernicola* Mattingly (Belgian Congo). Two species, *Anopheles (Cellia) smithii* Theobald (northwestern Africa) and *Ur. (Pfc.) sumethi* Peyton & Rattanarithikul (Thailand), are known to enter caves, and two others, *An. (Cel.) caroni* Adam (DR Congo) and *Culex (Lophoceraomyia) kusaiensis* Bohart (Caroline Islands), have been found at the entrances (mouths) of caves. The new species described here appears to be another troglobite.

Material and methods

This study is based on a male mosquito reared from a pupa collected from a rimstone pool in Wat Sumano cave located in Phatthalung Province of southern Thailand (see **Holotype**). The specimen was point-mounted on an insect pin and its genitalia were dissected, cleared in 5% NaOH for 2 h at 50°C and mounted in Euparal on a microscope slide. The pinned specimen was examined under simulated natural light with an Olympus SZ6045

Holotype. Male, with pupal exuviae (partially decomposed and over cleared) and dissected genitalia on separate microscope slides, THAILAND: *Phatthalung Province*, Srinagarindra District, Wat Sumano cave (07° 35' 10.4" N, 99° 52' 6.5" E), rimstone pool (0.5 x 0.5 m), 15.iv.2011 (M. Isenstadt). Deposited in the Natural History Museum, London.

Discussion

Three mosquito species, each the type species of a monobasic genus of tribe Aedini, were previously discovered in caves in Thailand, including *Borichinda cavernicola* (type locality: Borichinda cave, Chiangmai Province, northern Thailand), *Isoaedes cavaticus* (type locality: Gang Lawa cave, Kanchanaburi Province, west-central Thailand) and *Nyctomyia pholeocola* (type locality: Wat Tham Phanturat cave, Surat Thani Province, southern Thailand) (Harbach *et al.*, 2007; Reinert, 1979; Harbach *et al.*, 2013, respectively). *Isoaedes cavaticus* has also been found in two caves located about 120 km northwest of the type locality (Harrison *et al.*, 1991). A fourth species, *Culex harrisoni* of subgenus *Culiciomyia*, is only known from Chiang Dao cave in the mountainous area of Chiang Dao District, Chiangmai Province, northern Thailand (Sirivanakarn, 1977). The new species described here is the first newly discovered troglobite species to be placed in an existing generic-level taxon. Despite being found in a cave located about 450 km southeast of the cave that harbours *Nc. pholeocola* (Fig. 2, see also for the type localities of the other Thai cave species), there is no doubt that these species are closely related members of the same genus. The male of *Nc. biunguiculata* exhibits the generic characteristics of *Nyctomyia* (see Harbach *et al.*, 2013, as *Nyx*, preoccupied) and differs from the male of *Nc. pholeocola* by being slightly larger and in having narrow scales on the alula of the wing (scales broad in *Nc. pholeocola*), more numerous setae on the basal dorsomesal lobe of the gonocoxite (not apparent in Fig. 1), expanded distal portion of the gonostylus with an uneven row of relatively short, straight setae (straight row of longer setae with hooked apices in *Nc. pholeocola*); claspette with two shorter, stouter setae (two longer, slender setae in *Nc. pholeocola*), several setae on the proximal part of the gonostylus (absent in *Nc. pholeocola*) and two slightly subapical gonostylar claws (single apical claw in *Nc. pholeocola*). Additionally, there is an indication that the aedeagus is slightly larger and borne in a more cephalad position relative to the proctiger in *Nc. unguiculata*.

Prior to the discovery of *Nc. biunguiculata*, the mosquito fauna of Thailand included 460 species classified in 54 genera and 40 subgenera (Rattarithikul *et al.*, 2010; Harbach *et al.*, 2013) [the preoccupied generic name proposed by the latter authors was replaced by Harbach, 2013]. With the addition of *Nc. biunguiculata*, the Thai mosquito fauna now includes 461 species. The number of species in Thailand is certainly greater than this as several undescribed species are currently known and more are likely to be discovered, especially in the country's numerous caves.

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