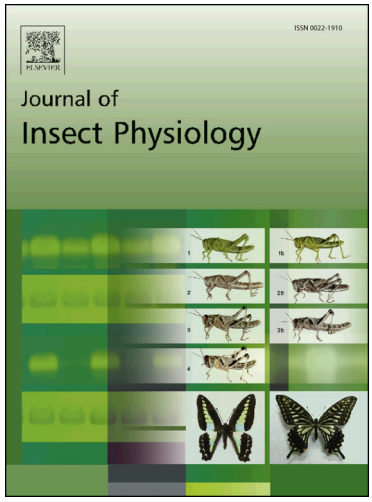

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Quantitative pteridine fluorescence analysis: a possible age-grading technique for the adult stages of the blow fly *Calliphora vicina* (Diptera: Calliphoridae)

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Abstract

Age estimation of adult flies could extend the possible window of time for calculating the minimal postmortem interval (PMI_{min}) by means of entomological methods. Currently, this is done by estimating the time required by necrophagous Diptera to reach certain juvenile developmental landmarks, and the method only works until the end of metamorphosis and emergence of the adult fly. Particularly at indoor crime scenes, being able to estimate the age of trapped adult flies would be an important tool with which to extend the calculable PMI beyond the developmental period. Recently, several promising age-dependent morphological and physiological characteristics of adult insects have been investigated in medical and forensic entomology, but the results are still preliminary and restricted to a few species.

We examined adults of the forensically relevant blow fly species *Calliphora vicina* and investigated the fluorescence levels of pteridine, a group of metabolites that accumulates in the eyes during aging. From Day 1 to Day 25 post-emergence, flies were kept at three different temperature regimes (20°C, 25°C, and fluctuating temperatures in the context of a field study) and 12:12 L:D. From Day 1 until Day 7, the fluorescence of pteridine was determined on a daily basis, and thereafter, every three days. The achieved fly age was multiplied with the relevant temperature and converted into accumulated degree-days (ADD).

The fluorescence level of pteridine increased linear with increasing ADD (females: $R^2 = 0.777$; males: $R^2 = 0.802$). The difference between sexes was significant ($p < 0.001$). Neither head weight nor temperature had an effect on pteridine fluorescence.

Because the variation in pteridine fluorescence increased with increasing ADD, it seems favorable to combine several aging methods for more precise results. In context, we emphasize that different body parts of the same specimen can be used to analyze cuticular hydrocarbons (legs), pteridine fluorescence (head/eyes), and gonotrophic stage (female abdomen).

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