

First Report of Human Myiasis Caused by *Chrysomya megacephala* and *Chrysomya rufifacies* (Diptera: Calliphoridae) in Thailand, and Its Implication in Forensic Entomology

KABKAEW L. SUKONTASON,¹ PAITON NARONGCHAI,² DUANGHATAI SRIPAKDEE,¹
NOPPAWAN BOONCHU,¹ TARINEE CHAIWONG,¹ RADCHADAWAN NGERN-KLUN,¹
SOMSAK PIANGJAI,¹ AND KOM SUKONTASON^{1,3}

J. Med. Entomol. 42(4): 702–704 (2005)

ABSTRACT We report a forensic entomology case associated with human myiasis in Chiang Mai Province, northern Thailand. The remains of a 53-yr-old-male were concurrently infested with third instars of the two blow fly species, *Chrysomya megacephala* (F.) and *Chrysomya rufifacies* (Macquart), near a severe tumor lesion presented on the lower right leg. The presence of third instars, ≈5 d old, on the day following postmortem indicated that myiasis occurred before death. This is the first report of both fly species acting as a myiasis-producing agent in Thailand. Unsynchronized data between the age of fly larvae due to myiasis pre-mortem and verified age/condition of the corpse suggest a potential complication and error in the estimation of postmortem interval if other predisposition fly infestations are not considered.

KEY WORDS *Chrysomya megacephala*, *Chrysomya rufifacies*, forensic entomology, myiasis, post-mortem interval

MYIASIS HAS BEEN REPORTED in many parts of the world (Zumpt 1965). Myiasis due to blow fly larvae (Diptera: Calliphoridae) are commonly recorded. Although human myiasis cases have been occasionally reported in Thailand, no references to *Chrysomya megacephala* (F.) and *Chrysomya rufifacies* (Macquart) were found. Herein, we report myiasis in a human as evidenced from postmortem examination and during a forensic investigation.

Case History and Entomological Finding. The remains of a 53-yr-old male were discovered indoors in the suburban area of Muang District, Chiang Mai Province (17–21° N and 98–99° E), northern Thailand, and transferred to the Department of Forensic Medicine, Faculty of Medicine, Chiang Mai University, on 8 December 2004 for forensic investigation. Forensic information revealed a corpse of male cachectic vagabond without sign of decomposition and mummification. This indicated that he died within 1 d before investigation. During autopsy, the remains displayed a large squamous cell carcinoma lesion, heavily infested with third instars of flies on the lower right leg (Fig. 1). According to the size of carcinoma lesion, it would occur in this man for at least 1 mo before death. No eggs or first or second instars of flies were found on this corpse, especially at the lesion. Malnutrition associ-

ated with carcinoma was claimed to be the cause of death. There was no evidence of metastasis to any internal organs. Microscopic examination of these fly larvae revealed two groups of maggots: nonhairy (≈1.4 cm) and hairy (≈1.4 cm). Anatomical features of the nonhairy maggots (rows of singly arranged spines between the prothorax and mesothorax; 8–12 papillae on the anterior spiracle; and a thick, dark incomplete posterior spiracular peritreme) were characteristic of third instars of the blow fly *Chrysomya megacephala* (F.) (Ishijima 1967, Omar 2002). Alternatively, the hairy maggots had large, elongated tubercles along the body segment with their tips bearing numerous small spines, and the thick, incomplete posterior spiracular peritreme, characteristic of third instars of the hairy maggot blow fly, *Chrysomya rufifacies* (Macquart) (Ishijima 1967, Wells et al. 1999, Omar 2002).

Discussion

That human remains had been infested by *C. megacephala* and *C. rufifacies* larvae for ≈5 d before investigation, based on the presence of third instars that developed under natural temperatures in the urban area of Chiang Mai, was an interesting aspect of this case. The presence of ≈5-d-old larvae, according to the developmental rate of both fly species studied under the natural temperatures in Chiang Mai in December 2001 and 2002, which were close to natural temperatures of 2004 (K.S., unpublished data), on the

¹ Department of Parasitology, Faculty of Medicine, Chiang Mai University, Chiang Mai 50200, Thailand.

² Department of Forensic Medicine, Faculty of Medicine, Chiang Mai University, Chiang Mai 50200, Thailand.

³ E-mail: ksukonta@mail.med.cmu.ac.th.



Fig. 1. Severe tumor lesion heavily infested with the third instars of blow flies *C. megacephala* and *C. rufifacies* (arrows) on the lower right leg of human remains.

day following postmortem, indicated that myiasis occurred before death. Average natural temperature of Chiang Mai during 4–8 December 2004 was 20.9°C (minimum 14.7, maximum 28.2°C) and average humidity was 72.8% (minimum 46.2, maximum 94.4%). By using forensic experience, this man died within 1 d before investigation under these temperature and humidity conditions because no postmortem decomposition was found in the corpse. Perhaps the cause of myiasis was the underlying illness due to severe tumor lesion on the leg; thus, making it difficult for the man to move. This circumstance would attract *C. megacephala* and *C. rufifacies* to oviposit on the lesion, because both species possess numerous receptors to detect such olfactory cues (Sukontason et al. 2004). This rare case of human myiasis probably existed because this homeless vagabond neglected basic cleanliness and medical treatment for this ulcerating tumor.

