

Crime Scene Analysis and Victim Identification Forum

Thursday, 03 March 2014

Cineworld: The O2, London, SE10 0DX, UK

www.regonline.co.uk/crime2014

Technology, research and knowledge in crime scene investigations and victim identification are advancing rapidly in response to the ever increasing number of criminals that are more forensically aware. This exciting and interactive meeting will bring together world leaders in forensic investigation of crime scenes and victim and suspect identification to discuss new techniques, procedures and research that can be used in criminal investigations. The future of crime scene analysis and victim identification will be a theme running throughout the conference with presentations discussing ideas such as new techniques for aging of blood stains at scenes, forensic jewellery analysis and new ways for linking crime scenes. More challenging scenes, such as fire scenes, will be discussed and the more unusual practices of forensic gait analysis and forensic podiatry will be introduced. This event will encourage the sharing of ideas and best practice amongst the delegates and presenters and will include an informal discussion session where advice and thoughts can be shared.

This event has **CPD accreditation** and is part of the **Forensic Forums 2014 Series** - www.forensicforums2014.com

Meeting Chair: *Dr Claire Gwinnett*, PhD, PgDipHPE, PgCHPE, PgCRM, FHEA, BSc(Hons), Principal Lecturer and Researcher in Forensic and Crime Science, Forensic and Crime Science Department, Staffordshire University, Stoke-on-Trent, UK

Abstracts for *poster presentation only* can be submitted up to two weeks before the event. You can download the instructions for authors at www.euroscicon.com/AbstractsForOralAndPosterPresentation.pdf

Talk times include 5 – 10 minutes for questions

9:30 - 10:00 **Registration**

10:00 - 10:15 **Introduction by the Chair:** *Dr Claire Gwinnett* PhD, PgDipHPE, PgCHPE, PgCRM, FHEA, BSc(Hons) Principal Lecturer and Researcher in Forensic and Crime Science, Forensic and Crime Science Department, Staffordshire University, Stoke-on-Trent, UK

10:15 - 10:45 **The detection and age estimation of blood stains using hyperspectral imaging**

Dr Meez Islam, Reader in Physical Chemistry, School of Science and Engineering, Teesside University, UK

There is a need for a reliable means of detecting, identifying and estimating the age of blood stains at crime scenes or from recovered evidence, in a non contact, non destructive manner. Hyperspectral imaging which allows spectral and spatial information to be obtained simultaneously provides a means of achieving this. At Teesside University we have developed the use of visible wavelength hyperspectral imaging to detect and identify blood stains on a range of substrates including dark coloured substrates and at dilutions which are invisible to the naked eye and also estimate the age of the blood stain.

10:45 - 11:15 **Fire scene investigation**

Mr David Scaysbrook, Consultant forensic scientist, Gardiner Fire Investigation - and - S&T Forensics, UK

This talk aims to provide a brief overview of fire scene investigation techniques, using case examples. In addition it will seek to ascertain how the current system of fire investigation – with the advent of huge fire & police service cutbacks and privatised forensic service providers - is functioning in England & Wales.

11:15 - 11:45 **Simultaneous development and drug detection in latent finger mark residues using doped nanoparticle based fingerprint powders – A SALDI TOF MS/MS approach**

Dr Latha Sundar, Chief Scientific Officer, ARRO SupraNano Ltd, UK

Surface engineered silica sub-micron particle based fingerprint powders has been proven to provide dual purpose in enhancing latent finger mark definition and in aiding the detection of chemical constituents present in the fingermarks with the use of SALDI TOF MS technique. These can include detection of contact residues, drugs (illicit and therapeutic drugs), metabolites and other endogenous compounds which can give additional information of the donor such as sex, age, ethnicity etc.

