

Developmental rate of *Synthesiomyia nudiseta* (van der Wulp, 1883) (Insecta, Diptera, Muscidae), a species of forensic importance, under alternating temperature

Aline M. Prado*, Barbara M. C. Maia, Bryan G. Ribeiro-Silva, Rafael Vergílio, Patricia J. Thyssen

Abstract

Synthesiomyia nudiseta (van der Wulp, 1883) (Insecta, Diptera, Muscidae) is widely distributed in the Neotropical region. It may be associated with decomposing bodies due to its necrophagous habit, for this reason it gains importance in the forensic field. Temperature is one of the most important extrinsic factors in the life of insects because it directly affects their metabolism. In the literature only data on the development time of forensically important insects under controlled temperature are available. Thus, this study aimed to evaluate the rate of development of *S. nudiseta* under alternating temperatures. The results obtained here may be useful for obtaining more accurate development models to estimate the time of death in criminal events.

Key words:

forensic entomology, post mortem interval, developmental model.

Introduction

Synthesiomyia nudiseta (van der Wulp, 1883), as well as other synanthropic muscids^{1,2}, is widely distributed and can be found almost everywhere in the Neotropics³. Due to its necrophagous habit, the species has already been recorded associated with corpses⁴, for this reason it gains importance for the resolution of crimes.

Several extrinsic factors (temperature, humidity, altitude, photoperiod, among others) can affect the metabolism of insects that are classified as heterothermal organisms. The temperature is the most relevant and has therefore been the most studied parameter within the forensic field, since it allows the construction of prediction models of development time, which can be used to estimate the age of the insect and consequently the time of death⁵. In the literature only development data of species of forensic importance under controlled temperatures are available.

Thus, this study aimed to evaluate the development rate of *S. nudiseta* under alternating temperatures under laboratory conditions.

Results and Discussion

Colonies of *S. nudiseta* were established from active collection in the urban environment of the city of Campinas, state of São Paulo, Brazil, using as bait beef liver. After identification⁶, adults were individualized in transparent plastic cages (30×30×50cm) with lateral openings covered with nylon screens, fed with sugar and water ad libitum and maintained under controlled conditions (26±1°C, 70±10%, and 12:12h). It was offered bovine raw ground meat as substrate for oviposition.

Eggs placed on bovine raw ground meat were removed with the aid of a brush and deposited (N= 100) in plastic bottles (6×8cm) containing the same substrate (=meat) in the proportion of 0.75 g/egg. The vials were maintained in a growth chamber (Fanem™ model 387) with the same relative humidity and photoperiod as for the adults: during the day (7 a.m. to 7 p.m.) were maintained at 27.5°C while at night (7:00 p.m. to 7:00 a.m.) at 17.5°C. To measure the evolution of growth, ten randomly chosen specimens were measured every 24h, from initial feeding larva until pupariation, and then discarded.

The developmental rate for *S. nudiseta* was influenced by alternating temperatures, observed from the length gain (Fig. 1) and by comparison with literature data³ on controlled fixed temperatures. In our study, the total larval development time for *S. nudiseta* was 336h. Velasquez et al.³ found approximately 367h and 168h for *S. nudiseta* reared under 15 and 25°C, respectively. In other words, if *S. nudiseta* is exposed under alternating temperature conditions the growth rate will resemble that observed for lower temperatures.

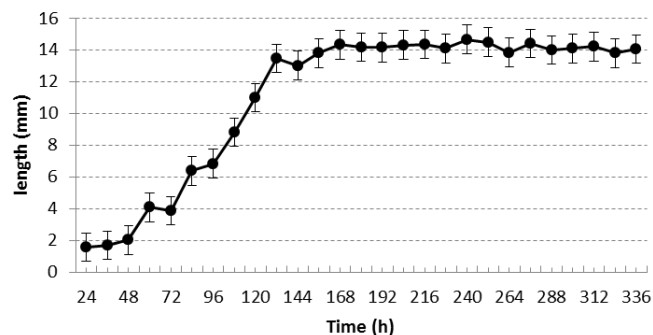


Figure 1. Mean and standard deviation of the larval length of *S. nudiseta* every 24 h reared under alternating temperatures, 27.5 and 17.5°C.

Conclusions

The results obtained here may lead us to have to review all the development models to estimate the time of death in criminal events proposed so far for species of forensic importance.

¹ Ferrar, P. A. *A guide to the breeding habits and immature stages of Diptera Cyclorrhapha*. 1987, 10-33; 43-59; 177-182.

² Couri, M. S.; Carvalho, C. J. B. *Biota Neotropica*. 2005, 5, 205-222.

³ Velasquez, Y.; Ivorra, T.; Grzywacz, A.; Martínez-Sánchez, A.; Magaña, C.; García-Rojo, A. and Rojo, S. *Bull. Entomol. Res.* 2013, 103, 98-110.

⁴ Carvalho, C. J. B. *Muscidae*. 2002, 7-9.

⁵ Thyssen, P. J. *Entomologia Forense*. 2011, 229-238.

⁶ Carvalho, C. J. B. and Mello-Patiu, C. A. *Rev. Bras. Entomol.* 2008, 52, 390-406.