

Article

Molecular Analysis of Forensically Important Blow Flies in Thailand

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Abstract: Blow flies are the first insect group to colonize on a dead body and thus correct species identification is a crucial step in forensic investigations for estimating the minimum postmortem interval, as developmental times are species-specific. Due to the difficulty of traditional morphology-based identification such as the morphological similarity of closely related species and uncovered taxonomic keys for all developmental stages, DNA-based identification has been increasing in interest, especially in high biodiversity areas such as Thailand. In this study, the effectiveness of long mitochondrial cytochrome *c* oxidase subunit I and II (*COI* and *COII*) sequences (1247 and 635 bp, respectively) in identifying 16 species of forensically relevant blow flies in Thailand (*Chrysomya bezziana*, *Chrysomya chani*, *Chrysomya megacephala*, *Chrysomya nigripes*, *Chrysomya pinguis*, *Chrysomya rufifacies*, *Chrysomya thanomthini*, *Chrysomya villeneuvei*, *Lucilia cuprina*, *Lucilia papuensis*, *Lucilia porphyrina*, *Lucilia sinensis*, *Hemipyrellia ligurriens*, *Hemipyrellia pulchra*, *Hypopygiopsis infumata*, and *Hypopygiopsis tumrasvini*) was assessed using distance-based (Kimura two-parameter distances based on Best Match, Best Close Match, and All Species Barcodes criteria) and tree-based (grouping taxa by sequence similarity in the neighbor-joining tree) methods. Analyses of the obtained sequence data demonstrated that *COI* and *COII* genes were effective markers for accurate species identification of the Thai blow flies. This study has not only demonstrated the genetic diversity of Thai blow flies, but also provided a reliable DNA reference database for further use in forensic entomology within the country and other regions where these species exist.

Keywords: forensic entomology; molecular identification; *COI*; *COII*; blow flies; Thailand

1. Introduction

Among necrophagous insects, blow flies (Diptera: Calliphoridae) are the first comers to colonize on a corpse within a few hours after death [1–3]. Therefore, the age of developing blow flies on a corpse can be used to estimate a minimum postmortem interval (PMI_{min}), which is the window of time between the day when insects first colonized the body and when the corpse is found [4]. Since developmental times of blow flies are species-specific even between closely related species, correct species identification is a crucial step for accurate PMI_{min} estimation [5]. Traditionally, blow flies would be identified using morphology, but the available taxonomic keys do not provide features for all