G67 *Phormia Regina* and Postmortem Interval Estimations: Wandering Into Curvilinear Blow Fly Development Modeling

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After attending this presentation, attendees will have a better understanding of the importance of forensic entomology in estimating Postmortem Interval (PMI) and the advantages of using curvilinear development data for PMI calculations.

This presentation will impact the forensic science community by vastly improving the current developmental data available for *Phormia regina* and increasing the accuracy of PMI estimations in human death investigations.

The blow fly *P. Regina* belongs to a group of necrophagous insects that can rapidly locate and colonize decomposing animals. When found on a human body, the developing eggs, larvae, or pupae could be used as an index for initial time of death (postmortem interval or PMI) measurements. Estimating the PMI is crucial in most human death investigations, since time of death is needed for proper event reconstruction pre- and post-death. To use insects in estimating PMI, we must be able to determine the insect age at the time of discovery and backtrack to time of oviposition. Consequently, understanding temperature-specific development rates is essential. Unfortunately, existing development models of forensically important insects are only linear approximations.

Here, experiments and findings for building a curvilinear developmental model for *P. Regina* are reported. Experimental considerations include diet, humidity, light cycle, temporal patterns of stage transitions, and temperature measures. Experiments were conducted over 11 temperatures (7.5°C, 10°C, 12.5°C, 15°C, 17.5°C, 20°C, 22.5°C, 25°C, 27.5°C, 30°C, and 32.5°C). Twenty eggs (collected within one hour of oviposition) were placed on 10g of beef liver in a 29.6ml (1oz) plastic cup. The cup was placed in a 4”x4”x2” plastic container that had 2.5cm (1in) of sand in the bottom. Measurements were taken at intervals calculated from Accumulated Degree Hours (ADH). Each life stage had five measurement points: at the beginning; one-quarter mark; one-half mark; three-quarter mark; and, the end. Each point was replicated four times, for a total of 20 measurements per life stage. For each sampling period, the cups were pulled from the chambers and the stage of each maggot was documented morphologically through posterior spiracle slits and cephalopharyngeal skeletal development.

The *P. Regina* data illustrate the advantages of curvilinear models in describing development at environmental temperatures near the biological minima and maxima, and the practical significance of curvilinear models over linear approximations. Results here represent the first in a series of larger studies modeling development of key forensically important blow flies of North America.

Blow Fly Development, Decomposition, Human Death Investigation

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