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SARCOPHAGA DUX THOMSON (DIPTERA: SARCOPHAGIDAE) RECOVERED FROM WRAPPED BODY OF AN INFANT: ITS EVIDENTIAL VALUE

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ABSTRACT

The decomposed body of a male infant was found in an oil palm estate in Rengit, Batu Pahat, Johor wrapped with clothes. Entomological specimens recovered in this case were flesh fly larvae, *Sarcophaga* (*Liosarcophaga*) *dux* Thomson and *Sarcophaga peregrina* (Robineau-Desvoidy) (Diptera: Sarcophagidae). Minimum post mortem interval (PMI_{min}) was approximately 48 hrs based on the largest specimen, i.e. *S. dux*. This species has been featured as forensically important species in Malaysia but scarcity of developmental data and bionomics in cadaver environment limit its utilization in forensic case. Issues pertaining its evidential value in this case and recommendations are described herein.

Keywords: forensic entomology, post mortem interval, Sarcophagidae, flesh fly

ABSTRAK

Mayat bayi lelaki reput dijumpai di sebuah estet kelapa sawit di Rengit, Batu Pahat, Johor, dibungkus dengan pakaian. Spesimen entomologi yang dijumpai dalam kes ini terdiri daripada larva lalat daging, *Sarcophaga* (*Liosarcophaga*) *dux* Thomson dan *Sarcophaga peregrina* (Robineau-Desvoidy) (Diptera: Sarcophagidae). Selang masa pasca kematian minimum (PMI_{min}) adalah 48 jam berdasarkan spesimen yang paling besar, i.e. *S. dux*. Spesies ini telah direkodkan sebagai spesies berkepentingan forensik di Malaysia tetapi kekurangan data perkembangan dan bionomik di persekitaran mayat mengehadkan aplikasinya dalam kes forensik. Isu dan syor berkenaan nilai bukti dalam kes ini turut dihuraikan.

Kata kunci: entomologi forensik, selang masa pasca kematian, Sarcophagidae, lalat daging

INTRODUCTION

The flesh flies (Diptera: Sarcophagidae) have been featured in forensic cases including in Malaysia. This fly family can be considered as the second most important group breeding on human remains after the blow flies (Diptera: Calliphoridae) (Byrd & Castner 2010). However, similar appearances of larvae from different species had caused difficulty in identification (Sukontason et al. 2010) and taxonomic identification mostly depends on the male genitalia (Marshall 2012). In recent years, interests have been shifted to Sarcophagidae and development of simplified taxonomic keys have becoming helpful to identify Sarcophagidae especially in Malaysia and neighboring countries (Sukontason et al. 2010; Samerjai et al. 2014; Heo et al. 2015). The forensically important species of Sarcophagidae in Malaysia is currently represented by 17 species, based on their occurrences on decomposed animal tissues and human remains, including

Sarcophaga (*Liosarcophaga*) *dux* Thomson (Tan et al. 2010). It is a species of medical importance and its distribution is not limited to the Oriental region (Sukontason et al. 2014). It has been recorded causing aural myiasis on human in Thailand (Sukontason e al. 2014) and parasitized scorpions in China (Shi et al. 2015). In Malaysia, *S. dux* has been featured in forensic cases (Nazni et al. 2015) including the current case being presented herein. Developmental data of *S. dux* in this region is scarce and it is the main purpose of this paper to further highlight the importance of this species as an important evidence in forensic entomology.

