

Investigating the Role of Diphenhydramine and Metabolite on the Life History of *Sarcophaga bullata* (M.) (Diptera: Sarcophagidae)

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Diphenhydramine is a first-generation over-the-counter antihistamine that alleviates allergy symptoms. In 2022, diphenhydramine was implicated in 13,574 overdose deaths in the US. In cases of diphenhydramine overdoses, both the raw drug and subsequent metabolites can be found in the liver as seen with other orally administered medications. In cases of overdose, death is often unattended and forensic entomology can be utilized to establish forensic timelines. However, drugs have been known to alter the survivability and reproductive success of necrophagous flies with varying degrees based on the drug and insect species. Currently, the effects of diphenhydramine and its metabolites on insect biology has not been studied. The purpose of this research is to determine the effects of diphenhydramine and a common co-occurring metabolite, 2-(benzhydryloxy) acetic acid, on *Sarcophaga bullata* (M.) (Diptera: Sarcophagidae) survivorship and fecundity. To do this, 2-(benzhydryloxy) acetic acid was chemically synthesized in the laboratory. Beef liver was treated with a control (no addition), or with forensically relevant quantities of diphenhydramine, 2-(benzhydryloxy) acetic acid, and a mixture of the two and inoculated with 50 *S. bullata* first instars. Pupation rate, eclosion success, and sex ratios were quantified and emerged adults were kept in colonies to determine offspring reproductive success with the affiliated treatment. Preliminary data suggest the presence of 2-(benzhydryloxy) acetic acid increases reproductive output, highlighting the need to study metabolite effects in entomotoxicology.

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