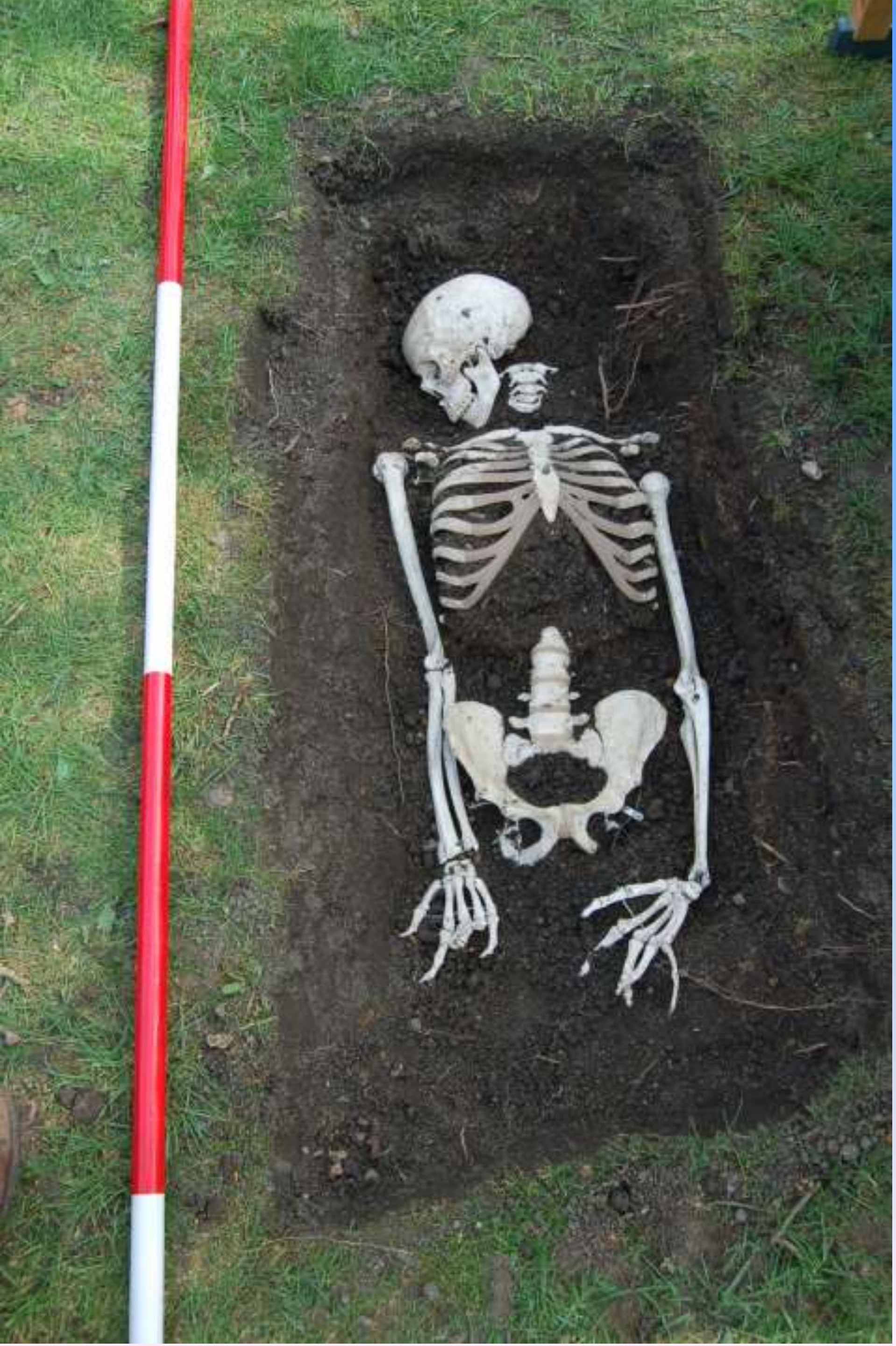


"Murder mayhem and machines"

Giorgio Blom

Alison Davidson

Jamie Pringle

John Cassella

STAFFORDSHIRE UNIVERSITY

Warning
explicit scenes of death!


Hiker Finds Body of El Toro Woman in Shallow Grave


Belfast Telegraph

FOUR WAYS TO CONTROL YOUR MIND

Murder probe as body found in lake

West Coast Cooler FASHIONWEEK


THE GARDEN OF DEATH

By ALUN REES and KATHRYN LISTER

Police dig up three missing girls' bodies

ONE of Britain's biggest mass murder inquiries was believed to be under way last night.

Detectives were searching for a number of other bodies after finding three buried in a suburban garden.

Page 4 Column 4

ACCUSED: Fred West


NEWS PICTURE SPECIAL ON THE

Murder riddle of the lady in the lake

A killer thought secret was safe

Check on missing women


DAILY Mirror

Perils of being a Yo-Yo dieter

EVIL BRADY BOASTS:

I'M LIKE JACK THE RIPPER


DAILY Mirror

STARTS TODAY YOUR FIRST TOKEN INSIDE

FRANCE FOR £1

PLUS FREE BOTTLE OF WINE

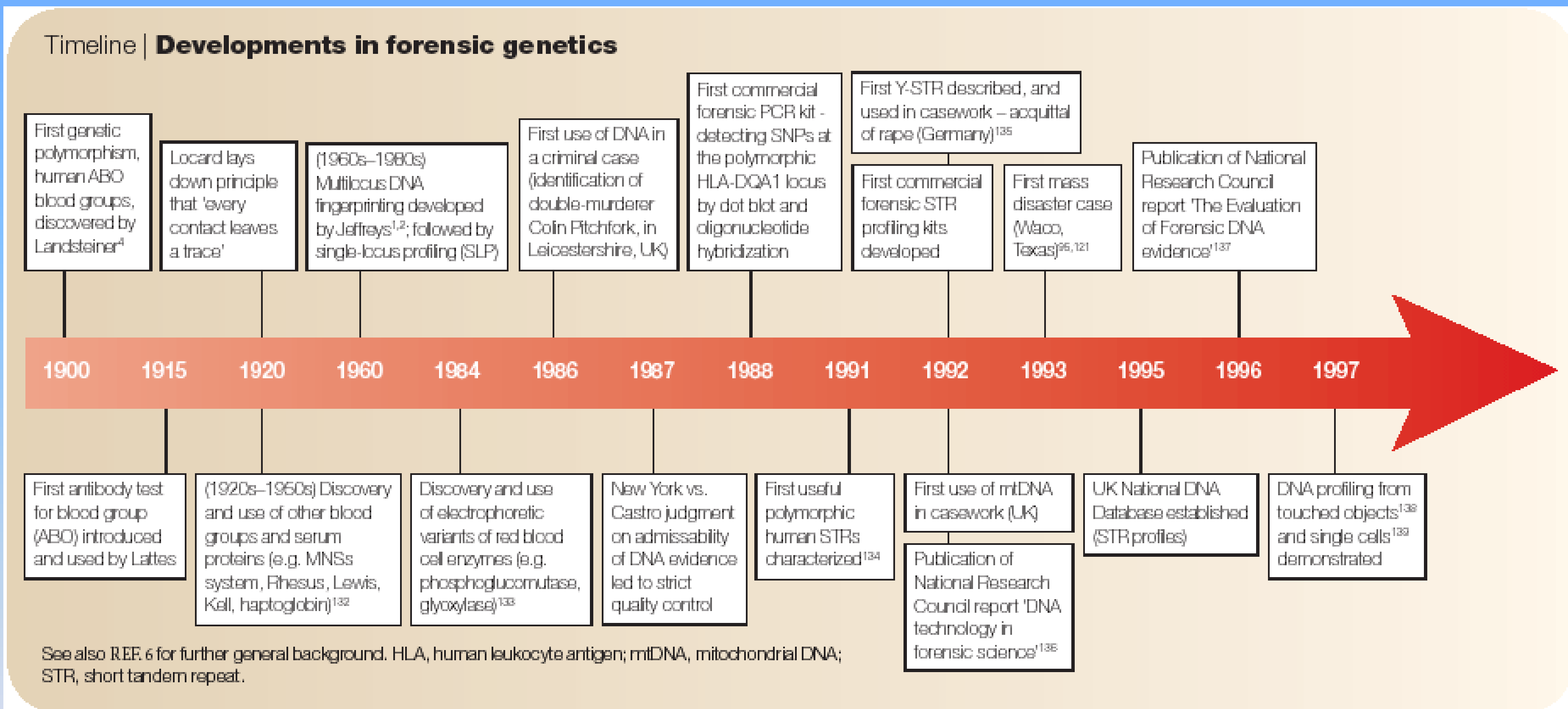
My last confession

60 MURDERS

WORLD EXCLUSIVE

By Fred West found hanged in prison cell

HOUSE OF HORROR MONSTER'S SUICIDE - 9 PAGE SPECIAL REPORT


Timeline | Developments in forensic genetics
First genetic polymorphism, human ABO blood groups, discovered by Landsteiner[4]
Locard lays down principle that 'every contact leaves a trace'
(1960s–1980s) Multilocus DNA fingerprinting developed by Jeffreys[1,2]; followed by single-locus profiling (SLP)
First use of DNA in a criminal case (identification of double-murderer Colin Pitchfork, in Leicestershire, UK)
First commercial forensic PCR kit - detecting SNPs at the polymorphic HLA-DQA1 locus by dot blot and oligonucleotide hybridization
First Y-STR described, and used in casework – acquittal of rape (Germany)[135]
First commercial forensic STR profiling kits developed
First mass disaster case (Waco, Texas)[95,121]
Publication of National Research Council report 'The Evaluation of Forensic DNA evidence'[137]
1900
1915
1920
1960
1984
1986
1987
1988
1991
1992
1993
1995
1996
1997
First antibody test for blood group (ABO) introduced and used by Lattes
(1920s–1950s) Discovery and use of other blood groups and serum proteins (e.g. MNSs system, Rhesus, Lewis, Kell, haptoglobin)[132]
Discovery and use of electrophoretic variants of red blood cell enzymes (e.g. phosphoglucomutase, glyoxylase)[133]
New York vs. Castro judgment on admissability of DNA evidence led to strict quality control
First useful polymorphic human STRs characterized[134]
First use of mtDNA in casework (UK)
Publication of National Research Council report 'DNA technology in forensic science'[136]
UK National DNA Database established (STR profiles)
DNA profiling from touched objects[138] and single cells[139] demonstrated
See also REF. 6 for further general background. HLA, human leukocyte antigen; mtDNA, mitochondrial DNA; STR, short tandem repeat.

- Last year in the United Kingdom approximately 200,000 people went missing of which 5,500 of those cases had a fatal outcome, which can range from suicide to accidents and misadventure to violent crimes.

- How you find those persons who have been murdered and placed in shallow, *hidden, clandestine* graves is the main topic of this presentation

- The use of laboratory scientific techniques and how they move into the ‘real-world’ will demonstrate the power and impact of science on our society

- The use of chemical analysis, in addition to other search methods ranging from Victim Recovery Dogs to ground penetrating radar, in order to locate human remains has found its way into the American juridical system, although the research and methodology were not ready at the time. This indicates that chemistry has a potential to aid in the detection of human remains, although this area of research still needs further exploration

Where to start ?

