

A REVIEW OF FORENSIC ENTOMOLOGY CASES AT IPOH HOSPITAL AND HOSPITAL UNIVERSITI KEBANGSAAN MALAYSIA FOR THE YEAR 2003.

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Abstract

Forensic entomology was utilized to determine the postmortem interval of eleven forensic cases sent for autopsy examination at Ipoh Hospital and Hospital University Kebangsaan Malaysia between of January to December 2003. Sixth species of sarcosaprophagous flies: *Chrysomya megacephala*, *Chrysomya rufifacies*, *Chrysomya villeneuvei*, *Chrysomya nigripes*, *Synthesiomya nudiseta* and a sarcophagid fly were found among the maggot specimens received by the Forensic Entomology Laboratory, Department of Parasitology & Medical Entomology, Universiti Kebangsaan Malaysia. Those maggots were collected from dead bodies found among others in wrapped in gunny bags, around water tank, hanged with black nylon clothes, inside home, beside road, drowning in lombong and an estate. *Ch. megacephala* was the main species found in eight cases examined. Postmortem Interval (PMI) estimated from the cases varied from one day to 10 days.

Key words : Forensic entomology, post-mortem interval, decomposing bodies.

Introduction

Forensic entomology is a science pertaining to the study of insects and other arthropods related to legal investigations. It can be divided in three subfields: urban, stored-product and dicolegal/medicocriminal entomology (Lord and Stevenson, 1986). Insect evidence has been helpful in determining post-mortem interval or site of human death, to link a suspect to the scene of crime, to

prove moving of the corpse to a different location or to determine drug levels in a deceased person. The use of entomological data in determining the duration of Postmortem interval (PMI) is still at its infancy stage and only a few studies had been recorded in Malaysia (Lee, 1989; Lee & Marzuki, 1993; Omar et al., 1992; Omar et al., 1994a). Forensic entomology is inextricably linked with the broader scientific field of medical entomology, taxonomy and forensic pathology.

Material and Methods

Specimens were received from the Kuala Lumpur Hospital and Hospital Universiti Kebangsaan Malaysia. Each bottle of specimens was labeled with hospital identification number, police report number, name of deceased (if known), date and time of collection and name of the collector. Request forms describing the cases and signed by the attending forensic pathologists was received along with the specimens.

Collections of specimens

Immature stage of flies (eggs or larvae) from decomposing bodies were collected based on the methods described by Smith (1986) and Catts & Haskell (1990). Larval samples were preserved in universal bottles containing 70% alcohol and live ones were later bred in containers with fresh beef liver.

Preparations of preserved larval samples

Larvae were placed in 70% alcohol at least for three days to allow for proper absorption of alcohol into tissues rendering them adequately preserved for the next steps of preparations. A transverse excision was made along the eleventh segment of each larva separating it into two parts. The anterior and posterior parts were then placed in 10% potassium hydroxide (KOH). Immersion in KOH usually lasted for more than 24 hours depending on the size of larvae. The larva was then placed in glacial acetic acid for seven minutes to neutralize the previous KOH solution. Gut and muscle contents of larvae were removed thoroughly with a forceps having a wooden stick as its handle. The larva was then passed through ascending concentrations of alcohol solutions from 80%, 90%, 95% and absolute alcohol for 30 minutes each. The larva was then placed in clove oil and then xylene for approximately 30 minutes duration each. It was then placed on glass slide and mounted with Canada balsam. The instar and species of the larvae was identified based on Ishijima (1967) and reference calliphorids maintained at the Department of Parasitology and Medical Entomology, Faculty of Medicine, Universiti Kebangsaan Malaysia.

Preparations of live larval samples

Live eggs or larvae obtained from the morgues were cultured in plastic containing beef liver *ad libitum*. On reaching pre-pupae stage, the larvae were transferred to drier containers containing

saw dust. The adult that subsequently emerged were pinned and their species identified using the key provided by Kurahashi et al. (1997).

