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Effect of massing on larval growth rate

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Abstract

Estimation of minimum post mortem interval commonly relies on predicting the age of blow fly larvae based on their size and an estimate of the temperatures to which they have been exposed throughout their development. The majority of larval growth rate data have been developed using small larval masses in order to avoid excess heat generation. The current study collected growth rate data for larvae at different mass volumes, and assessed the temperature production of these masses, for two forensically important blow fly species, *Chrysomya rufifacies* and *Calliphora vicina*. The growth rate of larvae in a small mass, exposed to the higher temperatures equivalent to those experienced by large masses, was also assessed to determine if observed differences were due to the known temperature effects of maggot masses. The results showed that temperature production increased with increasing mass volume, with temperature increases of 11 °C observed in the *Ch. rufifacies* large masses and increases of 5 °C in the large *C. vicina* masses. Similarly, the growth rate of the larvae was affected by mass size. The larvae from small masses grown at the higher temperatures experienced by large masses displayed an initial delay in growth, but then grew at a similar rate to those larvae at a constant 23 °C. Since these larvae from masses of equivalent sizes displayed similar patterns of growth rate, despite differing temperatures, and these growth rates differed from larger masses exposed to the same temperatures, it can be concluded that larval growth rate within a mass may be affected by additional factors other than temperature. Overall, this study highlights the importance of understanding the role of massing in larval development and provides initial developmental data for mass sizes of two forensically important blow fly species commonly encountered in Australian forensic casework.

Key words

Mass volume; Maggot massing; Growth rate; *Chrysomya rufifacies*; *Calliphora vicina*; Post mortem interval.

Introduction

Forensic entomologists estimate the minimum post mortem interval (PMI) based on the age of the larvae of blow flies or other carrion-breeding flies found on a body [1]. As first noted by de Reaumur [2], the rate of larval growth is highly dependent upon temperature, and so the