Establishing the persistence of an odour signature in decomposition soil

Perrault, K.A.[1], Stefanuto, P.-H.[2], Stuart, B.H.[1], Focant J.-F.[2], Forbes, S.L.[1]

[1]Centre for Forensic Science, University of Technology, Sydney, PO Box 123 NSW 2007, Katelynn.A.Perrault@student.uts.edu.au; Barbara.Stuart-1@uts.edu.au; Shari.Forbes@uts.edu.au
[2]CART, Organic and Biological Analytical Chemistry, Chemistry Department, University of Liège, Allée de la Chimie 3, B6c Sart-Tilman, B-4000 Liège, Belgium, phstefanuto@ulg.ac.be; JF.Focant@ulg.ac.be

Cadaver dogs are used to search for human remains by scenting volatile organic compounds (VOCs) evolved from decomposing cadavers. These compounds become diminished after extensive soft tissue decomposition or animal scavenging. Soil acts as a repository for decomposition VOCs thereby extending the period for locating remains when the odour source decreases. The objective was to identify the persistence of decomposition VOCs in soil following soft tissue decomposition and simulated scavenging. Pig carcasses were left to decompose at an outdoor site and were artificially scavenged after three months. Soil VOCs were then collected onto sorbent tubes at periodic intervals. Thermal desorption – two dimensional gas chromatography – time of flight mass spectrometry (TD – GC×GC – TOFMS) was used for analysis and indicated that highly volatile compounds diminished within eight weeks. Principal component analysis identified compounds exhibiting longer persistence that distinguished decomposition soil from control soil. TD – GC×GC – TOFMS was beneficial for providing enhanced sensitivity required for trace volatile analysis as well as increasing the number of compounds in the mixture which could be accurately identified. This study indicates the key compounds for extended postmortem intervals in decomposition soil which may be responsible for cadaver dog alerts at sites where remains are no longer present.