11:45 - 12:05 **Speakers' photo then mid-morning break and poster exhibition and trade show**

Please try to visit all the exhibition stands during your day at this event. Not only do our sponsors enable Euroscicon to keep the registration fees competitive, but they are also here specifically to talk to you

12:05 - 12:35 **Crime linkage: Identifying crime series in the absence of physical forensic evidence**

Dr. Jessica Woodhams, Senior Lecturer in Forensic Psychology, School of Psychology, University of Birmingham, UK

Crime linkage is a psychological practice used by police forces to identify crime series in the absence of physical forensic evidence. It assumes that criminals commit crimes in a consistent and distinctive manner. As well as being used to inform police investigations, it is presented in legal proceedings in some countries. Bearing in mind its uses, it is crucial that it receive empirical scrutiny. I will present a summary of the research conducted thus far as well as outline the work of a new international network for researchers and practitioners of crime linkage, the C-LINK (Crime Linkage International Network).

12:35 - 13:30 **Lunch, poster exhibition and trade show**

Please try to visit all the exhibition stands during your day at this event. Not only do our sponsors enable Euroscicon to keep the registration fees competitive, but they are also here specifically to talk to you.

13:30 - 14:00 **Secondary Transfer of DNA Evidence - How much do we need to worry?**

[*Laura Walton-Williams*](#), Staffordshire University, UK

DNA analysis is now a sufficiently sensitive technique to enable identification of an individual from an extremely small amount of biological material. Exhibits are routinely submitted to forensic laboratories for analysis of 'touch DNA', in order to link offenders to crime scenes. However, the analysis of minute amounts of DNA introduces additional interpretational challenges. The ability to identify the source and the relevance of a recovered DNA profile to the crime scene are not comprehensively understood. This talk will discuss the potential for transfer and persistence of DNA, and the degree to which this could cause problems in evidence interpretation.

14:00 - 14:30 **Comparative Observational Gait Analysis Between Imagery Acquired From CCTV of a Murder Perpetrator and a Suspected Subject: A Case Report**

Professor Carlo Frigo, Politecnico di Milano, Italy

14:30 - 15:00 **Forensic Podiatry**

Professor Wesley Vernon OBE, Head of Podiatry Services and Research Lead, Sheffield PCT Jordanthorpe Health

Centre, UK

Forensic Podiatry has been considered for over 90 years and practiced for the past 40 years. It is however only relatively recently that the specialty has become formalised with a supportive evidence based, standards and other governance arrangements. The lecture will provide a brief overview of forensic podiatry including it's history, role and practice.

15:00 - 15:30 **Afternoon Tea, last poster session and trade show**

15:30 - 16:00 **Forensic Gait Analysis - can we walk the walk?**

Professor Ivan Birch, Consultant Expert Witness, Sheffield Teaching Hospitals NHS Foundation Trust, UK

Forensic gait analysis is increasingly being used during criminal investigations, and as a source of evidence for use at trial. Despite substantial progress in the development of a research evidence base during the last two years, there remain a number of challenges to be overcome in terms of the development of best practice in this field of work. This presentation will consider the current state of the evidence base underpinning forensic gait analysis, strategies by which best practice might be developed, the challenges that practitioners commonly face, and the potential pitfalls of trying to analyse gait from CCTV footage.

16:00 - 16:30 **Co-ordinate measuring machine for bite mark analysis in crime scene and victim**

Dr Amal AlAli, The Barts and the London School of medicine and Dentistry, Queen Mary University of London, UK

The use of coordinate metrology with freeform comparison software has created an advanced and accurate comparison between two objects. This novel means of measuring enables better presentation of physical features of crime scene evidence, reduction/elimination of examiner subjectivity, better control of image visualization, and standardisation of comparison procedures. Hence, it fulfils the criteria for contemporary standards from both a legal and scientific perspective. This study aimed to develop this technology using an Incise Dental Scanner (IDS) to match and compare complex free form surfaces on bite marks.

16:30 - 17:00 **3D-forensics: mobile high resolution 3d-scanner and 3d data analysis for forensic evidence**

Mr Stephen Crabbe, Crabbe Consulting Ltd, Germany

Footwear and tyre impressions left at crime scenes are important evidence for both criminal investigations and proceedings in court. The common operational methodology to record these impressions is through the making of plaster casts. Plaster casting of impressions has a number of disadvantages. A group of European organisations have teamed-up to develop a new ground breaking solution for forensic evidence collection and analysis: 3D-Forensics - Mobile high-resolution 3D-Scanner and 3D data analysis for forensic evidence. The project started in 2013 and is co-funded by the European Union under the Seventh Framework Programme for research and technological development. The project's motivation, approach and benefits will be presented.