Soil Forensic Science Lorna Dawson video

The officers, in Metropolitan Police uniform, searched the grass on their hands and knees

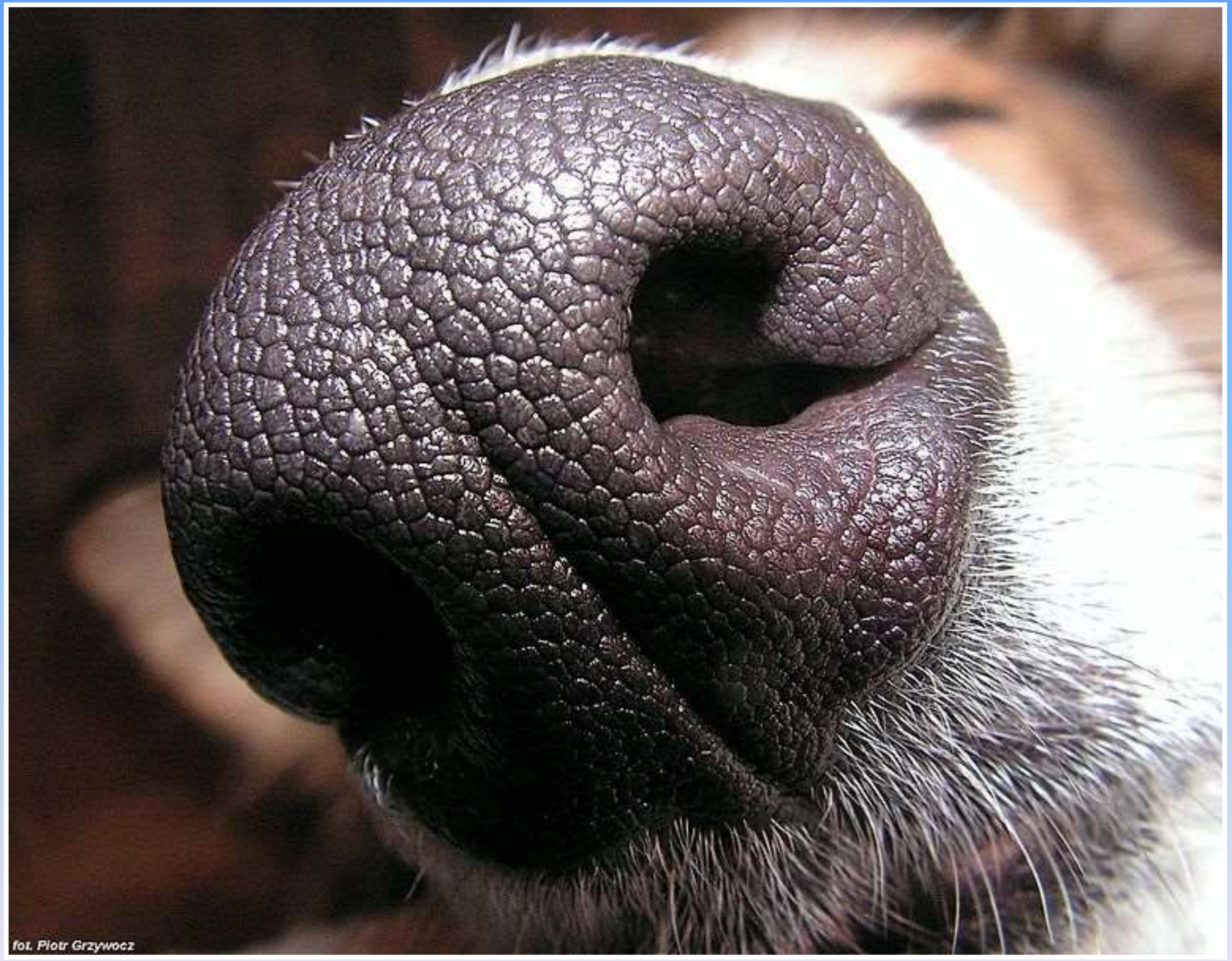
- Current procedures to detect clandestine graves

- Limitations of these procedures

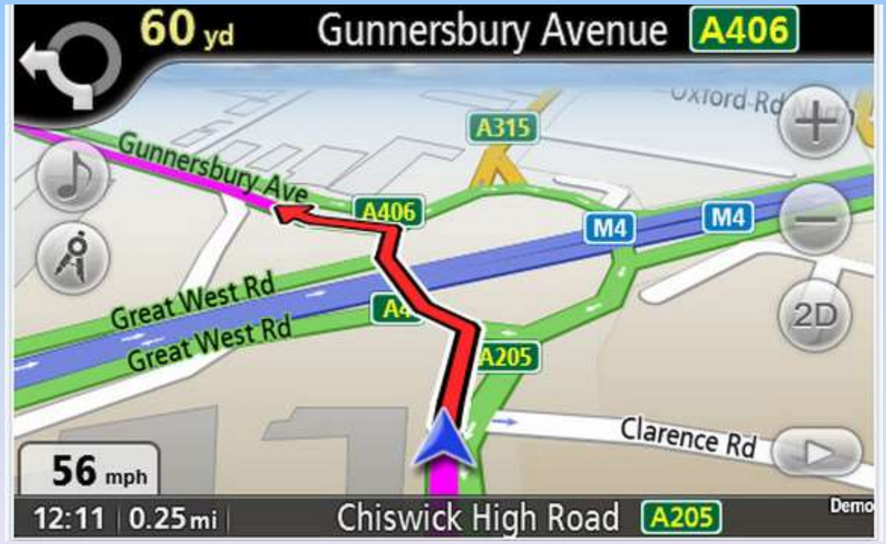
- Ideal procedure to detect clandestine graves

No grant funding available for this research

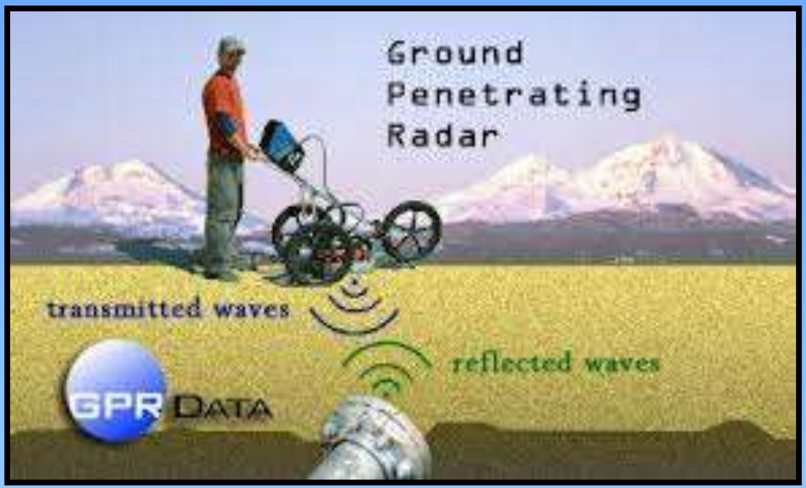
Current techniques employed

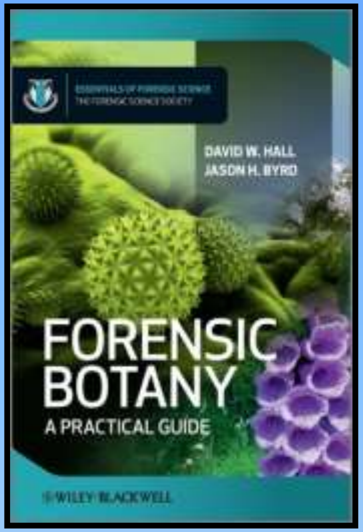

fot. Piotr Grzywocz

Mobile Technology tracking …..

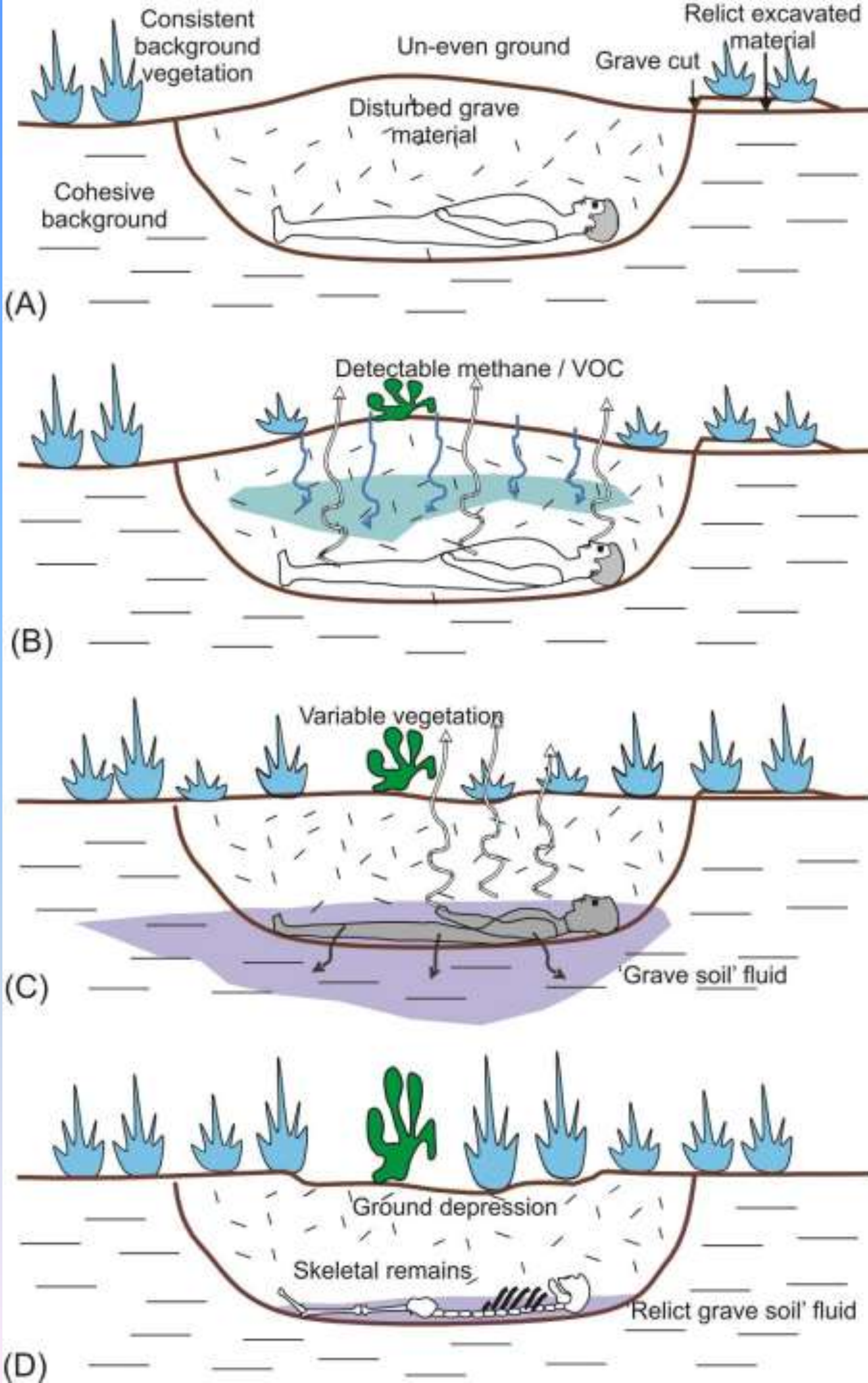


Current techniques employed





A fast method to locate a body in a large area of earth…..



- **Four main clandestine burial decompositional stages**. (A) Recent burial, surface expression is most obvious. (B) Early decomposition with search dogs and/or methane probes being optimal. (C) Late-stage decomposition with grave soil fluids. (D) Final skeletonised decomposition, GPR may locate.

