Forensic characterisation of soil microbial communities in response to cadaver decomposition

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Introduction
• An accurate estimation of time since death is an important aim of every medico-legal investigation and its determination can direct an entire forensic case.
• The potential for using biochemical and molecular methods to characterise the dynamics of soil microbial communities during the process of cadaver decomposition has been investigated.

Methods

PLFA Results
The control microbial population O is significantly (p < 0.001) different from the cadaver microbial population P. Numbers refer to sampling day.

T-RFLP Results
The separation of control (O) and cadaver (P) soil microbial populations based on the ITS region of fungal rDNA.

Experiment
• Analyses were performed on soil that was sampled periodically from under two human cadavers at the Forensic Anthropology Centre at the University of Tennessee.
• Phospholipid fatty analysis (PLFA) and terminal restriction fragment length polymorphism (T-RFLP) community profiling of the internal transcribed spacer (ITS) region of fungal ribosomal DNA (rDNA), provided a qualitative and quantitative analysis of these transformations in the microbial populations.

Conclusion
• PLFA analysis demonstrated that the presence of a cadaver undergoing decomposition, resulted in a significant change in the structure and composition of the soil microbial community.
• T-RFLP analysis:
  - showed an observable difference in control and cadaver soil fungal populations
  - suggested the possibility of a succession of fungal species at different decomposition phases
  - indicated that fungal species may be able to be grouped into early and late phase fungi

The potential exists for the development of a post mortem interval estimation tool based on soil microbial community succession.

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