17:00 **Chairman's Summing Up and Meeting Close**

Registration Website: www.regonline.co.uk/crime2014

Frequently asked questions about our events

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Yes this is available to everyone who attends the event and our sponsors.

It is available in real time. To access the list please just log into your registration details or use the QR code on right of the agenda card which is provided on the day of the event.

You will not be included in this list if you have opted out and you can do this by logging into your registration details. This list will not be sold or ever give out to third parties.

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We cannot give out the slides from our speaker's presentations as they are deleted immediately after each event. If you require a particular set of slides please approach the speaker. We will however have a meeting report and you will be emailed when this report is published.

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Please leave your name with registration before the end of lunch a certificate will be created for you and available in the afternoon

About the Chair

Claire Gwinnett a principal lecturer and researcher in forensic science; specifically trace evidence and forensic database production, at Staffordshire University. She has carried out consultancy work with other forensic practitioners in the development of a range of forensic databases including textile fibres, animal hair and bare footprints and has developed novel methods for generating forensic databases and proficiency testing for assessing the quality of data collected. Currently, Dr Claire Gwinnett is working with CAST (Centre of Applied Science and Technology) in the generation of a proficiency-testing scheme for scientists working in fingerprint research. Dr Gwinnett has advised in the development of a new system for competency testing with the Forensic Science Society in the UK and currently is a consultant advisor to the International Association for Identification's (IAI) Professional Programs Quality Assurance Governing Board (PPQAB). Dr Gwinnett is also currently working with The Netherlands Forensic Institute and UK police forces in the testing of a new method, developed and patented at Staffordshire University, which will enhance forensic fibres work across the world. Dr Gwinnett has also been a developer for the generation of forensic science education and training for the University of Mauritius and is currently the external examiner for the forensic science programme at the University of Technology in Jamaica. Dr Gwinnett has presented her research at national and international conferences for over 9 years and is currently contributing to the first UK forensic education textbook.

About the Speakers

Meez Islam is a Reader in Physical Chemistry at Teesside University whose research interests lie in the development and application of techniques based on optical spectroscopy. He obtained his undergraduate degree in Chemistry from Oxford University and his PhD in Physical Chemistry from Birmingham University.

David Scaysbrook joined the Metropolitan Police Forensic Science Laboratory in 1974. He trained in the examination of hairs, textile fibres, body fluids, blood pattern distribution and, later, DNA profiling. He transferred to the laboratory's Fire Investigation Unit where he investigated numerous fatal, suspicious, accidental and deliberate fires together with gas and vapour explosions. Following the merger with the Home Office Forensic Science Service David transferred to the Chepstow laboratory where he led a team of scientists. On the closure of the FSS David became a consultant and co-director of 'S&T Forensics' and managing director of 'Gardiner Fire Investigation'.

Latha Sundar has obtained her PhD in Analytical Chemistry and has been involved in utilising the gained expertise in the Forensic field after joining ARRO Supranano Ltd. To her credit she holds 20 papers published in Internationally reputed journals. She has more than 13 years of experience in analytical chemistry and currently involved in synthesizing surface functionalized nanoparticles and its application in drug detection for forensic and toxicological applications. She is a member of Royal Society of Chemistry and American Academy of Mass Spectrometry.

Jessica Woodhams, is a forensic psychologist who works at the University of Birmingham, UK. She is an expert in the area of crime linkage and serial interpersonal crime. She has published widely on the subject writing numerous articles and book chapters. She is currently co-editing the first book on the topic. She has been consulted as an expert witness on crime linkage and behavioural similarity. She is the founder of the Crime Linkage International Network.