Is there a problem ?
A famous case driven in part by the Media

An aerial image shows the ground where police first started digging in the Madeleine McCann investigation yards from the apartment where she was last seen


3562
22
© ExclusivePix


© ExclusivePix


© ExclusivePix

Metropolitan Police – news video- latest search for Madeline McCann

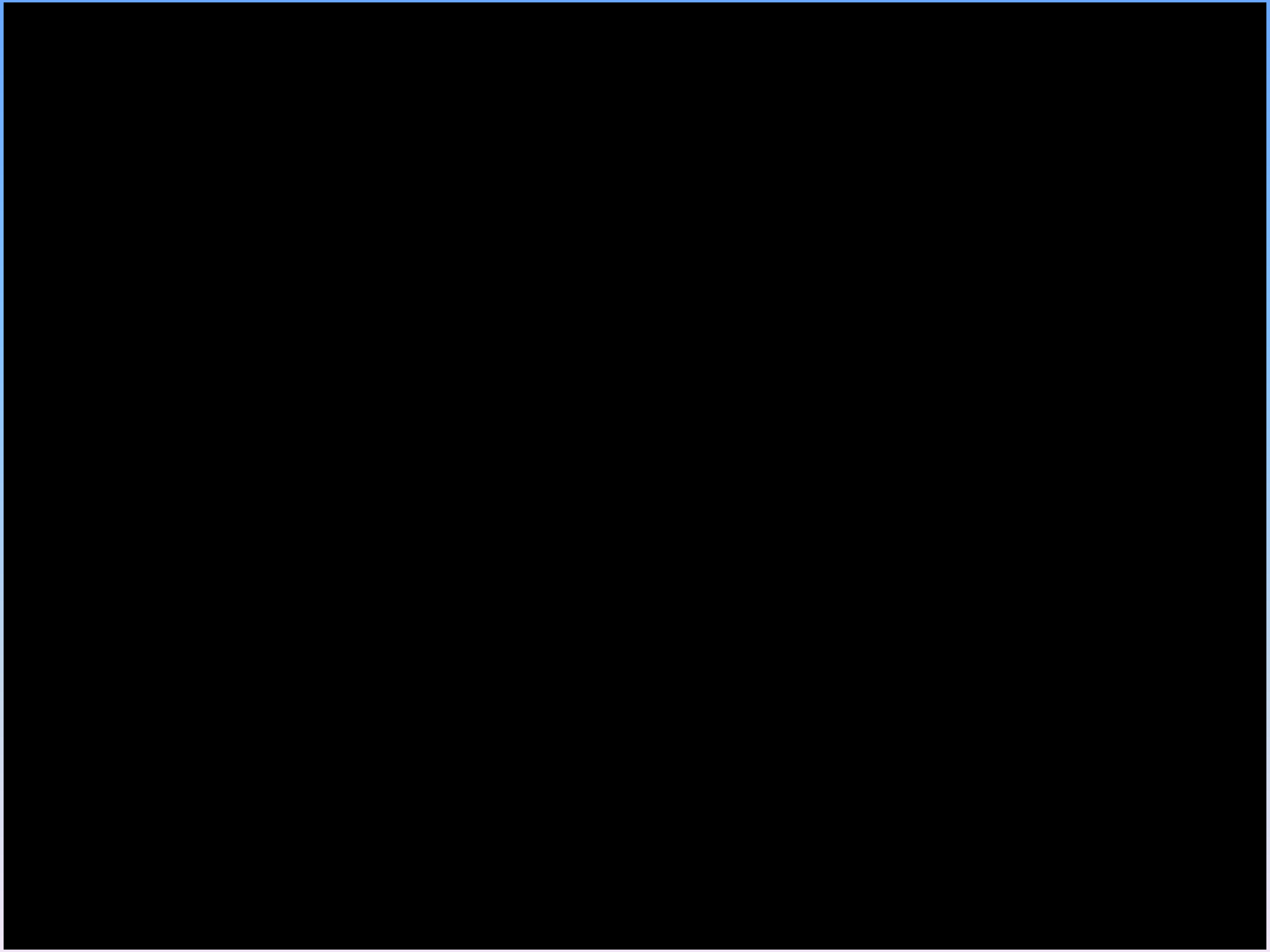
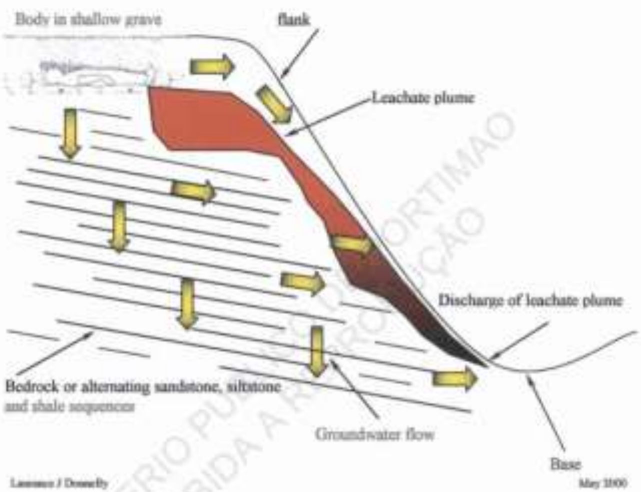


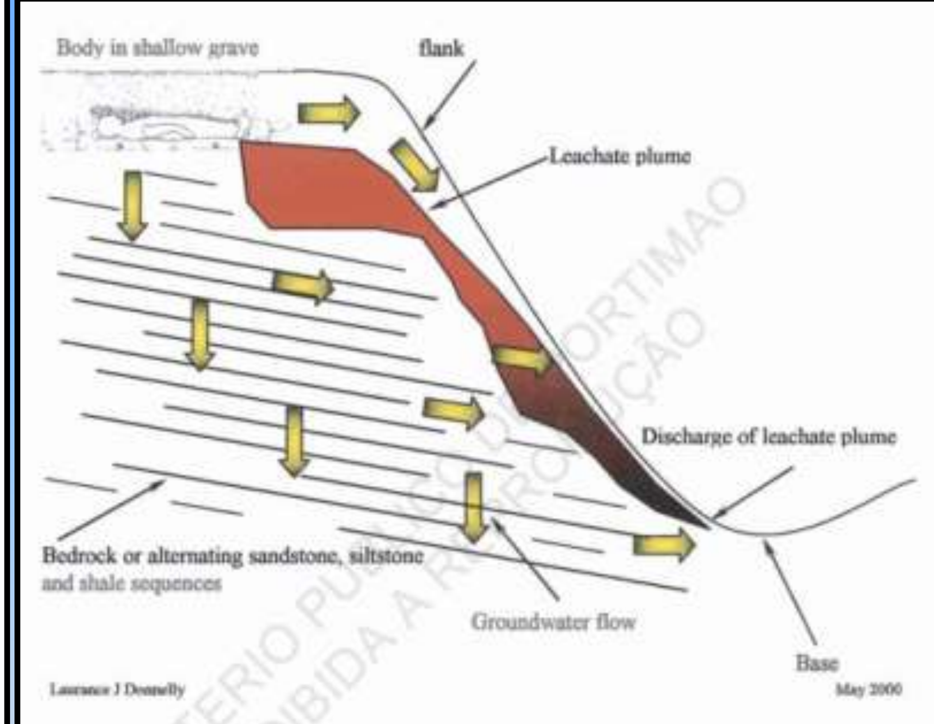
Figure 61 Schematic illustration to show the influence of groundwater flows and the migration of body scent, which may be carried away from the grave site, as a lecahate plume, to emerge on the flanks.



Ground Penetrating Radar (GPR)

This consists of a radar antenna transmitting electromagnetic energy in pulse form at frequencies between 25 MHz and 1 GHz. The pulses are partially reflected by the sub-surface geological structures, picked up by a receiving antenna and plotted as a continuous two-way travel time record, which is displayed as a pseudo-geological record section. The vertical depth scale of this section can be calibrated from the measured two-way travel times of the reflected events either by the use of the appropriate velocity values of electromagnetic pulse through the ground.

The depth of penetration achieved by the radar pulse is a function of both its frequency and the conductivity of the ground.




CRIME SCENE DO NOT ENTER

If only murders would stand there and wait to be caught…….

BBC TV *COUNTRY**FILE*** video

Burial Research Consortium

Ground-breaking taphonomy and decay research in the UK and abroad

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Burial Research Consortium

View my complete profile

Blog Archive

Related Links

University of Bradford

Thursday, 3 April 2014

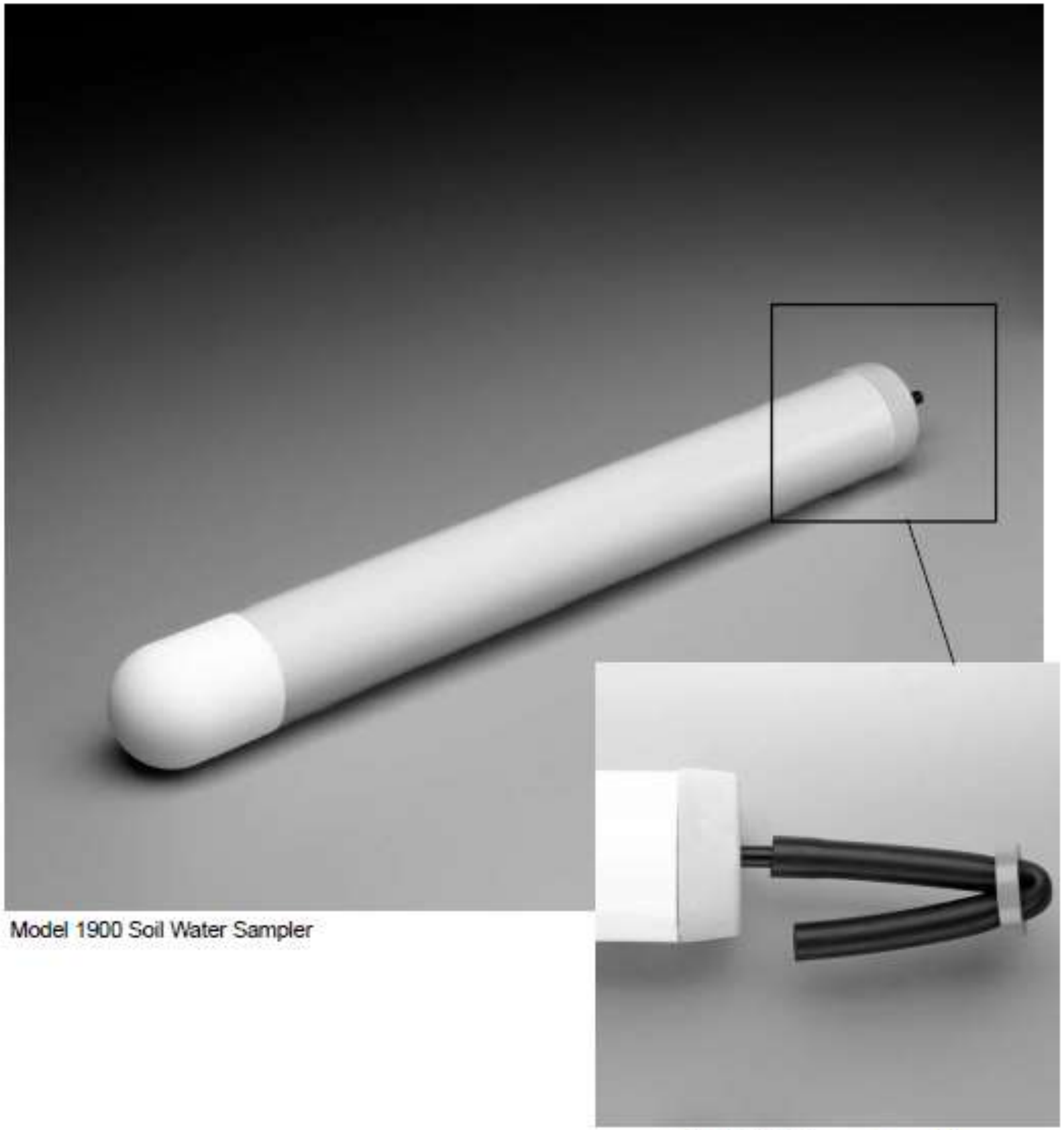
Another "body farm"...in the USA

We at the Burial Research Consortium watched and listened with interest to this press release and video about a forensic taphonomy facility being built at Fox Valley Technical College in Madison, Wisconsin. The 2 acre facility is set to open in 2015, and will primarily focus on decomposition in the northeastern USA climate, including sub-zero temperatures. This represents an important development in furthering forensic taphonomy research, and will be the seventh such facility in the USA. The BRC are at the forefront of the efforts in the UK/Europe to establish a similar facility, and will watch the progress at Fox Valley closely. We wish them the best of luck with the project!

