



### G74 Associative Learning of *Cochliomyia macellaria* in Response to Larval Resource: Inter- and Intraspecific Resource Interaction, and Presence of Inter- and Intraspecific Larvae on a Resource

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After attending this presentation, attendees will understand the concept of associative learning as it pertains to the blow fly, *Cochliomyia macellaria*. Experiments assessing adult blow fly response to its larval food resource, exposure of both intra- and interspecies to a food resource, and the presence of both intra- and interspecies larvae on a food resource were examined.

This presentation will impact the forensic science community by being the first to assess the importance of blow fly biology as it pertains to the pre-colonization interval (pre-CI) in a forensic investigation.

The pre-CI is the portion of the period of insect activity (PIA) prior to colonization of a food resource. The location phase begins when the insect detects a body and is more than likely governed by volatile odors

not only from the corpse itself, but also from other adult blow flies and their larvae present on the corpse. The acceptance phase begins when the insect first makes physical contact with the food resource. Understanding blow fly behavior under various conditions might allow for more concise estimates of the pre-CI of a body; the current study assesses *C. macellaria*'s behavioral response to three such conditions.

The first experiment addressed whether *C. macellaria* adult flies will be more attracted to food resources on which they were raised. An abundance of *C. macellaria* eggs was gathered from pre-existing colonies and randomly distributed between bull testicles and beef liver and kept under the same conditions. Once the flies reached the adult stage, they were only provided with water and a powdered milk and sugar mixture *ad libitum*. Beginning on the seventh day post-emergence, seven testicle-fed males and seven testicle-fed females were placed individually in a Teflon dual-choice olfactometer and their response to the resources provided recorded; likewise, seven liver-fed males and seven liver-fed females were examined under the same circumstances. Testicles were placed in containers connected to the dual-choice olfactometer, while liver was placed in the other. Resources were rotated between arms with each replicate. The olfactometer was also cleaned between sessions. This regime lasted for five consecutive days. The goal was to determine whether or not adult flies would associate with the odors of the source on which they were raised, thus "choosing" that particular resource.

The second experiment determined whether *C. macellaria* flies are equally attracted to a food resource that has been exposed to adults of the predatory species, *Chrysomya rufifacies*. An equal number of male and female *C. macellaria* were kept in one cage, while an equal number of male and female *C. rufifacies* were kept in a second cage, under the same conditions. Containers of beef liver were introduced to each cage, and one from each of the cages was removed every 24 hours for five consecutive days. Once one 24-hour exposed container was removed from each cage, they were connected to separate arms of the dual-choice olfactometer. Five female and male *C. macellaria* adults were tested to see whether they were deterred from the liver that had been exposed to *C. rufifacies*. Other containers of liver were exposed to each of the fly species colonies for 72-hour time intervals, at which point they were also used in the olfactometer. All *C. macellaria* adults used in this experiment were reared on beef liver.

The third experiment assessed whether the presence of intra- and interspecies larvae affected *C. macellaria*'s attractiveness to a food resource. This study is applicable to forensics because it addresses whether or not *C. macellaria* adults are less likely to lay their eggs on a cadaver that has already been infested with the predatory species, *C. rufifacies*. A similar experimental design with the olfactometer as described previously was used in this study. One container of beef liver containing third instar *C. macellaria* maggots and one container of beef liver colonized by *C. rufifacies* maggots were placed at the arms of the olfactometer. Five *C. macellaria* adults from each sex were tested for five consecutive days.

These experiments are the first to assess the importance of blow fly biology as it pertains to the pre-CI in a forensic investigation. In other words, the current experiments take into consideration a variety of factors which may influence the colonization of a food resource by the blow fly, *C. macellaria*.

#### Forensic Entomology, Period of Insect Activity, Associative Learning