Maria MacIennan is a Contemporary Jewellery Designer/Researcher, Lecturer and PhD Student in Design at the Visual Research Centre, University of Dundee. Her award-winning research into 'Forensic Jewellery' is a unique interdisciplinary collaboration between the University's Duncan of Jordanstone College of Art and Design (DJCAD) and Centre for Anatomy and Human Identification (CAHID). She has previously worked with INTERPOL, the Home Office and Police Scotland on projects relating to jewellery and design, having also recently completed a 6-month internship with the national College of Policing at Bramshill.

Wesley Vernon OBE is Head of Podiatry Services and Research Lead for Sheffield Community Services & Visiting Professor at Huddersfield and Staffordshire Universities. He is a Fellow of the Forensic Science Society and a Distinguished Member of the International Association for Identification where he Chairs the forensic podiatry sub-committee. He chairs the Healthy Footwear Guide scheme and is Vice Chair of the Society of Shoefitters. In 2010, he initiated a new competency testing scheme for independent forensic practitioners through the FSSoc. In 2009, he was awarded an OBE for services to medicine and health care.

Ivan Birch is Consultant Expert Witness in forensic gait analysis with Sheffield Teaching Hospitals NHS Foundation Trust. Ivan graduated in 1978 with a BSc Joint Honours in Science from the University of Salford, gained an MSc in Human Biology from the University of Loughborough in 1980, and was awarded a PhD in Biomechanics by the University of Brighton in 2007. He has extensive experience of teaching biomechanics, anatomy, physiology and research methods, and is a Professional Member of the Forensic Science Society and Emeritus Professor of Human Sciences. He has more than 30 years' experience of gait analysis.

Amal AlAli holds a BSc in dental science from King Saud University Riyadh. Moved to UK since 2006 starting MCLIN in Paediatric dentistry then joined Queen Mary for a PhD where she started working on 3-D and Identification. She presented on national and international meetings and her research on the Bite mark and Child abuse Accepted for research prize competition on the British Society of Paediatric Dentistry, 10-13 September Edinburgh UK.

Stephen Crabbe is the Managing Director of Crabbe Consulting Ltd (CCLD). CCLD works at the interfaces between end users, researchers and industry to support international cooperative research and technological development (RTD) often with European funding, particularly in connection with security challenges facing society. He has over 15 years of experience initiating and managing RTD projects, targeted research, developing strategies for the implementation of RTD results and in additional aspects of management and strategic consultancy. In the area of forensics, previous projects have included the development of a police database to identify and link missing persons and unidentified bodies at an international level. He obtained his undergraduate degree in Laws from University College London and a postgraduate diploma in vocational training for the Bar from BPP University College of Professional Studies.

Laura Walton-Williams is the Award Leader for the BSc Forensic Investigation degree programme at Staffordshire University, predominantly lecturing in the field of Forensic Biology. Her research interests include DNA analysis, identification and interpretation of body fluids, the examination of sexual assault victims and Bloodstain Pattern Analysis. She is also a STEM ambassador, a Professional Member of the Forensic Science Society, the British Association of Human Identification, the Forensic Institute Network and a Fellow of the Higher Education Academy.

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POSTER PRESENTATIONS

COMPARATIVE OBSERVATIONAL GAIT ANALYSIS BETWEEN IMAGERY ACQUIRED FROM CCTV OF A MURDER PERPETRATOR AND A SUSPECTED SUBJECT: A CASE REPORT

Maria Grazia Benedetti (1), Carlo Frigo (2), Patrizia Zucchetto (3)

(1) *Physical Medicine and Rehabilitation Unit, Istituto Ortopedico Rizzoli, Bologna, Italy*, (2) *Dipartimento di Elettronica, Informazione e Bioingegneria, Politecnico di Milano, Italy*, (3) *ASL TO1, Turin, Italy*. Postal address of the presenting author: carlo.frigo@polimi.it

INTRODUCTION The imagery of a subject responsible for a murder both before and after the attack was acquired by street CCTV. After some time a suspected subject was arrested and accused to be the executer of the homicide on the basis of his gait features. In fact walking of this subject had been recorded, without his knowledge, and for some aspects appeared to be similar to that of the murderer. We were contacted by the defence lawyers as experts in gait analysis for a comparative analysis of the recorded images. **METHODS**