Posted by Burial Research Consortium at 07:01 No comments:

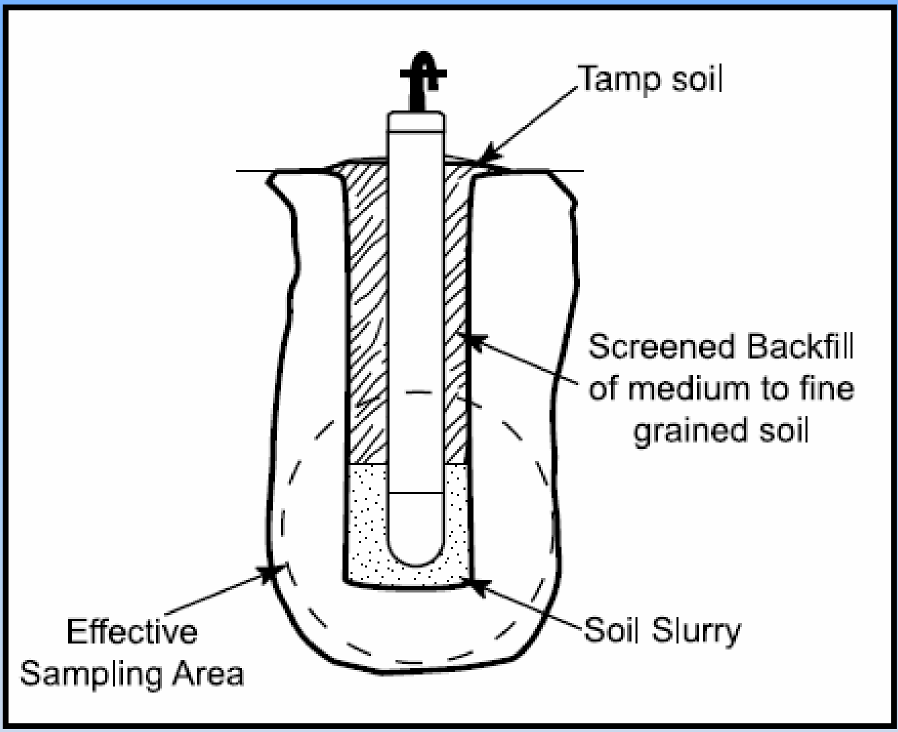
Recommend this on Google

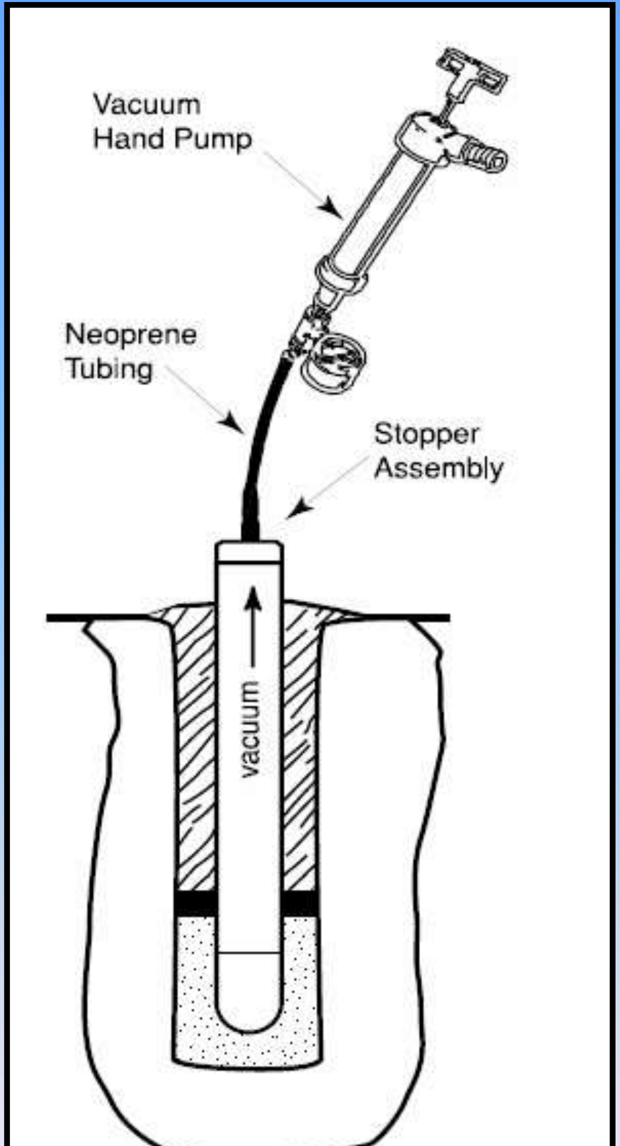
Monday, 6 January 2014



Model 1900 Soil Water Sampler

Z1900-200 Stopper Assembly
(Shows stopper, Neoprene tubing and clamping ring)


Tamp soil
Screened Backfill
of medium to fine
grained soil
Effective
Sampling Area
Soil Slurry


Vacuum
Hand Pump
Neoprene
Tubing
Stopper
Assembly
vacuum
Figure 10

Forensic Science International 198 (2010) 126–133

Contents lists available at ScienceDirect

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journal homepage: www.elsevier.com/locate/forsciint

Preliminary soilwater conductivity analysis to date clandestine burials of homicide victims

Jamie K. Pringle[a,*], John P. Cassella[b], John R. Jervis[a]

[a] School of Physical Sciences & Geography, Keele University, Keele, Staffordshire, ST5 5BG, UK
[b] Department of Forensic and Crime Science, Faculty of Sciences, Staffordshire University, College Road, Stoke-on-Trent, Staffordshire, ST4 2DE, UK

A B S T R A C T

This study reports on a new geoscientific method to estimate the post-burial interval (PBI) and potential post-mortem interval (PMI) date of homicide victims in clandestine graves by measuring decomposition fluid conductivities. Establishing PBI/PMI dates may be critical for forensic investigators to establish time-lines to link or indeed rule out suspects to a crime. Regular *in situ* soilwater analysis from a simulated clandestine grave (which contained a domestic buried pig carcass) in a semi-rural environment had significantly elevated conductivity measurements when compared to background values. A temporal rapid increase of the conductivity of burial fluids was observed until one-year post-burial, after this values slowly increased until two years (end of the current study period). Conversion of *x*-axis from post-burial days to 'accumulated degree days' (ADDs) corrected for both local temperature variations and associated depth of burial and resulted in an improved fit for multiple linear regression analyses. ADD correction also allowed comparison with a previous conductivity grave study on a different site with a different soil type and environment; this showed comparable results with a similar trend observed. A separate simulated discovered burial had a conductivity estimated PBI date that showed 12% error from its actual burial date. Research is also applicable in examining illegal animal burials; time of burial and waste deposition. Further research is required to extend the monitoring period, to use human cadavers and to repeat this with other soil types and depositional environments.

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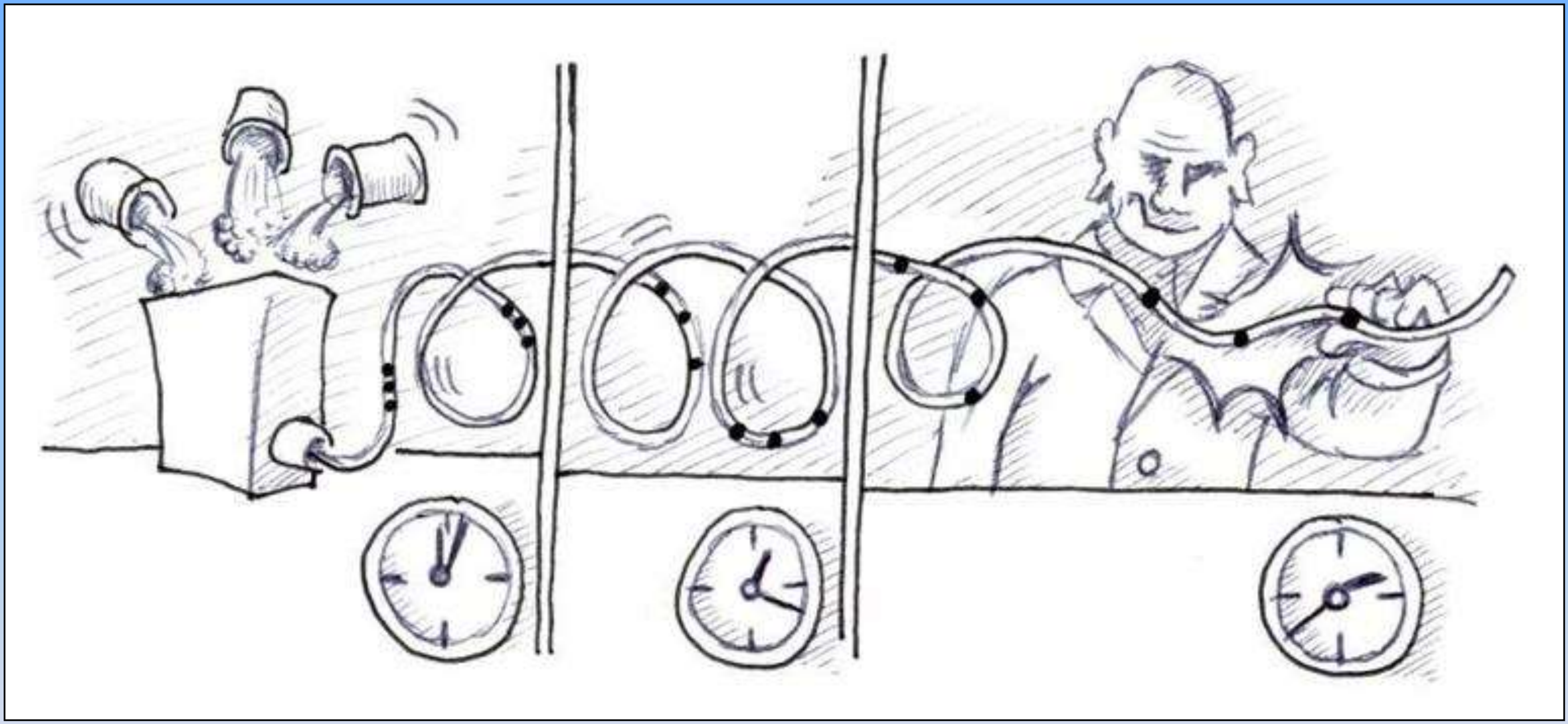
- Putrescine and cadaverine are significant decomposition products
- Putrescine and cadaverine are potential biomarkers for analytical instrument detection of clandestine graves
- Prominent researchers did not detect these compounds in grave headspace or soil – why?