Case Background

On 22 April 2016 at approximately 0830 hrs, a body of male infant was found in an oil palm estate in Rengit, Batu Pahat Johor. An autopsy was performed on 23 April 2016 at 1130 hrs and entomological specimens were collected during the autopsy. From the forensic pathologist's observation, the body was in a state of active decomposition with considerably minimal infestation of fly larvae observed inside the clothes that wrapped the body. Entomological specimens, consist of 2 preserved larvae and 3 larvae were sent to Forensic Entomology Laboratory, Faculty of Health Sciences, Universiti Kebangsaan Malaysia on 25 April 2016. Upon receiving the specimens, a chain of custody voucher was provided to the sender. In the laboratory, live specimens were transferred in a plastic rearing container half-filled with sawdust and ≈70 g cow's liver as food for larvae. The specimens were reared until adult stage to facilitate species identification. The preserved larvae were used as indicators for PMI_{min} estimation. Length of each specimen was measured by using stereomicroscope fitted with DinoLite™ digital camera and DinoCapture™ software. After measuring the length, larvae were processed and mounted on slides for species identification. It was found that the preserved larvae consist of *S. dux* and *Sarcophaga peregrina* (Robineau-Desvoidy). Adult male sarcophagids reared from larvae were all identified as *S. dux.* Identification of both species based on larvae and adult specimens was conducted based

on descriptions of local Sarcophagidae (Sukontason et al. 2010; 2014; Heo et al. 2015).

PMI_{min} estimation was based on the age of the oldest insect specimens found on the body. In this investigation, the life cycle of the largest larva i.e. *S. dux* (third instar, body length = 16.9 mm) was used as reference. At environmental temperature of 35.2 – 37.9ºC, this species took approximately 48 hrs to reach almost similar length as recorded by Sukontason et al. (2010). Based on Sukontason et al. (2010) the maximum length that could be achieved by *S. dux* larva was nearly 18 mm. Environmental temperatures 3 days prior to body discovery in Rengit from local meteorological station were estimated almost similar to study by Sukontason et al. (2010), i.e. 35.0 – 36.0ºC. In retrospective, infestation of *S. dux* larva on the body might have begun on 21 April 2016.

At 35ºC, total larva duration for *S. peregrina* was 5 days (Villet et al. 2006) but the specimen (third instar, body length = 10.46 mm) was possibly half from its total developmental milestone. It has been recorded that *S. peregrina* larvae could reach 24.36±0.82 mm during its third instar post feeding stage when reared at 25±5ºC (Majumder et al. 2012). Due to limited number of specimens provided for the analysis and the scarcity of *S. peregrina* developmental data, PMI_{min} estimation was based on the age estimation of *S. dux* larva.

Several limitations were noted in this analysis. Firstly, the number of specimens received in this case could be considered inadequate to represent overall life cycle of insects occurred on the body. The PMI_{min} was estimated based on the age of single *S. dux*. For future work, it is recommended that if larvae on the corpse are fewer than 100, all should be sampled for analysis (Amendt et al. 2007). Secondly, the arrival of *S. dux* was possibly delayed by the condition of the body being wrapped in clothes. Such condition could affect period of insect activity (PIA) that usually correlates with estimation of PMI_{min} (Tomberlin et al.

2011). After evaluating this condition, it was possible that the adult *S. dux* larviposit on the surface of the clothes and the larvae succeeded development in the concealed parts of the body. This might explain why in this case there were no representatives from Calliphoridae that normally oviposit directly on human remains. In tropical environment, wrapping of decomposing remains could delay invasion of blow flies up to 2.5 days (Goff 1992). Therefore, studies focusing on the PIA on bodies in concealed environments can provide better understanding on the relationship between insect colonization and PMI_{min}.

In addition to the above, and thirdly, viviparity or ovoviviparity in *S. dux* is poorly studied. It is generally known that almost all Sarcophagidae are either obligate oviviparity or multilarviparity (Meier et al. 1999). *Sarcophaga dux* has been documented performing larviposition (Kumara et al. 2013) but in rare occasion, it has been observed to lay eggs (possibly ovoviviparity) in laboratory environment (Sukontason et al. 2010; 2014). By having this ability to incubate eggs or retain larvae longer in the uterus, PMI_{min} estimation based on the age of the larvae could be inaccurate as the precocious development or internal incubation period was not considered (Villet et al. 2010)

This report highlights the occurrence of *S. dux* in a death investigation and issues pertaining its evidential value. It is likely this species could be featured as forensic evidence in the future. Therefore, further studies on *S. dux* focusing the aspect of sampling, PIA and development can help to improve its evidential value in forensic entomology.

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