Case histories of corpses sent for autopsy

A. Cases from Ipoh Hospital

The total number of cases received from Ipoh Hospital was two for the year 2003. The first case was an unknown female, decayed and aged between 16-25 years old. The body was found at a slope beside road with her facing downward, fully dressed with sign of being eaten by animal. The second case was an unidentified female aged approximately 40 years old. The both body were found at a slope beside a road with sign of being eaten by animal at the feet, mouth, hand and genitalia. The third case is Indian man was found at a rubber estate. The head, hand and body fully covered with maggots and had some injuries on them.

B. Cases from Hospital Universiti Kebangsaan Malaysia

The total number of cases received from Hospital Universiti Kebangsaan Malaysia was six for the year 2002. The first case was a 47 year old Chinese male who was found inside a condominium. The second case was an unidentified dead body found inside an empty house. Syringes and morphine were also found inside the house. The body was in an already advanced stage of decomposition with disappearance of soft tissue and was partially skeletonized. While the third case was a 22 year old Chinese male who was allegedly murdered. The body was skeletonised. The fourth case was that of a 68 year old Chinese male found in a house. The fifth case was an unidentified body. The body was wrapped in pink flowery curtains packed in a box. No eggs or puparia were found. The sixth case was an unidentified newborn boy. The body was found inside a tank of a garbage truck. The deceased was already under generalized decomposition. No significant mark of antemortem injury was found on the body of the sixth case.

Results

The species that were identified and the postmortem interval (PMI) estimated for every cases are shown on **Table 1**. For most of the cases, the remains were found in the decomposing stage and

had third instar fly and empty puparia on them. Five species of flies were found to be attracted to the human corpses in this study: *Chrysomya megacephala*, *Chrysomya rufifacies*, *Chrysomya villeneuvi*, *Chrysomya nigripes*, *Sarcophagidae*, and *Synthesiomyia nudiseta*. *Ch. megacephala* was the found 9 out of 11 from the corpses, followed by *Ch. ruffifacies* (5 out of 11) and *Chrysomya villeneuvi*, *Chrysomya nigripes*, *Sarcophagidae*, and *Synthesiomyia nudiseta* each.

Postmortem Interval

A. Cases from Ipoh Hospital

Postmortem intervals were five days (cases # 1), three days (cases # 2 and # 3)

B. Cases from HUKM

Postmortem interval were one days (cases # 5), two days (cases # 4, # 7 and # 8), three days (cases # 1, # 3 and # 6) and more than 10 days (cases # 2).

Table 1: Species of flies collected and postmortem interval for the cases.

A. Ipoh Hospital

Cases No.	Larval stage received	Species collected	PMI (days)
1	Third instar	i <i>Ch. nigripes</i> ii <i>Ch. villeneuvi</i>	5
2	Third instar	i <i>Ch. rufifacies</i> ii <i>Ch. villeneuvi</i> iii <i>Ch. megacephala</i>	3
3	Third instar Second instar	i <i>Ch. rufifacies</i> ii <i>Ch. villeneuvi</i> iii <i>Ch. megacephala</i>	3

B. Hospital Universiti Kebangsaan Malaysia.

Cases No.	Larval stage received	Species collected	PMI (days)
1	Third instar	i <i>Ch. megacephala</i> ii <i>Ch. rufifacies</i>	3
2	Empty puparium	i <i>Ch. megacephala</i>	10
3	Third instar	i <i>Ch. megacephala</i>	3
4	Third instar Second instar	i <i>Ch. rufifacies</i> ii <i>Ch. megacephala</i>	2
5	First instar Second instar	i <i>Ch. rufifacies</i> ii <i>Ch. megacephala</i>	1
6	First instar	i <i>Ch. megacephala</i>	3
7	Third instar	i <i>Ch. megacephala</i>	2
8	Third instar	i <i>Sarcophaga sp.</i> ii <i>Synthesiomyia nudiseta</i>	2

Discussion

In this study, most of the forensic specimens sent were third instar larvae. This is similar to the finding of Lee (1989) and Affandy (2003). Third instar maggots are usually found at the

active decay stage of decomposition. This is the most foul smelling stage of decomposition are thereby would instantly alerts the people around its presence.