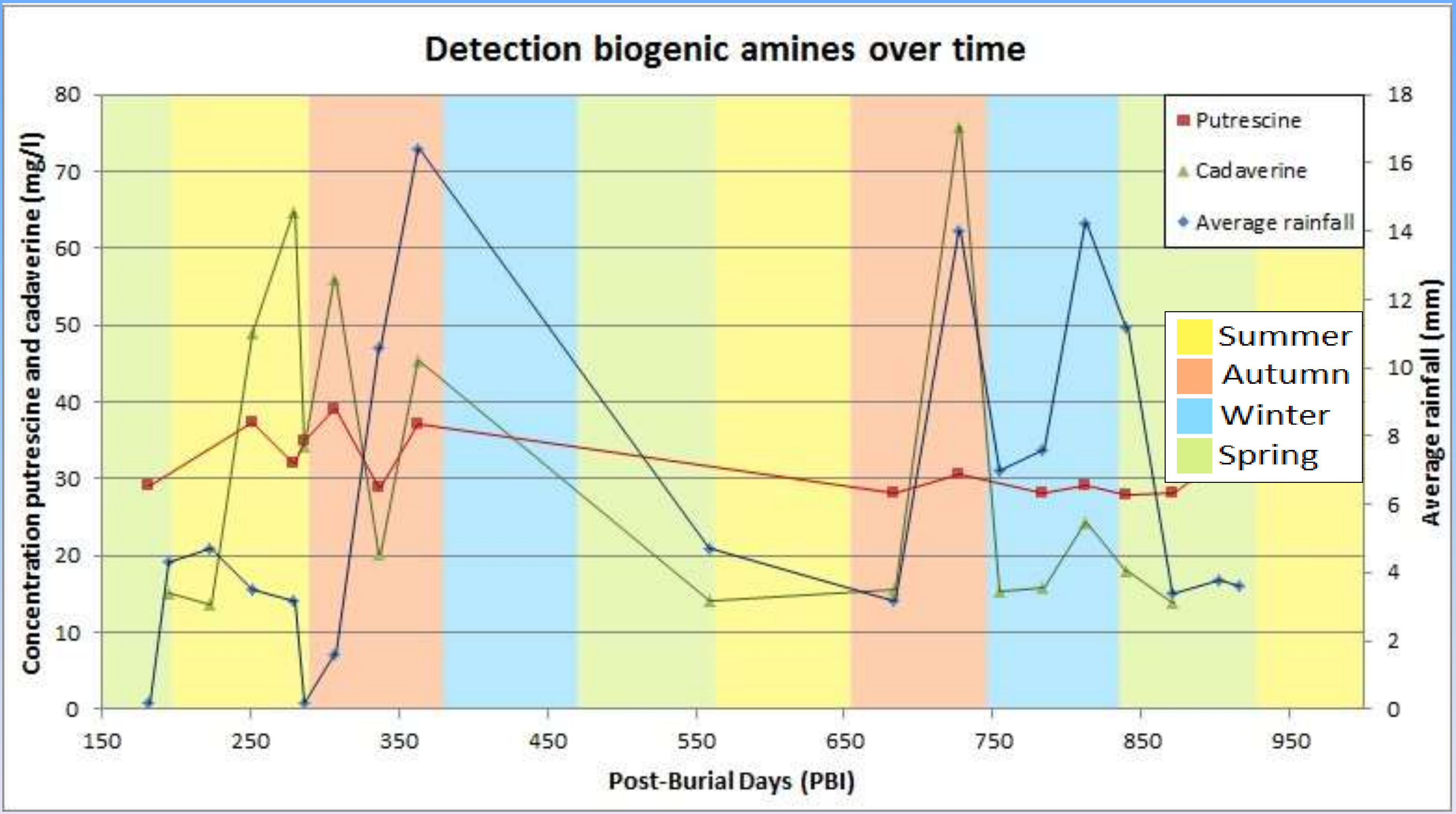

Caution

Video on How GCMS works



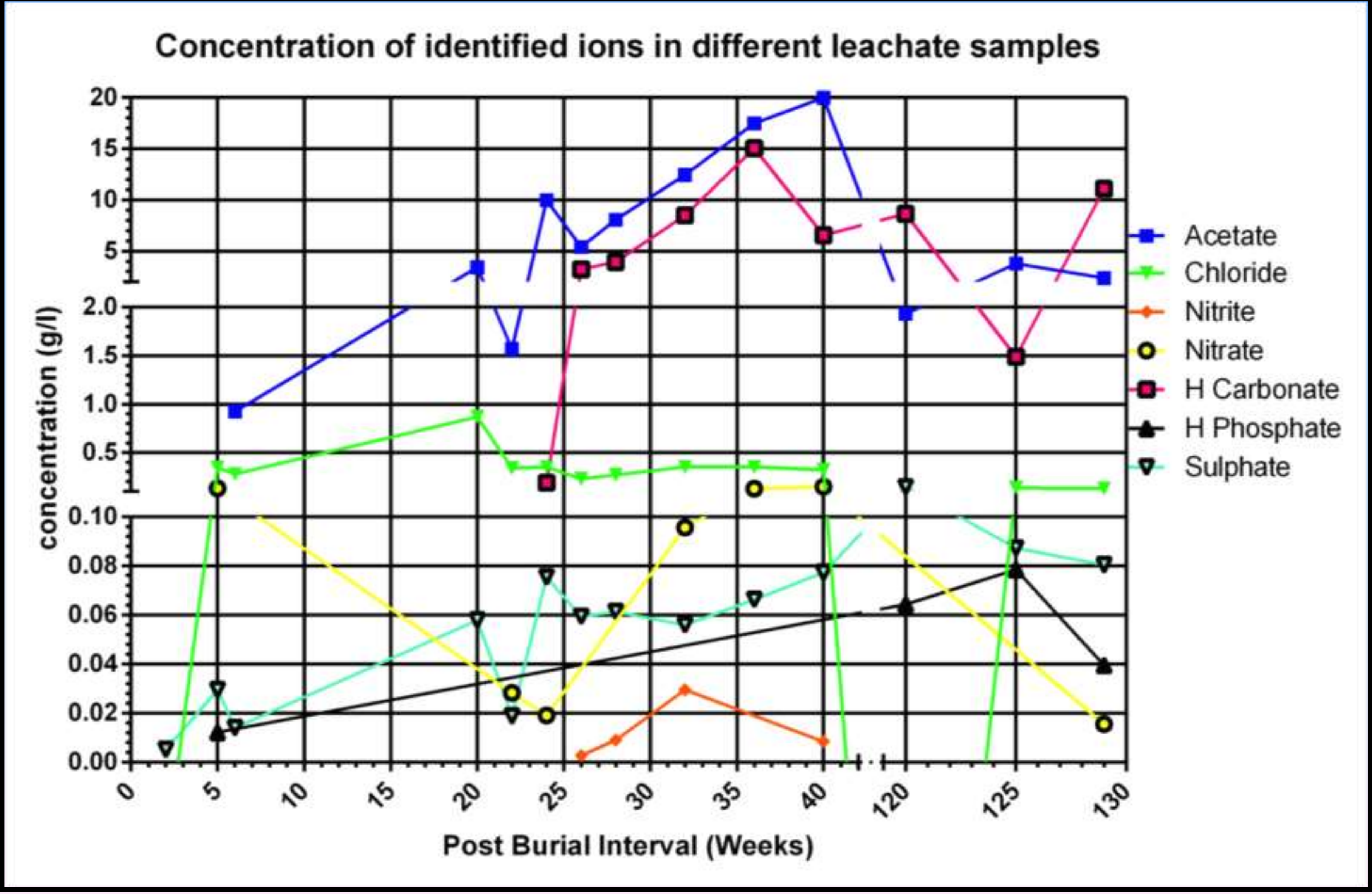
Giorgio video

Analysis of leachate samples



Detection of putrescine and cadaverine the leachate samples over time.

ION CHROMATOGRAPHY - AN EXAMINATION OF PORCINE LEACHATE TO IDENTIFY CHEMICAL MARKERS FOR CLANDESTINE GRAVES



Summary of the early Putrescine , Cadaverine and work

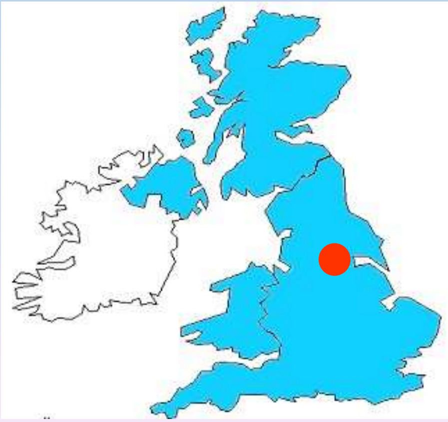
- Putrescine and cadaverine were detected in the leachate samples from 181 days up to 902 days post burial by GC-FID.

- Methylamine was also detected around this time interval.

- There is no linear relationship for the concentration of putrescine and cadaverine over time.

- Putrescine and cadaverine are less volatile if dissolved in water – so they will hang around longer in soil.

Image removed due to sensitivity



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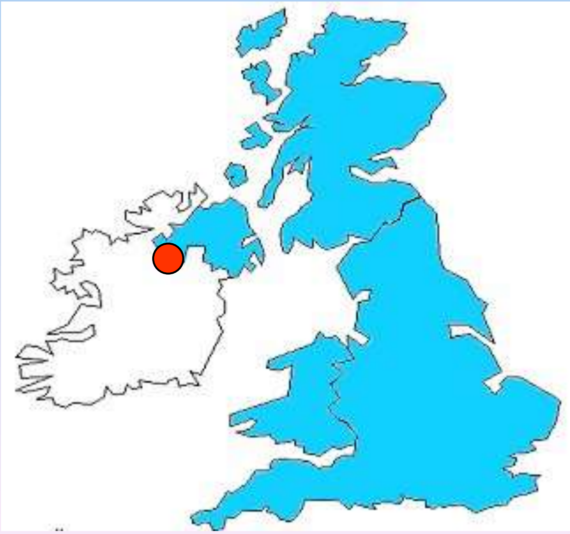

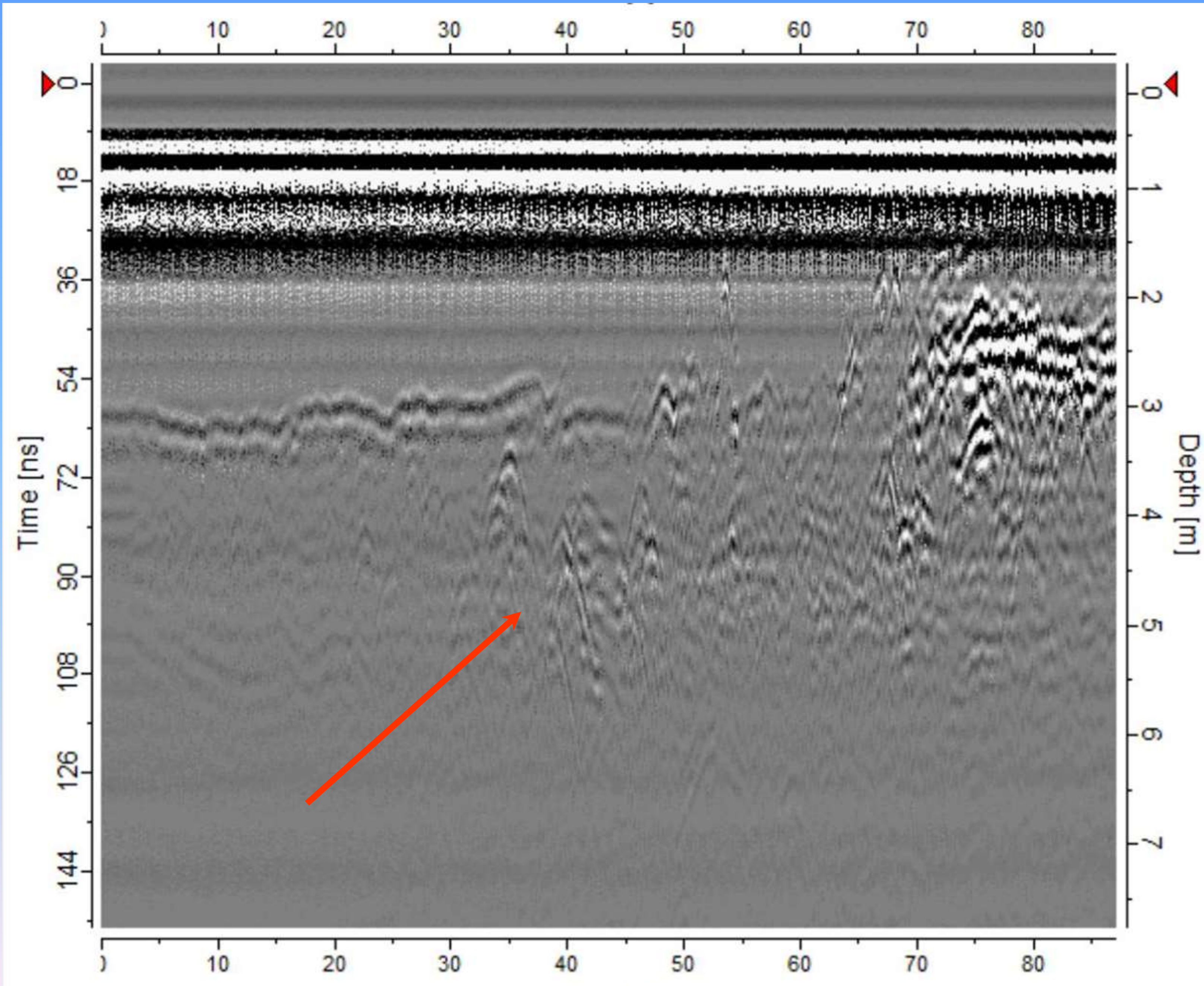

10 20 30 40 50 60 70 80
Time [ns]
0 18 36 54 72 90 108 126 144
Depth [m]
0 1 2 3 4 5 6 7

