



## Original Paper

Ultrastructure of male terminalia of *Boettcherisca peregrina* and *Boettcherisca nathani* (Diptera: Sarcophagidae), flesh fly species of forensic importance

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## ABSTRACT

Flesh flies are received greater attention due to their use as evidence in forensic investigations of decomposing human remains. Investigators will often use age of immature insects associated with such remains as the minimal postmortem interval (PMI<sub>min</sub>) given certain assumptions. *Boettcherisca peregrina* is a significant flesh fly species of forensic importance in several countries, whereas *B. nathani* is potentially a species of forensic importance. Distinguishing these two species is difficult and relies on close examination of the male terminalia. For genus *Boettcherisca* belonging to subfamily Sarcophaginae, identification is primarily based on the morphological structures associated with male terminalia. Using light microscopy and scanning electron microscopy, similarities and differences were determined for these two species. In this study, *B. peregrina* was collected from an urban area of Mueang District, while *B. nathani* was collected from the highland forest area of Doi Saket District, Chiang Mai province, northern Thailand. The morphological observations indicated similarities in the morphology of vesica (large, rounded anterior margin, bi-lobed, half upper-outer margins serrated), harpes (well-developed, elongated, broad basally with bifurcated apically) and lateral styli (two parallel tube-like with open ends with microsemination apically) in both species. However, differences were found with the cercus and juxta. With regards to the cercus, *B. peregrina* has bristles or setae only along the posterior surface and the cercal tip is pointed, while *B. nathani* has bristles or setae on both the anterior and posterior surfaces, and the cercal tip is hook-shaped. Morphometric measurements of three criteria of the cerci (length from top to middle, internal distance at narrow part and distance between apex of cercal prong) revealed that the average length of each criteria of *B. nathani* cerci ( $n = 30$ ) were significantly greater than *B. peregrina* cerci ( $n = 30$ ). As for the juxta, the juxtal lateral plate was different: primarily bifurcated in *B. peregrina* and non-bifurcated in *B. nathani*. The medial part of juxta was different: V-shaped 95.8% (46/48) and, to a lesser extent, W-shaped 4.2% (2/48) in *B. peregrina*, only W-shaped 100% (52/52) in *B. nathani*. Such information is useful for entomologists to distinguish between adult males of these two species, which could be valuable when determining colonization patterns in association with decomposing human remains.

## 1. Introduction

The Sarcophagidae or flesh flies consist of 173 genera and over 3000 described species worldwide, comprising three subfamilies, i.e., Milogrammatinae, Paramacronychiinae and Sarcophaginae (Pape et al., 2011). In Thailand, 31 genera and 86 species of flesh flies were listed

(Kurahashi and Samerjai 2018). In the large subfamily of Sarcophaginae, some species are carrion breeders and initial corpse colonizers (Meiklejohn et al., 2012). The genus *Boettcherisca* classified in this subfamily has been reported from various localities and many parts of the world including the Oriental, Palaearctic, Australasian and Oceanian regions (Wang et al., 2017a; Kaur et al., 2020). *Boettcherisca peregrina*

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