

Abstract

Testing the Suitability of Preserved Insect Collections for Biodiscovery Using Liquid Chromatography Mass Spectrometry [†]

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Abstract: Small metabolites and venom metabolites produced by insects are known to exhibit biological activity. These metabolites could be used to develop natural product-based therapeutics. To screen for these metabolites, insects must be collected and accurately identified. Natural history collections consist of identified insects and provide a source of raw material for metabolomic screening. The objective of this research was to understand whether preservation significantly altered the insect metabolomic profiles. Insects from the family Sphecidae: *Podalonia tydei* (Le Guillou), which were preserved in ethanol, flash frozen, and homogenized with methanol. The resulting metabolomic extracts and storage ethanol were analysed using untargeted liquid chromatography-mass spectrometry. Mass spectral data were processed with MZmine2. The data were analysed using multivariate statistical analysis. In the Principal Component Analysis, ethanol stored samples and their storage solvents clustered close together. This was verified by Analysis of Similarity (ANOSIM). Based on ANOSIM ($p = 0.003$, $R^2 = 0.48$), there was significant overlap between chemical profiles of treatments (ethanol only, ethanol stored tissue, flash frozen tissue). A group of acyl-carnitines were putatively identified from the extracts. The flash frozen samples have a high relative abundance for acyl-carnitines, however the Kruskal–Wallis ($p > 0.05$) showed no significant difference between the median of abundance. Therefore, preserved insects from natural history collections and their ethanol storage solvents could be used for metabolomic screening. However, it would be best to use specimens from the same species preserved under various conditions to capture metabolites that may degrade or leach during preservation.

Keywords: preserved collections; biodiscovery; metabolomics; hymenoptera

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