

Heavy Metal Detection and Quantification on Blow Fly (Diptera: Calliphoridae) Larvae and Potential Forensic Entomotoxicology Applications

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Insects are quite cosmopolitan and are exposed to a wide range of biotic and abiotic conditions. These conditions may result in insects accumulating xenobiotics present in their food and environment. Blow flies (Diptera: Calliphoridae) will colonize and start feed on corpses shortly after death; because of this, they are often used to estimate the minimum post-mortem interval (mPMI). Forensic entomotoxicology focuses on the use of insects to identify xenobiotics which may have been present in the corpse; these substances can also have an influence on the developmental time of the insects and consequently, this can have an impact on the estimation of mPMI. Heavy metals are toxic and non-biodegradable elements and their presence in the environment can be used to indicate health risk for all exposed living organisms. The objective of this study was to develop a protocol for the detection and quantification of heavy metals in Calliphoridae larvae. Metal accumulation and distribution was analyzed in the gut content and cuticle of the larvae; these were compared to the heavy metals detected in tissue samples of the carcass and in the soil. The results represent a first step towards a more structured protocol for the analysis of heavy metals from insects and towards a better understanding of how calliphorids accumulate metals. Future work will assess the influence of heavy metal levels and larval growth and will refine the way that Calliphoridae can be used in forensic entomotoxicology investigations. Supported by the SOT Intern Program, EMSOP, and NIH R25ES020721.

