

## BRIEF COMMUNICATION

### Recovery of forensically important insect larvae from human cadavers in Malaysia (1993-1996)

HL LEE MSc, BSc (Hons)

*Division of Medical Entomology, Institute for Medical Research, Kuala Lumpur, Malaysia.*

#### Abstract

Forensically important entomological specimens recovered from 95 forensic cases of human cadavers from April 1993 to May 1996 in Malaysia were identified and analysed. The results indicated that 73.7% of these specimens were *Chrysomya* species, occurring either as single or mixed infestations. Of these, the most prominent species were *Ch megacephala* (F.) and *Ch rufifacies* (Macquart). Other fly maggots recovered included *Sarcophaga* spp., *Lucilia* spp. and *Hermetia* spp., mostly occurring together with other calliphorine flies. A member of Muscidae fly, *Ophyra* spp. was also recovered for the first time.

**Key words:** Forensic entomology

#### INTRODUCTION

Forensic entomology is "the study of insects and other arthropods associated with certain suspected criminal events, for the purpose of uncovering information useful to an investigation."<sup>1</sup> In Malaysia, samples of arthropods collected in the course of forensic investigation are frequently referred to our department for the purpose of species identification and estimation of post-mortem intervals (PMI). Reid<sup>2</sup> first described the medico-legal aspect of the use of fly maggots for PMI and Lee *et al*,<sup>3</sup> Lee<sup>4,5</sup> reviewed and reported forensic cases associated with fly maggots. Detail studies of PMI in monkey carrions had also been conducted in Malaysia.<sup>6</sup> In view of the recent increase in forensic entomological specimens, the species composition of insect larvae recovered from human cadavers from April 1993 to May 1996 was analysed and reported here.

#### MATERIALS AND METHODS

Entomological specimens when received were processed immediately by the following standard procedures.<sup>3</sup> Larvae were first cleared by soaking in 10% KOH solution for 4-24 hours depending on the types of specimen. After rinsing in distilled water, they were transferred to 10% acetic acid and left for 30 min. After this neutralising process, the larvae were soaked in distilled water and the last segment was partially cut transversely to facilitate removal of internal organs. The last segment which contained the posterior spiracles,

an important taxonomic feature, was completely detached to be mounted separately. The treated specimens were then dehydrated in ascending series of ethanol, rinsed briefly with xylene, mounted on glass slide with Canada balsam and dried at 30°C overnight. Identification of larvae was accomplished by studying the anterior and posterior spiracles, the cephalopharyngeal skeleton and other taxonomic features using standard identification charts and keys prepared by the Division of Medical Entomology, Institute for Medical Research.

#### RESULTS AND DISCUSSION

Forensic specimens were recovered from 95 human cadaver cases. Of these, the blow-fly larvae of the genus *Chrysomya* (Family: Calliphoridae) account for 73.7% of all cases studied (Table 1). In the last study carried out between January 1973 and March 1993, Lee<sup>5</sup> found that 82.4% of the larvae were those of *Chrysomya*. Thus *Chrysomya* continued to be the most important fly maggot found on human cadavers in Malaysia. As in other reported studies in Malaysia, 2 species, namely *Ch rufifacies* (Macquart) and *Ch megacephala* (F.) were predominant, occurring either as a single species or mixed infestation. These 2 species were also found associated with other blow flies such as *Lucilia* spp. as well as other maggots such as *Sarcophaga* spp. and *Hermetia* spp. (Table 2). The presence of *Hermetia* spp. is usually associated with highly decomposed corpses

**TABLE 1: *Chrysomya* species collected from 95 human cadavers in Malaysia (April 1993 - May 1996)**

Identification	No. of cases
<i>Chrysomya megacephala</i>	33
<i>Chrysomya rufifacies</i>	18
+ <i>Chrysomya megacephala</i>	
<i>Chrysomya</i> spp.	4
<i>Chrysomya rufifacies</i>	6
<i>Chrysomya nigripes</i>	1
<i>Chrysomya rufifacies</i>	4
+ <i>Chrysomya</i> spp.	
<i>Chrysomya rufifacies</i>	1
+ <i>Chrysomya nigripes</i>	
<i>Chrysomya villeneuvei</i>	1
+ <i>Chrysomya megacephala</i>	
<i>Chrysomya villeneuvei</i>	1
+ <i>Chrysomya megacephala</i>	
+ <i>Chrysomya rufifacies</i>	
<i>Chrysomya megacephala</i>	1
+ <i>Chrysomya rufifacies</i>	
+ <i>Chrysomya</i> spp.	
<b>Total</b>	<b>70 (73.7%)</b>

**TABLE 2: Occurrence of *Chrysomya* species with other larvae in human cadavers (April 1993 - May 1996)**

Identification	No. of cases
<i>Chrysomya megacephala</i>	1
+ <i>Lucilia</i> spp.	
<i>Chrysomya megacephala</i>	1
+ <i>Sarcophaga</i> spp.	
<i>Chrysomya rufifacies</i>	1
+ <i>Hermetia</i> spp.	
+ coleopteran larvae	
<i>Chrysomya megacephala</i>	2
+ <i>Chrysomya rufifacies</i>	
+ <i>Sarcophaga</i> spp.	
<i>Chrysomya rufifacies</i>	1
+ <i>Lucilia</i> spp.	
<i>Chrysomya rufifacies</i>	1
+ <i>Sarcophaga</i> spp.	
<i>Chrysomya rufifacies</i>	1
+ coleopteran larvae	
<i>Chrysomya nigripes</i>	1
+ <i>Ophyra</i> spp.	
<b>Total</b>	<b>9 (9.5%)</b>

**TABLE 3: Occurrence of other larvae recovered from human cadavers (April 1993 - May 1996)**

Identification	No. of cases
<i>Hermetia</i> spp.	2
<i>Hermetia</i> spp.	2
+ <i>Ophyra</i>	
<i>Sarcophaga</i> spp.	1
+ <i>Lucilia</i> spp.	
<i>Lucilia</i> spp.	5
<i>Calliphorine</i> eggs and L-1 larvae	5
Unidentified larvae	1
<b>Total</b>	<b>16 (16.8%)</b>

especially at the remaining stage (>2 weeks).<sup>6</sup> It is of special interest to note the presence of *Ophyra* spp. for the first time in Malaysia. Members of the Muscidae are normally not associated with human cadavers<sup>4</sup> and is usually recovered from monkey carcass.<sup>6</sup> Various blow flies and other flies were also found to occur (Table 3). No larvae of *Musca domestica* (L.) or any other *Musca* spp. were ever recovered from human cadavers in Malaysia. Although Lee & Marzuki<sup>6</sup> reported the presence of *Fannia scalaris* (F.) and *Ophyra* spp. from 9 day-old monkey carrion, no *M domestica* was ever recovered.

In comparison to previous observations, there was an increase in the number of forensic entomological specimens in the last 4 years. From January 1973 to March 1993, a total of 165 cases were received and reported.<sup>5</sup> However, a total of 95 cases were received in the period April 1993 to May 1996. Such increase may reflect the actual increase in forensically-related cases or better awareness of the importance of PMI determination using insect larvae.

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