



## Pathology Biology Section – 2009

### G68 Patterns of Adult Blow Fly Attraction to Carrion Over Time

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After attending this presentation, attendees will better understand about the length of time between the exposure of carrion to adult blow flies and the onset of fly attraction to that carrion. Attendees will also learn about the physiological age profile of adult flies attracted to carrion over time.

This presentation will impact the forensic community because it helps better quantify the length of time between exposure of a cadaver and the onset of insect colonization.

This presentation is intended to educate attendees about the length of time between the exposure of carrion to adult blow flies and the onset of fly attraction to that carrion. Attendees will also learn about the physiological age profile of adult flies attracted to carrion over time.

This information is significant for the forensic sciences community because it helps better quantify the length of time between exposure of a cadaver and the onset of insect colonization.

Forensic entomology's most common application is to calculate the length of time that a cadaver has been deceased, the total postmortem interval (PMI). Most commonly, what is actually calculated is the duration of immature insect inhabitation of the cadaver, based on the known growth rate of particular insect species - what the authors are terming the post-colonization interval (post-CI). Little attention has been paid to the time between exposure of a body to insect activity and the onset of oviposition, and in this research, termed as the pre-colonization interval (pre-CI). However, under appropriate conditions such as a very fresh cadaver, or when high temperatures lead to rapid decay, the pre-CI may represent a substantial portion of the total PMI. Adequately characterizing the behavior of the adult fly, particularly as a function of cadaver age and ambient temperature, could greatly assist entomologists in calculating the total period of all insect activity on a cadaver.

Insects arrive at a cadaver in relatively predictable succession patterns. Blow flies tend to arrive very early in the succession pattern, often within 24 hours postmortem. Adult flies found around a very fresh cadaver are usually presumed to oviposit shortly after locating it. However, since most blow flies require a protein meal in order to produce eggs, young flies may visit a cadaver long before they are capable of ovipositing. The process of producing eggs by depositing vitellin (yolk protein) into the immature ovarioles allows the physiological age of flies to be determined. By determining the ovarian status of flies, and the patterns of the groups' relative carrion usage, it can be accurately assessed how long postmortem oviposition-ready flies are found at a cadaver. The rate of ovarian development is largely dependent on fly metabolism, which in turn is significantly influenced by temperature. The higher the temperature, the faster ovaries develop, so long as the fly has obtained adequate dietary protein. Therefore, temperature is an important factor to track when estimating either the rate of ovarian development or simply the overall physiological age.

Experiments were performed evaluating the attractiveness of carrion to the common early-arriving blow flies, *Cochliomyia macellaria* (Fabricius) and *Chrysomya rufifacies* (Macquart). Pigs were killed by cranial stunning, and placed in an open field within one hour of death. At hourly intervals between dawn and dusk of the next 72 hours, ambient temperature observations were made, and adult flies were collected from the carcasses. Flies were identified to species and sexed. All flies were weighed and placed in different weight classes. Female flies were dissected, and their ovarian developmental status determined in order to place them into five separate age groups. The post-CI and behavior pattern was evaluated for each group. The post-CI of each age group will be discussed in relationship to temperature. Complicating or retarding environmental factors will also be discussed, as well as the limitations of the findings. However, the results of this study are expected to be useful in improving the accuracy of entomologically derived postmortem intervals. Furthermore, this research shows the importance of collecting adult insects as well as immatures at a body recovery site.

#### Forensic Entomology, Blow Flies, Postmortem Interval