G69 DNA-Based Identification of Forensically Significant Blowflies of Australia and Southern Africa

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After attending this presentation, attendees will understand the DNA-based identification of flies; potential of improved identification of flies to increase the efficiency and accuracy of forensic entomology as an investigative technique; the importance of consideration of DNA variation between geographically isolated populations in estimating time since death; species status and implications for forensic entomology.

This presentation will impact the forensic community and/or humanity by demonstrating the potential of DNA for use in improving the accuracy of the estimation of time since death will be explored. This will aid scientists to incorporate DNA-based forensic entomology into investigations, increasing the efficiency and accuracy of the technique for aiding investigators to focus their investigations more effectively. These DNA-based techniques improve the performance of entomology in casework, an important facet of any science used in criminal investigation, as standards must constantly be improved.

Entomology is an important forensic investigative tool, commonly applied to the estimation of time since death, referred to as post mortem interval (PMI). Blowflies (*Diptera: Calliphoridae*) are commonly found in association with corpses and may be used to estimate PMI. A critical step in entomologically based PMI estimation is the identification of insects to species level. Many species display affinities with corpses in any given area, and all will develop at different rates. Blowflies, and particularly their immatures must therefore be accurately identified. Based on morphological characters this was generally problematic, but more recently DNA-based techniques have been utilised for identification.

In applying DNA-based techniques, careful consideration is required to ensure that DNA characters used are robust and thus present throughout the entire of a species. This requires not only study of many individuals of a species from a locality, but analysis of individuals from isolated populations of the species.

The majority of studies have addressed the corpse fauna of the United States, Europe, Britain and Australia, but generally neglected Africa. In southern Africa, forensic entomology is being incorporated increasingly into death investigations.

This study consequently focused on the molecular-based identification of flies from southern Africa and Australia, considering distinction between species as well as differences between geographically isolated populations. The cytochrome oxidase I (COI) encoding region of mitochondrial DNA (mtDNA) was sequenced over 1167 base pairs, and analysis performed using phylogenetic techniques to compute similarity and difference between individuals.

Results proved the region to be useful in species level identification, with robust characters present. Variation between species was consistently calculated at 3.0% or higher, while intraspecific variation did not exceed 0.8%. While the distinction between these two values indicates the ability to clearly distinguish between species, there is little scope for identifying the geographical provenance of insects considering the low variation between conspecific populations. Consequently, an alternate region is suggested for this purpose. In conclusion, many southern African and Australian species of blowflies can be successfully distinguished on the basis of DNA.

Entomology, DNA, Blowflies

 ** Presenting Author*