

INFLUENCE OF FLUCTUATING TEMPERATURES AND POPULATION ORIGINS ON THE DEVELOPMENT OF *CALLIPHORA VICINA* (DIPTERA, CALLIPHORIDAE)

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Introduction

Blow flies are among the first insects to discover and colonise in human corpses. Among the numerous species involved *Calliphora vicina* is the most frequent fly found in our research and is used to calculate Post-mortem interval (PMI). Time of development depends on temperature, but a great many factors can influence estimates of insect development. We studied two of them:

Influence of fluctuating temperatures

Origins of populations

on the development of *Calliphora vicina* under laboratory conditions.



Study region - Canton de Vaud - Switzerland



Populations of *C. vicina* sampled

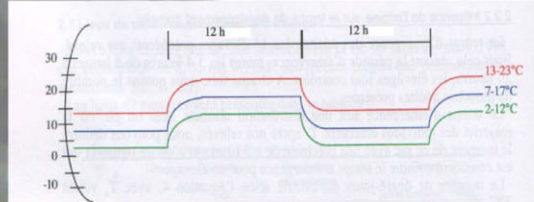
- Altitude 1100 m (3)
- Altitude 740 m (2)
- Altitude 420 m (1)

Material and methods

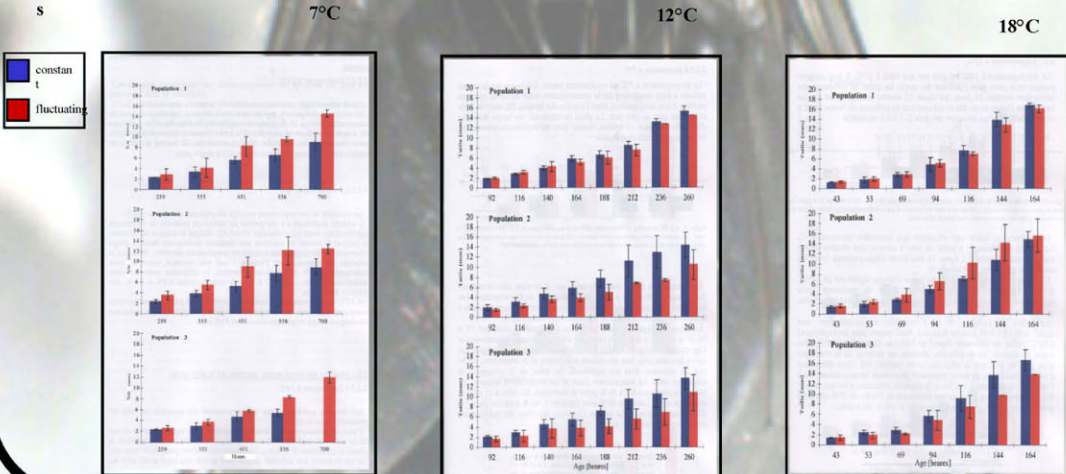
Gravid females, from three different areas of our country (see map above) were allowed to lay eggs. For each population, eggs were divided into 2 groups, the first one kept at constant temperature, the second one submitted to fluctuating temperatures (the mean corresponding to the constant temperature)

The different temperatures were chosen to reflect our annual local climatic conditions (7°C, 12°C, 18°C for the fixed temperatures and the same = 5°C over a 24 hours period) (see figure).

We measured size of the larvae at different age in the two groups



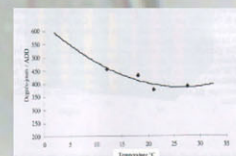
Results



Discussion

Our results showed that at 18°C there were no differences in development time, but for lower temperatures (12°C) larvae reared under fluctuating temperature took more time to reach imago stage, but the opposite was observed at 7°C. This phenomenon is known as **rate summation effect**. Moreover fluctuating temperatures affect significantly the size of imagoes. We also observed differences in size (larvae as well as adults) between the three populations but this did not affect significantly the development time from egg to adult. We recommend one should be very cautious when using larval size only to determine PMI.

It has long been acknowledged that degree-days (accumulation from egg to adult emergence - ADD) is species specific and fairly constant at normal temperatures (that is normal range activity temperatures for this species). Our results nevertheless showed some significant differences from established findings (for *C. vicina*) suggesting strongly that PMI estimates should be done by using data obtained with indigenous populations (see figure)



$$\text{ADD/Temperature } y = 0.3399x^2 - 18.124x + 629.78 \quad (R^2 = 0.80)$$