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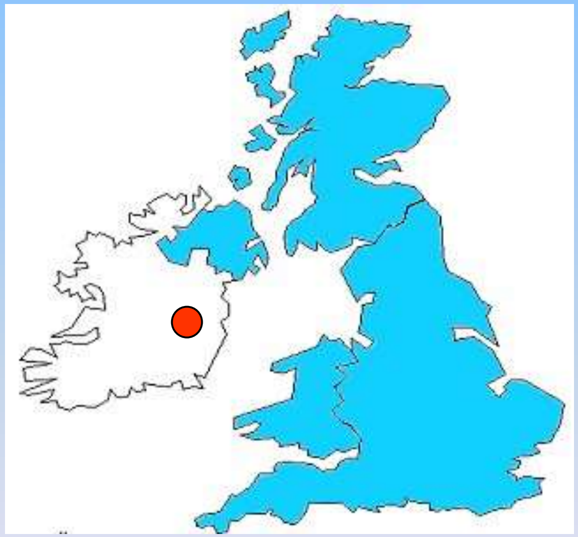


15:04 30/DEC/2012

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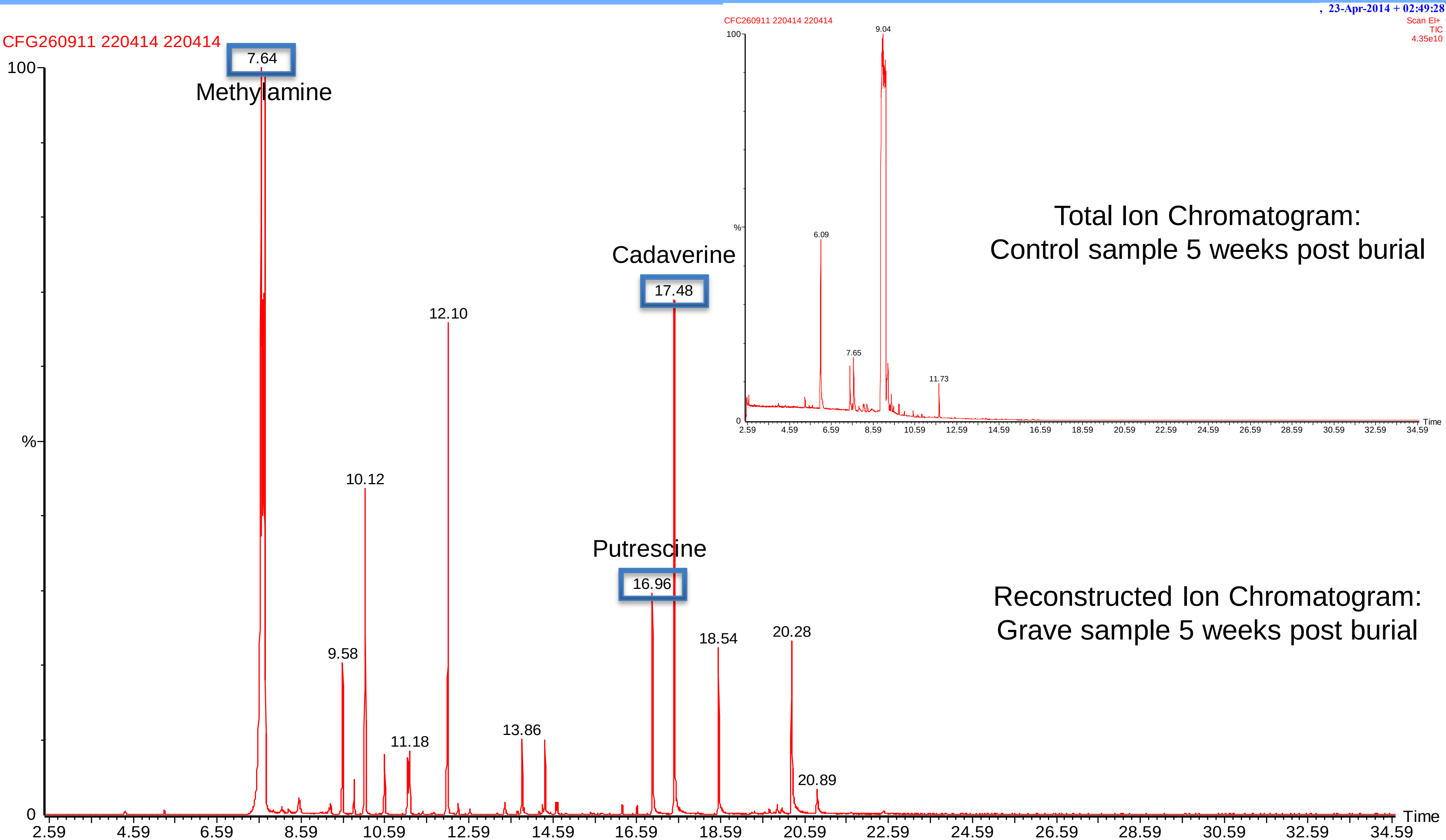
H (NH - CH - CO) n+p OH
CH2
CH2
CO2 N
SS
ON
O
CHCO
OH
O
HN
HO
H
OH
H
N
CH3
H
CH3
H3C
HO
H3C
CH3
H
N
H
CH3

ANALYTICAL METHODS (1)
GC-MS CRANFIELD LEACHATE



ANALYTICAL METHODS (1) GAS CHROMATOGRAPHY MASS SPECTROMETRY (GC-MS)

- Why?
  - Analysis of decomposition markers putrescine & cadaverine

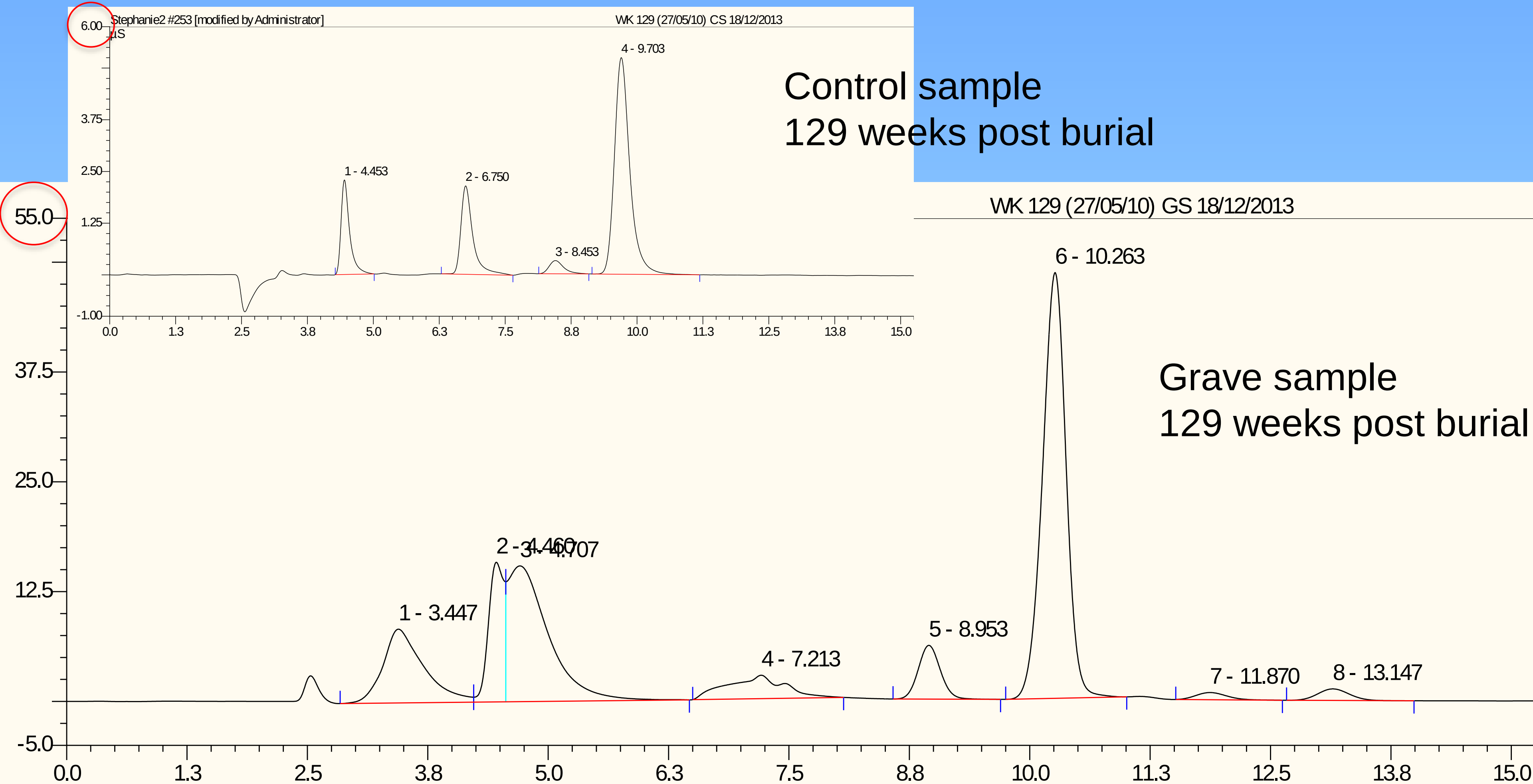
- Methodology
  - Derivatisation of amines using pentafluorobenzaldehyde
  - DB-5MS column

- Outcomes
  - Methylamine another potential decomposition marker
  - RSD < 5%
  - Methylamine $LOD_{(TIC)}$ 4.2 ppb, $LOQ_{(TIC)}$ 12.6 ppb
  - Putrescine $LOD_{(TIC)}$ 15.9 ppb, $LOQ_{(TIC)}$ 48.3 ppb
  - Cadaverine $LOD_{(TIC)}$ 13.6 ppb, $LOQ_{(TIC)}$ 41.3 ppb$_{(}$

ANALYTICAL METHODS (2)
ION CHROMATOGRAPHY (IC)

- Why?
  - Pringle 2012 demonstrated high levels of soil-water conductivity relating to the gravesite samples
- Methodology
  - AS22 Column, Carbonate / bicarbonate Eluent, H_2SO_4 suppressor
- Outcomes
  - Fluoride & Acetate co-elute
  - RSD < 2%
  - Acetate $LOD_{(TIC)}$ 5.9ppm, $LOQ_{(TIC)}$ 18.2 ppm
  - Chloride $LOD_{(TIC)}$ 1.8 ppm, $LOQ_{(TIC)}$ 10.4 ppm
  - Nitrate $LOD_{(TIC)}$ 0.6 ppm, $LOQ_{(TIC)}$ 1.7 ppm
  - Phosphate $LOD_{(TIC)}$ 1.4 ppm, $LOQ_{(TIC)}$ 4.9 ppm
  - Carbonate $LOD_{(TIC)}$ 0.5 ppm, $LOQ_{(TIC)}$ 1.5 ppm

ANALYTICAL METHODS (2)
IC KEELE LEACHATE



Courtesy of Stephanie van Rens

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ION CHROMATOGRAPHY (IC)