Movies of both subjects were provided to us by the police and were analysed using an Observational Gait Analysis (OGA) approach [1], taking into account also the check list for forensic gait analysis provided in [2]. Sub-phases of gait stride were identified in the two subject's walking; corresponding frames were isolated in the movies, and qualitatively compared. Step length and width, and position of the shoulders were also measured. As there were no information about the optical characteristics of the cameras, nor about their placement, nor metric references in the field of view, all the information were obtained from single images by visual identification of points, lines of flight and reference axes, and by applying simple perspective corrections. The individual frames were loaded in MS-PowerPoint. The measurements were then taken by using the software MB-ruler, which allows overlying the computer screen with a measuring instrument that can take the form of a protractor or of a ruler and can provide the coordinates of a cursor in a two dimensional system of axes. Student's t-Test was used to compare sets of data with significance level of $p \leq 0.05$.

RESULTS The perpetrator presented a misalignment of the trunk that appeared more tilted to the right in the phase of right foot support. Even the lateral displacement of the shoulders in relation to pelvis and ankles during stance phase was greater on the right ($p < 0.05$). In association there was a slight limp on the right side. The right foot showed reduced ankle dorsiflexion before initial contact with subsequent rapid support of the entire foot, while the left initial contact was regular. The movement of the upper limbs was regular. The feet were normally positioned throughout the gait cycle, and the tibia seemed to be externally rotated as in a varus knee. Step width was reduced. The suspected had abducted feet, mainly at left side (toe out gait), throughout the gait cycle with a consequent increase of the progression angle, and a widening of the support base ($p < 0.05$). He showed also reduced right upper limb swing. Furthermore, the differences between left and right displacement of the shoulders in relation to the pelvis and ankles were not significant.

DISCUSSION A mismatch between the gait pattern of the two subjects was found through the analysis of typical events of gait. The analysis, however accurate, suffered from the following limitations: quality of the movies, distortion due to the angle of incidence of the camera relative to the direction of progression of the gait of the two subjects, different rate of progression of the two subjects, different environmental circumstances in which they were filmed, presence of clothing and footwear. **REFERENCES** [1] Brunnekeef JJ, et al. Reliability of videotaped observational gait analysis in patients with orthopedic impairments. *BMC Musculoskelet Disord.* 17;6:17, 2005. [2] Larsen PK, et al. Gait analysis in forensic medicine, *Proc. of SPIE-IS&T Electronic Imaging*, 6491, 2007

SIMULTANEOUS DEVELOPMENT AND DRUG DETECTION IN LATENT FINGER MARK RESIDUES USING DOPED NANOPARTICLE BASED FINGERPRINT POWDERS – A SALDI TOF MS/MS APPROACH

L Sundar, MSc, MRSC, PhD*, F Rowell, PhD

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Development of finger marks using fingerprint powders is one of the conventional methods used to identify suspects in crime scene investigations. Success of identification heavily depends on the quality of developed marks for characteristics ridge patterns for manual comparison or using computerised algorithms. But, if the finger mark is smudged or partially developed where it does not satisfy the criteria for comparison with the database, the whole exercise is futile and is of no value to the forensic investigators. However, in this type of circumstances getting chemical information of the finger marks can give valuable information on the fingerprint donor such as contact residue, use of drugs (illicit drugs or therapeutic drugs), smoking habits etc. The aim of this paper is to discuss about the nature of the nanoparticle based fingerprint powders which has a dual function to visually enhance the latent finger marks and to directly analyse the lifted finger mark without any further treatment using Surface Assisted Laser Desorption Ionisation Time of Flight Mass Spectrometer technique (SALDI TOF MS/MS). A range of illicit and therapeutic drugs have been detected on the finger marks dusted with nanoparticle based fingerprint powders in addition to the superior definition of the finger marks revealing up to 3rd level details. Recent studies have also been carried out to detect drugs from cyanoacrylate developed finger marks using MALDI and SALDI TOF MS after exposing to solvent treatment. This presentation will have an impact on the forensic science community with the latest trend on the direct identification of chemical constituents using the conventional fingerprinting methods followed by SALDI TOF MS method.