

# Comparison of the longevity of *Cochliomyia macellaria* (Fabricius) and *Chrysomya rufifacies* (Macquart) adult males (Diptera:Calliphoridae)

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**Abstract:** Depending on the species, males or females tend to exhibit increased longevity based on heterogametic chromosomes. While differences in longevity between males and females of a species has been extensively studied, differences in longevity between males of the same family has been minimally investigated. Longevity is crucial in understanding an insect's physiology; it can affect developmental times and other life history traits. *Cochliomyia macellaria* and *Chrysomya rufifacies* are two Calliphoridae species that are known to cause myiasis, which is detrimental to the livestock industry. By determining the longevity of the adult *C. macellaria* and *Ch. rufifacies* males, it is possible to use the data to predetermine future myiasis outbreaks and take preventative action. Wild maggots from both species were reared and the longevity of emerging males was recorded. Results show that male *C. macellaria* adults lived an average of  $27.79 \pm 10.96$  days, significantly longer than *Ch. rufifacies* adult males that lived an average of  $21 \pm 12.80$  days ( $p=0.021$ ). It is possible that the difference in longevity is due to mating; *Ch. rufifacies* mate sooner than *C. macellaria*, due to differences in female developmental time and longevity.

Keywords: Blowfly, *Cochliomyia macellaria*, *Chrysomya rufifacies*, myiasis, longevity

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Differences in longevity between males and females are commonly observed across many species; the sex with the heterogametic chromosome tends to have increased longevity. (Tower and

Arbeitman 2009, Kaiser and Bachtrog 2014). Longevity is an important factor in the life history of insects that affects length of developmental stages. *Cochliomyia macellaria* and *Chrysomya*

*rufifacies* are important Calliphoridae in forensic entomology due to their roles in the breakdown of carrion and post-mortem interval determination (Mohr and Tomberlin 2014). These species are also known for causing myiasis, the parasitic infestation of a mammalian by fly larvae (Otranto 2001). *Cochliomyia macellaria* and *Chrysomya rufifacies* myiasis cause severe economic damage of livestock, including reduced milk production, weight and fertility issues, and reduced hide quality (Francesconi and Lupi 2012). Mated females of both species lay eggs on wet, damp areas of the body and the larvae feed on living tissue (Otranto 2001). Comparing the longevity of *C. macellaria* and *Ch. rufifacies* adult males will be helpful in determining differences in life histories and predicting mating periods. Predicting when each species is ready to mate can aid in taking preventative measures prior to a possible myiasis outbreak (Goulson 2005).

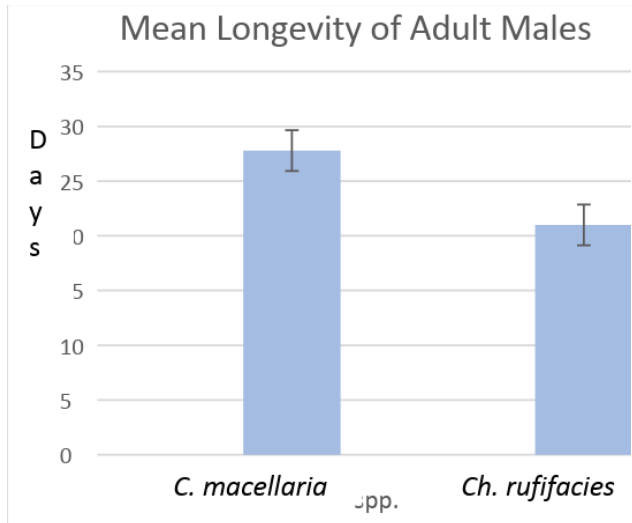
## Materials and Methods

Wild maggots of *C. macellaria* and *Ch. rufifacies* were collected from carrion in College Station, TX. Both species of maggot were raised on food-grade cow liver (American Laboratories, Inc., Omaha, NE) and the adult flies were placed in a collapsible 12x12x12 fly cage (BioQuip, Rancho Dominguez, CA) with sugar (American Sugar Refining, Inc., West Palm Beach, FL) and water. The newly emerged adults were then given

cow liver as a protein meal at 3 days old, and at 5 days, more cow liver was provided for oviposition. The eggs were left on the liver, and the maggots were allowed to grow. The liver was placed on a bed of sand in a 1 pint mason jar (Ball Corporation, Broomfield, CO). Extra liver was added *ad libitum*. Pupae were gathered and weighed individually and moved into individual 2 oz. portion cups with lids at 25 °C. Emerged adult males were placed inside cups and fed 0.05 cc of 10% sugar water daily until death. Longevity of the adults was recorded and data was analyzed using a T-test in SPSS (IBM SPSS for Windows Version 22.0).

## Results

The mean longevity in *C. macellaria* was  $27.79 \pm 10.96$  days, while the mean longevity for *Ch. rufifacies* was  $21 \pm 12.80$  days (Figure 1). In *C. macellaria*, the maximum age in days recorded was 42, and the minimum age recorded was 1. In *Ch. rufifacies*, the maximum age recorded in days was 46, and the minimum age recorded was 4. A T-test was done to determine if there was a significant difference between both longevities. *C. macellaria* lived significantly longer than *Ch. rufifacies* ( $p=0.021$ ) (Figure 1).



**Fig. 1:** Graph of the mean longevity of adult male *C. macellaria* and *Ch. rufifacies*

Developmental time is dependent on temperature for both species and both sexes, meaning that somehow altering the temperature of the infected area can affect future mating times and reduce continuation of myiasis outbreaks (Reynozo and Brundage 2015).

## Discussion

According to the results, *C. macellaria* lived longer than *Ch. rufifacies*.

It is possible that the reason *Ch. rufifacies* are observed to have short longevity is due to their peak mating time (Brundage 2012). *Ch. rufifacies* mate 2 to 10 days post-eclosion, while *C. macellaria* mate 3 to 18 days post-eclosion (Baumgartner 1985, Schmidt and Kunz 1985, Baumgartner 1993). *Cochliomyia macellaria* mate later in their adult life than *Chrysomya rufifacies* and as a result need to live longer to have an opportunity to reproduce. This may be due to females of both species having different developmental times (Brundage 2012). Other studies have found that *Ch. rufifacies* females live on average 23 days; female longevity seems to be slightly greater than males in *Ch. rufifacies* (Reynozo and Brundage 2015). Further studies need to be done in the field with both sexes where environmental factors impact longevity.

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