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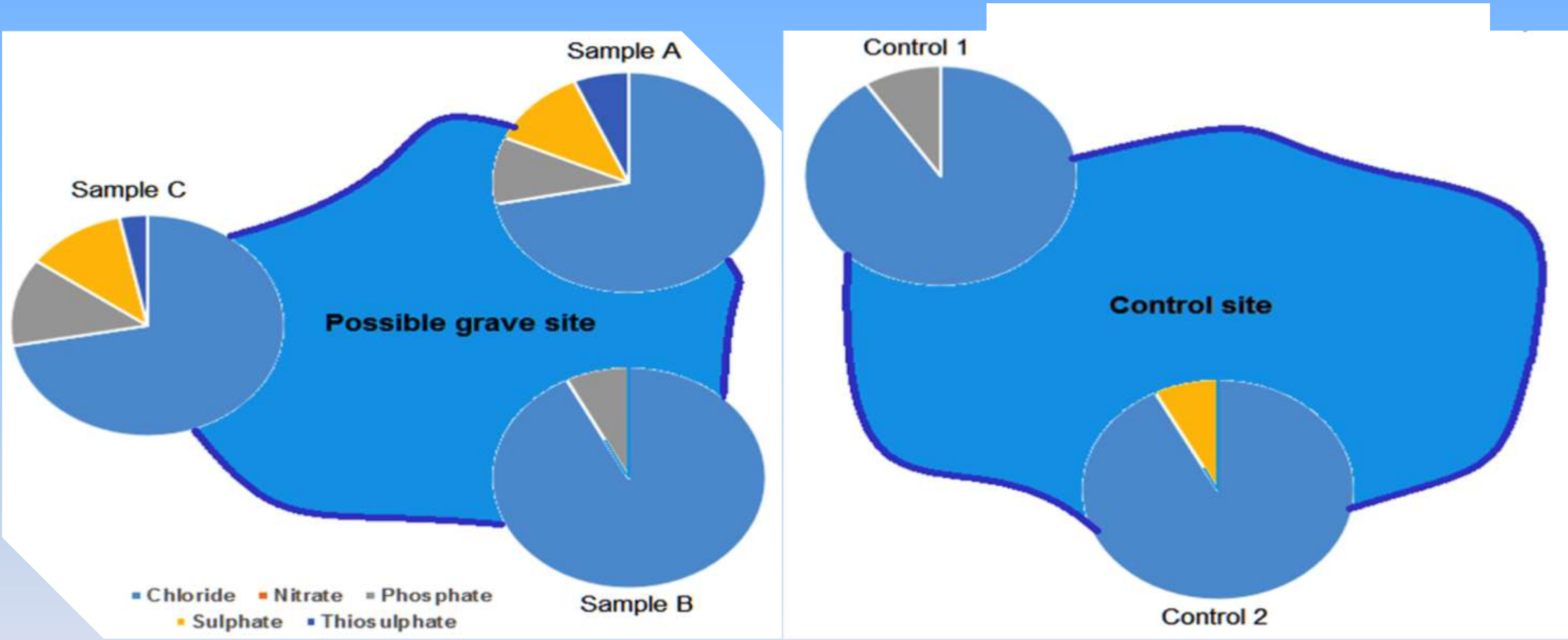
  - Carbonate $LOD_{(TIC)}$ 0.5 ppm, $LOQ_{(TIC)}$ 1.5 ppm

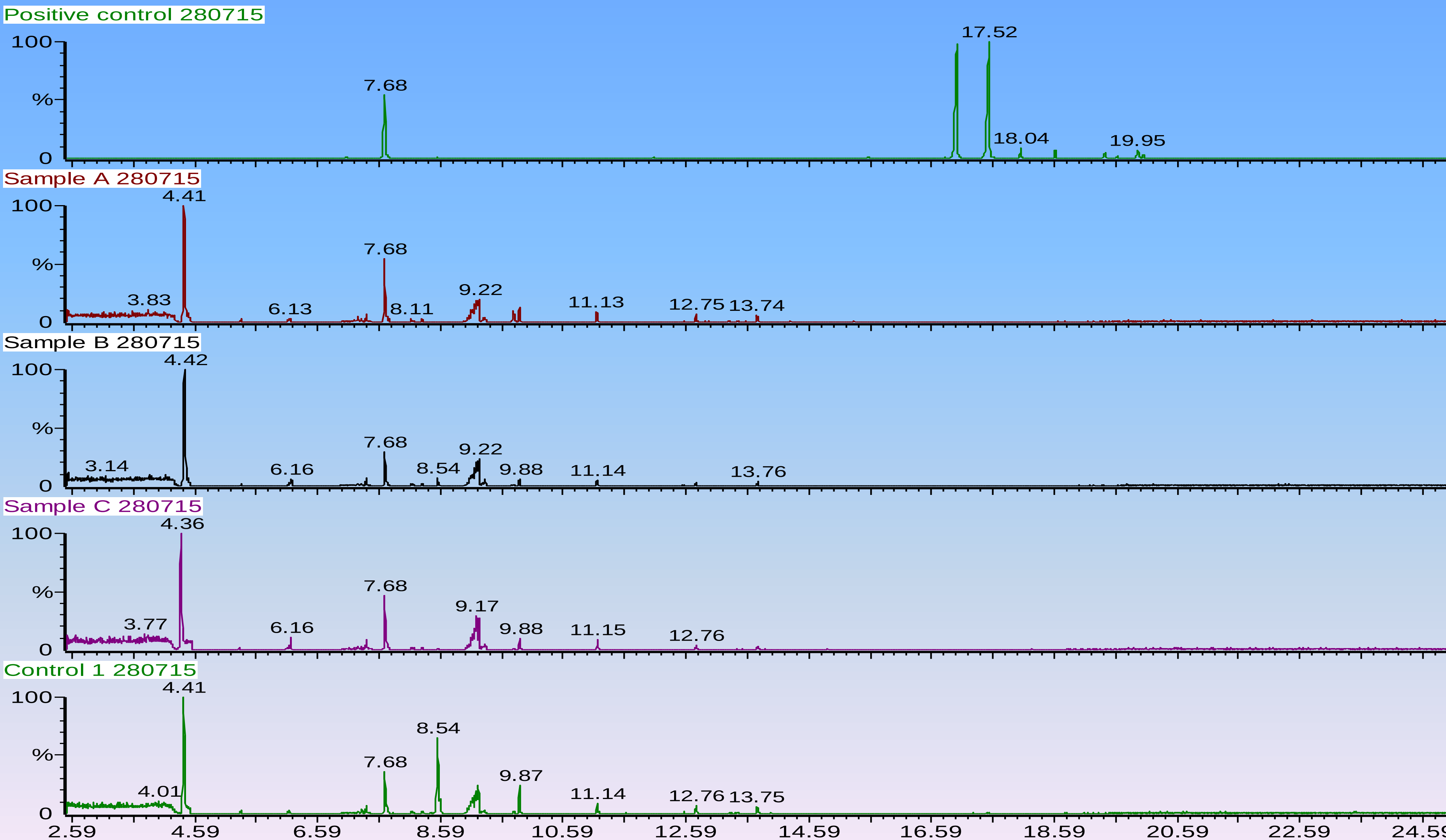
Courtesy of Max Krens & Stephanie van Rens

CASEWORK SAMPLES A (WATER) IC



Courtesy of Vincent Voorwerk

CASEWORK SAMPLES A (WATER) GC-MS



Courtesy of Vincent Voorwerk

CASEWORK SAMPLES (2)
LOCATION B

SOIL EXTRACTION METHODOLOGY

1a. (IC) Dry 1g soil in oven at 60°C overnight or

1b. (GC) Mix 1g soil with 1g anhydrous sodium sulphate

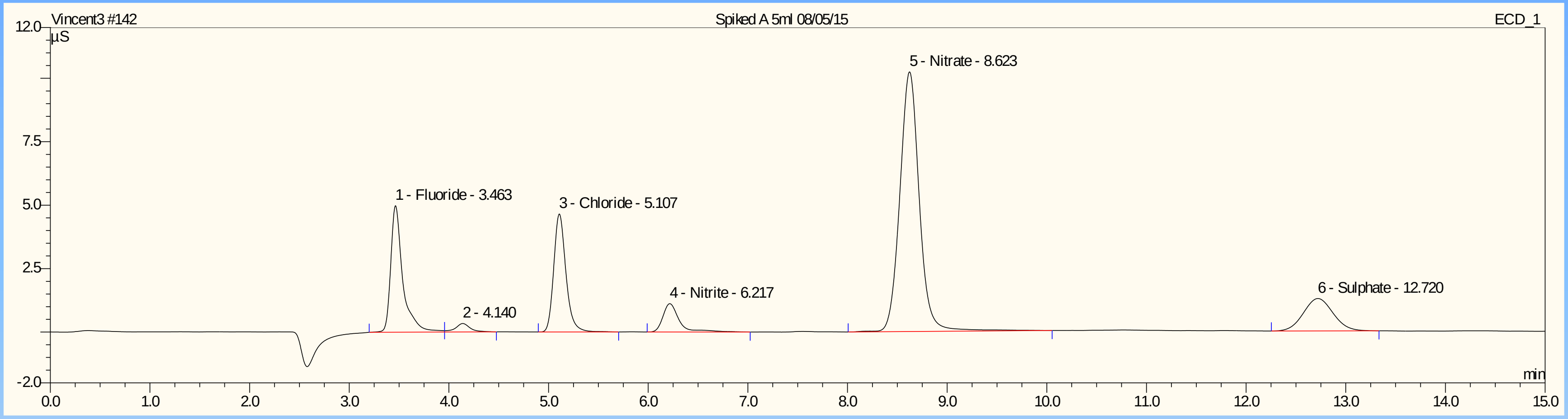
2.Grind sample, sieve and place in centrifuge tube

3.Add 5ml distilled water and vortex sample for 10 seconds

4.Place samples in ultrasonic bath for 15 minutes, centrifuge for 10 minutes 2500rpm and filter aliquot