To our knowledge, this is the first report in Thailand of myiasis in a human caused by *C. megacephala* and *C. rufifacies*. Fly species that have previously been reported as involved in myiasis in Thailand included the blow fly *Chrysomya bezziana* Villeneuve (Papasathorn and Piyarasana 1962, Papasathorn et al. 1967, Vitavasiri et al. 1995, Nacapunchai and Laohavichit 1999); *Cochliomyia* (= *Callitroga*) *macellaria* (F.) (Wanachiwawin et al. 1996); the flesh fly *Parasarcophaga ruficornis* F. (Sucharit et al. 1981); drone fly, *Eristalis tenax* (L.) (Kruatrachu and Chinachoti 1957, Bhaibulaya 1982, Siripoonya et al. 1993), sheep bot fly, *Oestrus ovis* L. (Nacapunchai et al. 1998); and the fly *Megaselia scalaris* (Loew) (Priyanond et al. 1973). Moreover, this case represented a rare phenomenon of myiasis in the country caused by the double infestation of *C. megacephala* and *C. rufifacies*. Indeed, this occurrence may have occurred because both fly species are synanthropic. *C. megacephala* is the most abundant blow fly species surveyed in Chiang Mai

(78.02%), and to a lesser extent, *C. rufifacies* (16.80%) (Lertthamngtham et al. 2003).

Forensic investigations and the estimation of human postmortem intervals (time since death) depend on the identification of blow fly larvae on a corpse and their approximated age. This report cautions forensic entomologists that under very unusual circumstances, myiasis premortem may introduce errors and miscalculations in the determination of the postmortem interval.

Acknowledgments

We appreciate valuable suggestions of anonymous reviewers and R. W. Merritt (Michigan State University, East Lansing, MI). We thank the Faculty of Medicine and Chiang Mai University for funding publication costs.

References Cited

- Bhaibulaya, M. 1982. Intestinal myiasis caused by *Eristalis tenax* larva: a case report. *J. Parasitol. Trop. Med. Assoc. Thai.* 5: 97–99.
- Ishijima, H. 1967. Revision of the third stage larvae of synanthropic flies of Japan (Diptera: Anthomyiidae, Muscidae, Calliphoridae and Sarcophagidae). *Jpn. J. Sanit. Zool.* 18: 47–100.
- Kruatrachu, M., and N. Chinachoti. 1957. A case of myiasis due to *Eristalis tenax* larvae. *J. Med. Assoc. Thai.* 40: 31–34.
- Lertthamngtham, S., K. L. Sukontason, K. Sukontason, S. Piangjai, W. Choochote, R. C. Vogtsberger, and J. K. Olson. 2003. Seasonal fluctuation of the two most forensically-important fly species in northern Thailand. *Ann. Trop. Med. Parasitol.* 97: 87–91.
- Nacapunchai, D., C. Lamom, and N. Sukprasert. 1998. A first record from Thailand of human external ophthalmomyiasis due to *Oestrus ovis*. *Southeast Asian J. Trop. Med. Public Health* 29: 133–136.

- Nacapunchai, D., and K. Laohavichit. 1999. Human myiasis caused by *Chrysomya bezziana* larvae in gangrenous wound following snake bite. *Mahidol. Med. J.* 6: 81-83.
- Omar, B. 2002. Key to third instar larvae of flies of forensic importance in Malaysia, pp. 143-147. *In* B. Greenberg and J. C. Kunich [eds.], *Entomology and the law: flies as forensic indicators*. Cambridge University Press, Cambridge, United Kingdom.
- Papasarithorn, T., and S. Piyarasana. 1962. A report case of myiasis caused by the larvae of *Chrysomya bezziana* Villeneuve. *J. Med. Assoc. Thai.* 45: 47-52.
- Papasarithorn, T., P. Chularerk, C. Limcharoen, and J. Rojanapremsook. 1967. Human myiasis caused by *Chrysomya bezziana* Villeneuve. *J. Med. Assoc. Thai.* 50: 761-766.
- Priyanond, P., P. Sangsook, and S. Panpairoj. 1973. A case report of acute urethral obstruction caused by Phoridae larvae. *Navy Med. J.* 13: 115-121.
- Siripoonya, P., S. Tesjaroen, and C. Viravan. 1993. Intestinal myiasis: a case report. *J. Med. Assoc. Thai.* 76 (Suppl. 2): 229-231.
- Sucharit, S., V. Kerdpibule, W. Tumrasvin, T. Deesin, and C. Na Nakorn. 1981. Myiasis of the vagina of a comatose woman caused by *Parasarcophaga ruficornis* Fabricius. *J. Med. Assoc. Thai.* 64: 580-583.
- Sukontason, K., K. L. Sukontason, S. Piangjai, N. Boonchu, T. Chaiwong, R. Ngern-klun, D. Sripakdee, R. C. Vogtsberger, and J. K. Olson. 2004. Antennal sensilla of some forensically important flies in families Calliphoridae, Sarcophagidae and Muscidae. *Micron* 35: 671-679.
- Vitavasiri, A., P. Charoengchasi, S. Kaewmanee, and M. Bhaibulaya. 1995. Subdermal myiasis caused by maggots of *Chrysomya bezziana*. *Siriraj Hosp. Gaz.* 47: 419-422.
- Wanachawanawin, D., K. Ungkanont, and S. Kaewmanee. 1996. Myiasis of the maxillary sinus caused by *Cochliomyia macellaria* larvae and review of literature. *Siriraj Hosp. Gaz.* 48: 118-122.
- Wells, J. D., J. H. Byrd, and T. I. Tantawi. 1999. Key to third-instar Chrysomyinae (Diptera: Calliphoridae) from carrion in the Continental United States. *J. Med. Entomol.* 36: 638-641.
- Zumpt, F. 1965. *Myiasis in man and animals in the Old World*. Butterworths, London, United Kingdom.

Received 18 January 2005; accepted 12 April 2005.