Dipterans especially *Chrysomya* spp. are usually the first group of flies found among corpses undergoing early decomposition. The dominant role

of *Chrysomya* spp. as major decomposers is widely reported by previous studies (Lee, 1989; Omar et al., 1994b).

For cases found inside building, PMI are estimated one day earlier than the calculated age of the specimen as it may take several hours for the flies to enter a room inside a building. Collections from corpses found inside building revealed the presence of *Synthesiomya nudiseta* in 1 out of 3 cases. This muscid fly is known as exclusive decomposers of corpses found indoor (Omar et al., 1994a).

The presence of *Chrysomya villeneuvi* in a body found in a rubber estate is in agreement with statement made by Omar et al (2002) as this species is well known as a Malaysian jungle dweller.

Overall nine cases were described in this report. *Ch. megacephala* and *Ch. rufifacies* are the major species found among corpses.

References

- Afandy, H., Omar, B., Marwi, M. A. Ahmad, M. S., Halim, M., Feng, S. S., & Moktar, N. (2003). A review of forensic specimens sent to Forensic Entomology Laboratory Universiti Kebangsaan Malaysia for the year 2001. *Tropical Biomedicine* **20**(1): 27-31
- Catts, E. P. & Haskell, N. H. (1990). *Entomology and Death: A procedural guides*. Joyce's Print Shop Inc., South Carolina. 1-109 pp.
- Garcia, L. S., and D. A. Bruckner. (1997). *Medically important arthropods*, p.523-563. In L. S. Garcia and D. A. Bruckner (ed.), *Diagnostic medical parasitology*, 3rd ed. ASM Press, Washington, D.C..
- Ishijima, H. (1967). Revision of third stage larva of synanthropic flies of Japan (Diptera; Anthomyiidae, Muscidae, Calliphoridae and Sarcophagidae). *Japanese Journal of Sanitary Zoology*, **18** : 47-87.
- Kurahashi, H., Benjaphong, N. & Omar, B. (1997). Blowflies (Insect: Diptera: Calliphoridae) of Malaysia and Singapore. *The Raffles Bulletin of Zoology*, **5**: 1-88.
- Lee, H.L. (1989). Recovery of forensically important entomological specimens from human cadavers in Malaysia. *Malaysia Journal of Patology*, **11**: 33-36.
- Lee, H. L. & Marzuki (1993). Preliminary observation of arthropods on carrion and its application to forensic entomology in Malaysia. *Tropical Biomedicine* **10**: 5-8.
- Lerlercq, M. (1969). *Entomological Parasitology: The relations between Entomological and Medical Sciences*. Pergamon Press, Oxford, 159 pp.
- Lord, W.D., Goff, M.L., Adkins, T.R. & Haskell, N.H. (1994). The black soldier fly *Hermetia illucens* (Diptera: Stratiomyidae) as a potential measure of human postmortem interval: observation and case histories. *Journal of Forensic sciences* **39**; 215-222.
- Omar, B. & Marwi, M. A. (1992). Arthropod ecological succession as forensic indicator. *Pascasidang Kolokium Perubatan ke 3*: 40-44
- Omar, B. (1994a). Diptera succession in monkey carrion at a rubber tree plantation in Malaysia. *Tropical Biomedicine*, **11**: 77-82.
- Omar, B., Marwi, M. A., Mansar, A. H., Rahman, M. S. & Oothuman, P. (1994b). Maggot of *Synthesiomyia nudiseta* (Wulp) (Diptera: Muscidae) as decomposer of corpses found indoor in Malaysia. *Tropical Biomedicine*, **11**: 145-148.
- Sinniah, B., Ramakrishnan, K. and Lim, E. J. (1994). *Hermitia Illucens* and *Chrysomya megacephala* isolated from human cadaver. *Tropical Biomedicine*, **11**: 7-9.
- Smith, K. G. V. (1986). *A manual of forensic entomology*. Cornell University Press, New York, 205 pp.