5.Re-do step 3 & 4 two times

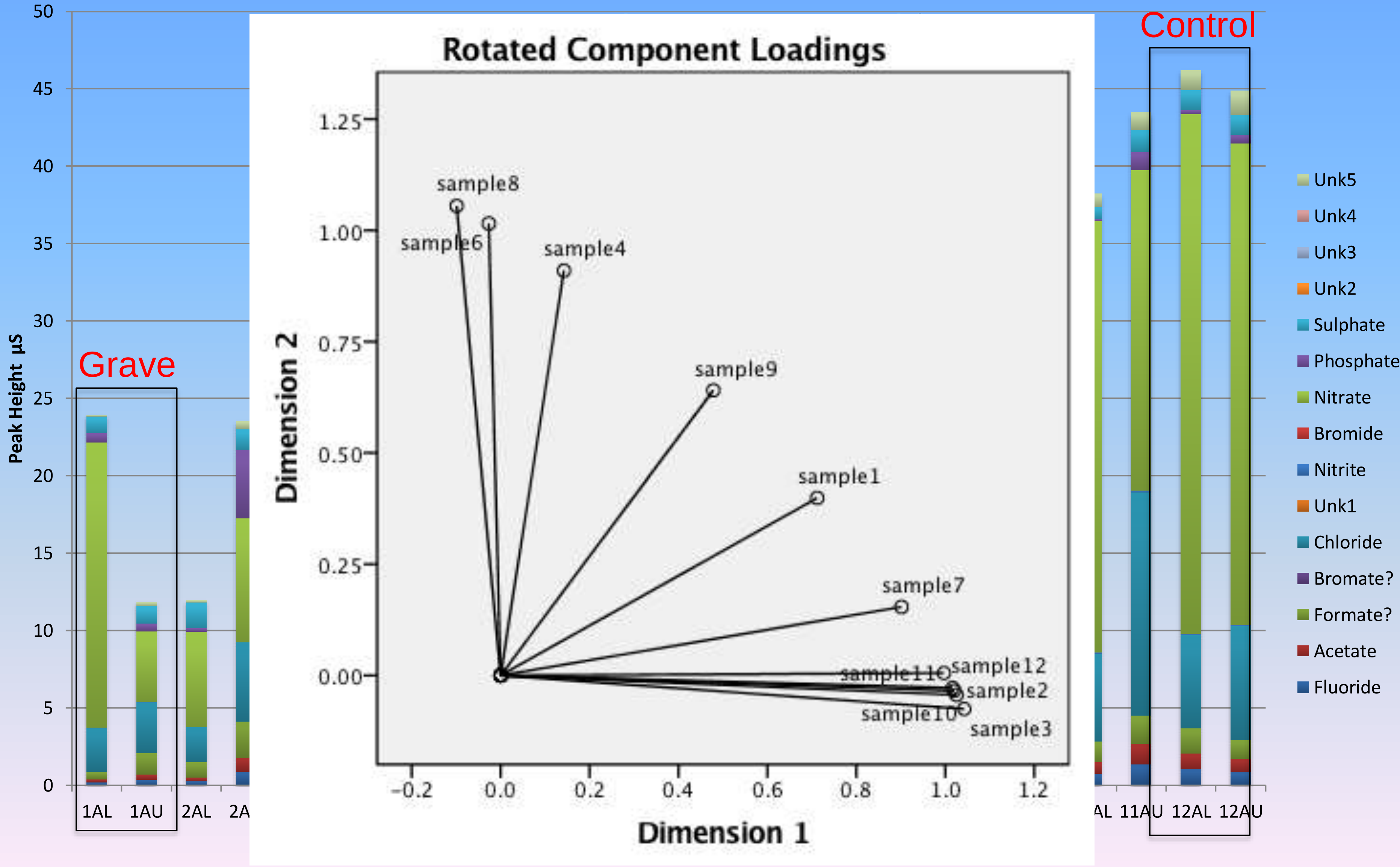
SOIL EXTRACTION RESULTS IC



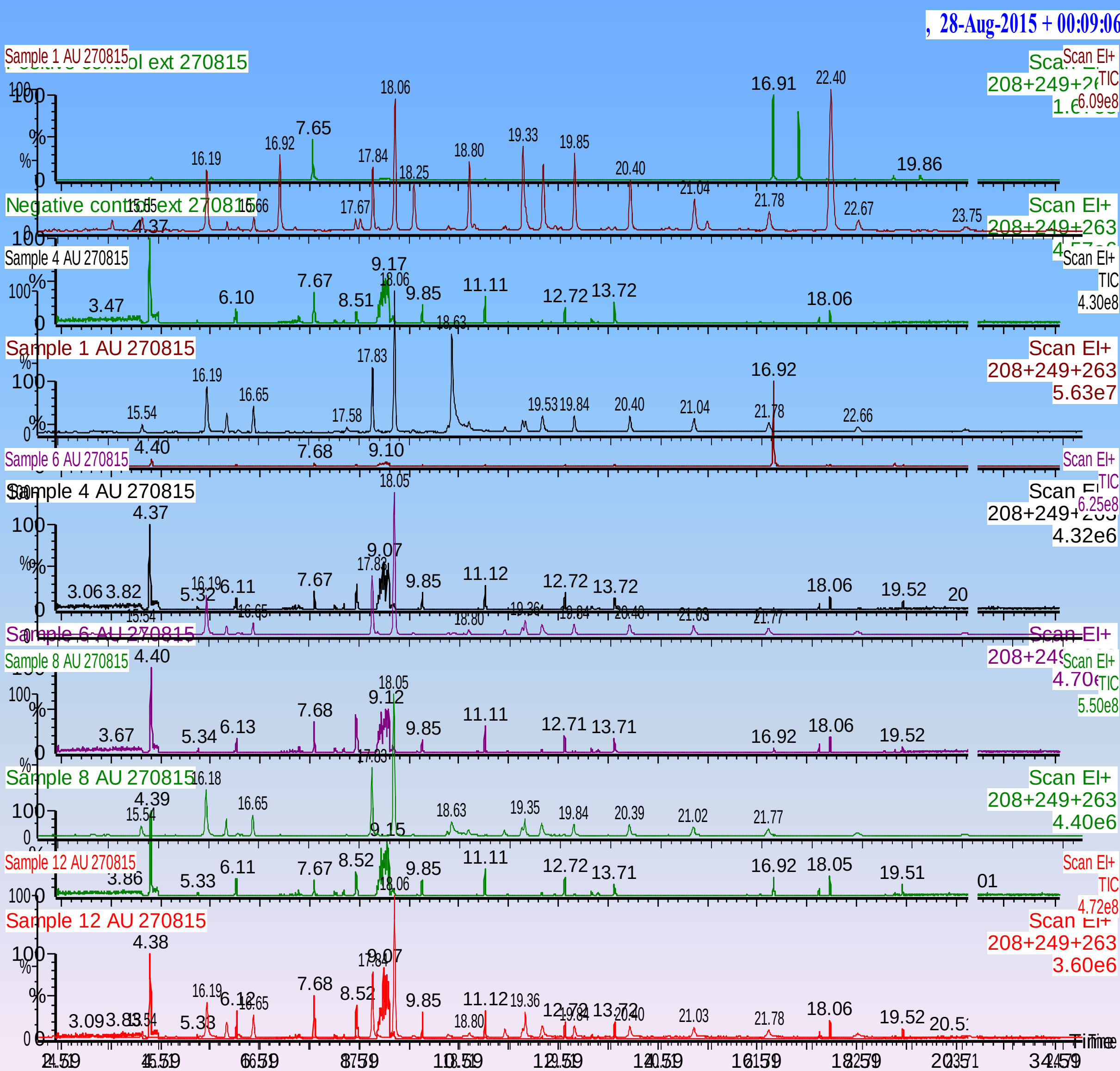
Anion	Spiked (mg·L^{-1})	Found (mg·L^{-1})	Control (mg·L^{-1})	Recovery (%)	RSD (%)
Fluoride	3.3245	0.9571	0.3005	**19.75**	3.0
Chloride	3.3245	0.9270	0.2457	**20.49**	2.4
Nitrite	3.3245	0.9419	0.4165	**10.85**	9.1
Nitrate	6.6490	5.9045	4.0984	**17.16**	7.9
Sulphate	3.3245	1.1875	0.4931	**20.89**	9.2

Courtesy of Vincent Voorwerk

CASEWORK SAMPLES B (SOIL) IC



CASEWORK SAMPLES B (SOIL) GC



Recovery

Chemical	Spiked ($\mu g \cdot L^{-1}$)	Found ($\mu g \cdot L^{-1}$)	Recovery %
Methylamine	15.5	1.7	**10.72**
Putrescine	44.1	4.0	**9.17**
Cadaverine	51.1	3.7	**7.32**

Quantification

Location	Putrescine ($\mu g \cdot L^{-1}$)	Cadaverine ($\mu g \cdot L^{-1}$)
1 AU (Grave)	149.2	< LOD
6 AU (Downhill)	< LOQ	< LOD
8 AU (Uphill)	< LOQ	< LOD
12 AU (Control)	< LOD	< LOD


H NH - CH - CO
n+p
OH
CH2
CH2
CO2
SS
ON
O
OH
CHCO
HN
HO
H3C
CH3
H
N

LABRADOR (Lightweight Analyzer for Buried Remains and Decomposition Odor Recognition)

Caylee Marie Anthony

“Jose Baez harassing Dr. Vass about the handheld "sniffer machine" nicknamed "Labrador," designed to detect human decomposition by reading such air samples. “

http://www.acandyrose.com/caylee_anthony_murder_trial_060611.htm

Casey Anthony Trial - Dr. Vass and the hamburger theory

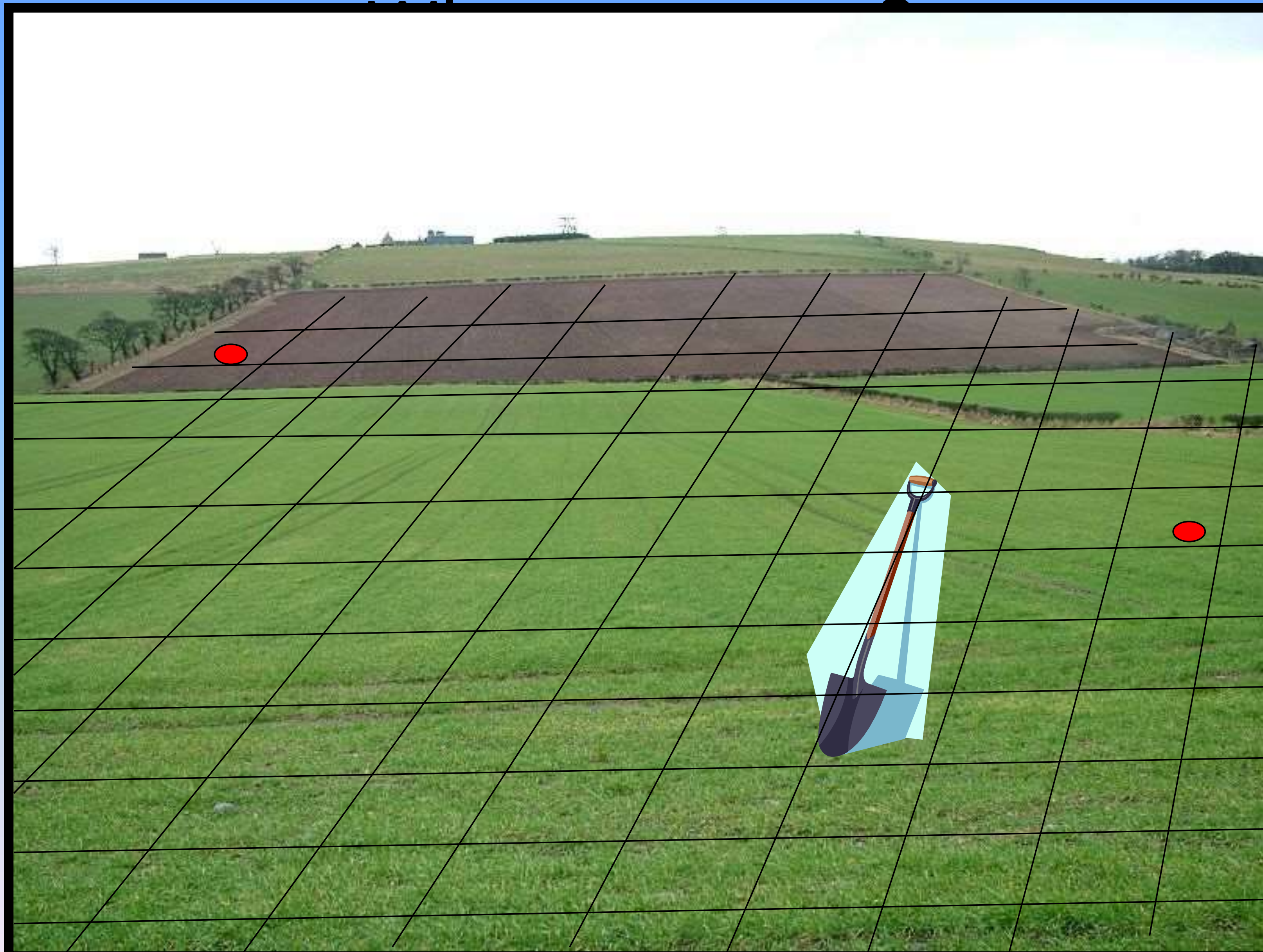
Confounding variables& getting the research into the Criminal Justice System

Confounding variables& getting the research into the Criminal Justice System

Trial - Dr Vass tells Baez You can't take it out of context

That Courtroom look………

UK Taphonomy facility (?)



The future – a simple chemistry set kit?

- SIRCHIE® Fingerprint Laboratories introduces the NARK® II Progressive System for Drug Identification. NARK® II has the capability of presumptively identifying several families of substances suspected of being abused drugs. Designed to function as a transportable narcotics laboratory, it is available for use wherever the need for its capability might arise.

The way forward…..next steps

- Continue to investigate and develop the chemistry methodology
- Continue to work within the Burial Research Consortium
- Work more closely with Police colleagues to develop and test the research further “in the field”

Thank you for listening