



D47 Rearing of *Chrysomya megacephala* (Diptera: Calliphoridae) at Different Population Densities

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Attendees will learn that larger densities of *C. megacephala* will result in smaller and lighter puparia and adults. Also, larger numbers will result in increased mortality in the larval stage. This presentation will impact the forensic community and/or humanity by providing additional information on insects used as forensic indicators.

Chrysomya megacephala and *Chrysomya rufifacies* are the primary invading Diptera species found on decomposing carcasses and corpses throughout O'ahu, Hawaii. These two species are in the family Calliphoridae, which are commonly known as blowflies. *C. megacephala* and *C. rufifacies* are found during the first, second, third, and fourth stages of decomposition. These two species both feed on flesh and tissue. When their food source is depleted or larval development complete, larvae will leave the carcass for pupariation. *C. megacephala* larvae feed only on corpses and carcasses, while; by contrast, the *C. rufifacies* larvae feed on the corpse or carcass, prey on other larvae, and sometimes cannibalize its own species. There has not been a significant amount of research on interactions between these two species, even though they are frequently found on corpses in large numbers. Frequent occurrence of these larvae makes them a very important part of solving deaths in Hawaii. Does the density population of *C. megacephala* have an effect on the rate of development? The hypothesis is that large densities will result in smaller and lighter puparia and adults. It is believed that large numbers will result in increased mortality in the larval stage. Can *C. rufifacies* display cannibalistic or predatory behavior when the food source is limited? From previous work (Goodbrod & Goff 1990), the hypothesis of this study is that *C. rufifacies* is both predatory and cannibalistic.

In order to test these questions, it was necessary to establish colonies of larvae by collecting a large number of eggs. Larvae were separated into individual containers at specific densities of 100, 150, 200, 250, 300, and 400 larvae/12.5g of beef liver. Then the cultures are replicated a total of 6 times. Larvae were reared in Tupperware containers with a hole cut out of the top and covered by organza material. The organza material permits airflow. They were supplied with a limited food, 12.5g of beef liver, and given a few drops of water everyday using a transfer pipette to keep the liver moist. Puparial and adult stages lengths and weights were recorded. Two colonies were established with a 50/50 ratio of *C. megacephala* and *C. rufifacies*. This was done to observe the survival of larvae of the two species when in competition for a limited food source. There were not many trials of these because a limited amount of *C. rufifacies* was recovered from the host. Mortality was calculated based on puparial development and adult emergence.

In all six cultures initiated at first instar, the weights ranged from .010g to .032g. The lengths ranged from .543cm to .788cm. In all six cultures initiated at second instar, the weights and lengths were slightly larger. This could be because these larvae fed on the host a little longer than the first instar larvae. The greatest weight, in all of the second instar cultures was .037g and the smallest was .016g. The shortest length was .598cm and the longest was .800cm. The 100 puparia densities were larger in length and weight because there were fewer larvae feeding on the constant food source. The 400 puparia densities were the smallest because there were a great number of larvae feeding the 12.5 grams of beef liver.

The weights and lengths increased as the population became less dense. When the mortality rates were averaged between the three cultures and then divided by the density number the results verified the hypothesis. Rearing of *C. megacephala* in pure cultures at six different density dependent populations displayed a direct relationship between density versus length and weight of the larvae. The survival rates decreased at the greater densities. Puparial and adult lengths and weights decreased as population densities increased. Within the cultures reared with the *C. megacephala* and *C. rufifacies*, the *C. rufifacies* showed cannibalism and also was predatory on *C. megacephala*. USDE grant number P217A030070 supported this research.

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