G66 New Frontiers in Forensic Entomology: Chronobiological Studies on Body Search, Oviposition, and Emergence of *Megaselia Scalaris*

Esta Bostock, BSc, University of Huddersfield, Queensgate, Huddersfield, West Yorkshire HD1 3DH, UNITED KINGDOM; and Stefano Vanin, PhD, Queensgate, Huddersfield HD1 3DH, UNITED KINGDOM*

After attending this presentation, attendees will learn novel information about how photoperiod and light-dark conditions can affect forensically important insects in behaviors like oviposition and location of food sources that play an important role for the Postmortem Interval (PMI) estimation.

This presentation will impact the forensic science community by demonstrating how the knowledge of the species chronobiology can improve the PMI estimation, particularly in indoor cases. The presented research deals with *Megaselia scalaris*, a species that plays an important role in colonizing bodies in closed environments.

Circadian clocks have evolved to synchronize physiology, metabolism, and behavior to the 24-hour geophysical cycles of the Earth. The understanding of the circadian clock mechanism is a crucial element of forensic entomology because it is able to control routines such as locomotor activities, locating of food sources, feeding, mating, ovipositing, and emergence times.

Colonization of carrion and human cadavers by insects allow for the PMI to be determined. However, it is thought by some that flies are not active during the nighttime period and, therefore, are not able to oviposit during this time or in general in dark conditions. To put that into a forensic context, if eggs were located on a cadaver, the conclusion would be that death occurred during the previous day or before. Determining nocturnal oviposition in forensically important flies is of fundamental importance so that the PMI can be determined with more precision by the forensic entomologist.

To describe the behavior and the potential role that the circadian clock may have on both the locomotor activity and emergence times of the *M.scalaris,* this study used Trikinetics technology used previously in *Drosophila* studies which allows for factual data rather than observational data as reported in many articles. The activity rhythms of *M.scalaris* were monitored using light/dark (LD 12:12) photoperiods at 20°C.

Males (N=593, p=0.00) and females (N=205, p=0.00) both demonstrate that there are significant differences in their locomotor activities between dark and light conditions and further results establish that the flies are both diurnal and nocturnal in activity. Both sexes demonstrated a bimodal rhythmical activity which is more evident in the evening. In addition, different light colors have different attractiveness in the two sexes, with females more attracted by red light.

The pupa emergence experiment run in LD 12:12 photoperiod (N=67, p=0.00) determined that there is a significant difference between the emergence in both light and dark conditions, while pupa emergence which was run in complete darkness (N=46, p=0.069) show no significant differences.

To determine if *M.scalaris* were able to oviposit during the nighttime period, 120 females were placed individually into glass tubes containing food at one end and left for 12 hours (7:00 p.m. to 7:00 a.m.). The results demonstrate that, overall, 34.5% of females were able to oviposit during the night.

These experiments have demonstrated that *M.scalaris* is able to oviposit in dark conditions during the night. The pupa emergence determines that there are different rhythms during full darkness conditions and light/dark conditions. In addition, the experiments demonstrated that this species is clock regulated and that in continuous dark it can oviposit both during the dark and the light subjective phase.

The locomotor activity demonstrates that *M.scalaris* is both diurnal and nocturnal in activity which supports the oviposition data also presented.

PMI Estimation, Indoor Cases, Phoridae

 ** Presenting Author*