



G100 Effect of Concealment on Necrophagous Flies Access

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After attending this presentation, attendees will understand how different combinations of accessibility and odor diffusion affect the access of bait by calliphorids necrophagous flies. Such results are needed in forensic entomology to estimate the Pre-Appearance Interval (PAI: delay before first insect arrival), especially regarding indoor cases.

This presentation will impact the forensic science community by providing, for the first time, data on flies' abundance and PAI depending on odor diffusion and accessibility.

Forensic entomology is used to estimate the age of the insects sampled on cadavers, and subsequently to estimate the time of death. However, flies do not always colonize corpses immediately after death. If the corpse is difficult to reach, especially in the case of wrapping, concealment, or burying, access by necrophagous insects may be delayed. Such a delay in insect arrival (PAI) is also observed with bodies discovered inside dwellings or vehicles.

It may seem obvious that the less accessible a corpse is, the later and fewer flies there will be; however, no known detailed experimental evidences have been obtained. Furthermore, a delayed/altered insect access on concealed or indoor corpses could actually result from two different processes: first, the difficulty for the insects to detect a corpse due to potentially low odor diffusion, and, second, the inherent difficulty in accessing concealed corpses. Thus, two different parameters overlap in insect "accessibility," the escape of gases and the surface allowing insects to enter. It was hypothesized that these two parameters both influence the colonization process, and therefore, must be considered together.

Two possible consequences of the low accessibility of a corpse could be: (1) an increase in the pre-appearance interval (i.e., the time before first insect arrival); and, (2) a decrease in the total number of flies accessing the corpse. Both can impact the decomposition timeline and, in a forensic context, the PMI estimation. To answer this question, experiments were performed under controlled (laboratory) and field conditions. Baited traps were used to test how different combinations of accessibility and odor diffusion affect the access of bait by calliphorids necrophagous flies. Although such experimental designs were not directly connected to "real" forensic cases, they covered a large range of possible scenarios and thus bring general information on the behavior of necrophagous flies.

During laboratory experiments, 30 *Lucilia sericata* gravid females were kept in a cupboard with one of the traps. The most efficient trap caught a mean of 24.6 ± 3.4 flies per run. The less efficient one had the largest odor diffusion surface (99 cm^2) combined with the lowest accessibility (one 1 cm^2 entrance hole). It caught a mean of 5 ± 3.7 flies per run, and significantly differed from the other. Overall, the results indicate that: (1) *Lucilia sericata* can enter in barely accessible traps; and, (2) odor diffusion and accessibility both affect the number of flies entering the traps.

Field experiments were performed with the same trap designs. For these experiments, all the traps were placed together outdoors in the same place and at the same time. The trap with the larger entrance (ten 9 cm^2 holes) caught the most flies (55.6% to 99.4% of the total number of flies caught during a single run). On the contrary, only a few flies entered the other traps. None of these traps exceeded 29% of the total number of flies caught during a single run. A delayed access of the less open (odor diffusion and accessibility) traps was finally noted. Major conclusions of field experiments are: (1) traps with low accessibility took longer to be accessed by flies; (2) larger odour diffusion surfaces increased fly attraction; and, (3) flies more readily accessed traps through larger holes than through an equivalent surface area made up of smaller holes.

In a forensic-entomology context, results suggest that both accessibility and odor effusion should be considered together to assess the possible time that might elapse between death and first arrival by flies.

Entomology, PMI Estimation, Indoor Cases