

Fourth SIPR Annual Conference
Policing in an age of austerity

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SPSA / SIPR Conference
New developments in forensic science

14th – 15th September 2010
West Park Conference Centre, Dundee



Programme and Abstracts

CONFERENCE ORGANISING COMMITTEE

Jim Fraser, SIPR, University of Strathclyde
Tim Heilbronn, SIPR, University of Dundee
Nicholas Fyfe, SIPR, University of Dundee

Tom Nelson, SPSA
Jim Dunlop, SPSA

Roddy Ross, Tayside Police

Practitioner Research Session:

Kenneth Scott, University of the West of Scotland
Pat Cronin, University of Abertay Dundee

ACKNOWLEDGEMENTS

The Organising Committee acknowledges the generous support of ACPOS and the Scottish Funding Council, who fund the Scottish Institute for Policing Research, as well as the financial support received from SPSA and Dundee City Council for providing a Civic Reception to which all delegates are invited, and to LGC forensics and the Forensic Science Service for their sponsorship of the New Developments in Forensics Showcase.

Cover picture: © SPSA, Dundee



Welcome from the Director of SIPR

On behalf of the Scottish Institute for Policing Research (SIPR), I am delighted to welcome you to SIPR's fourth annual research conference which this year is being held in partnership with the Scottish Police Services Authority.

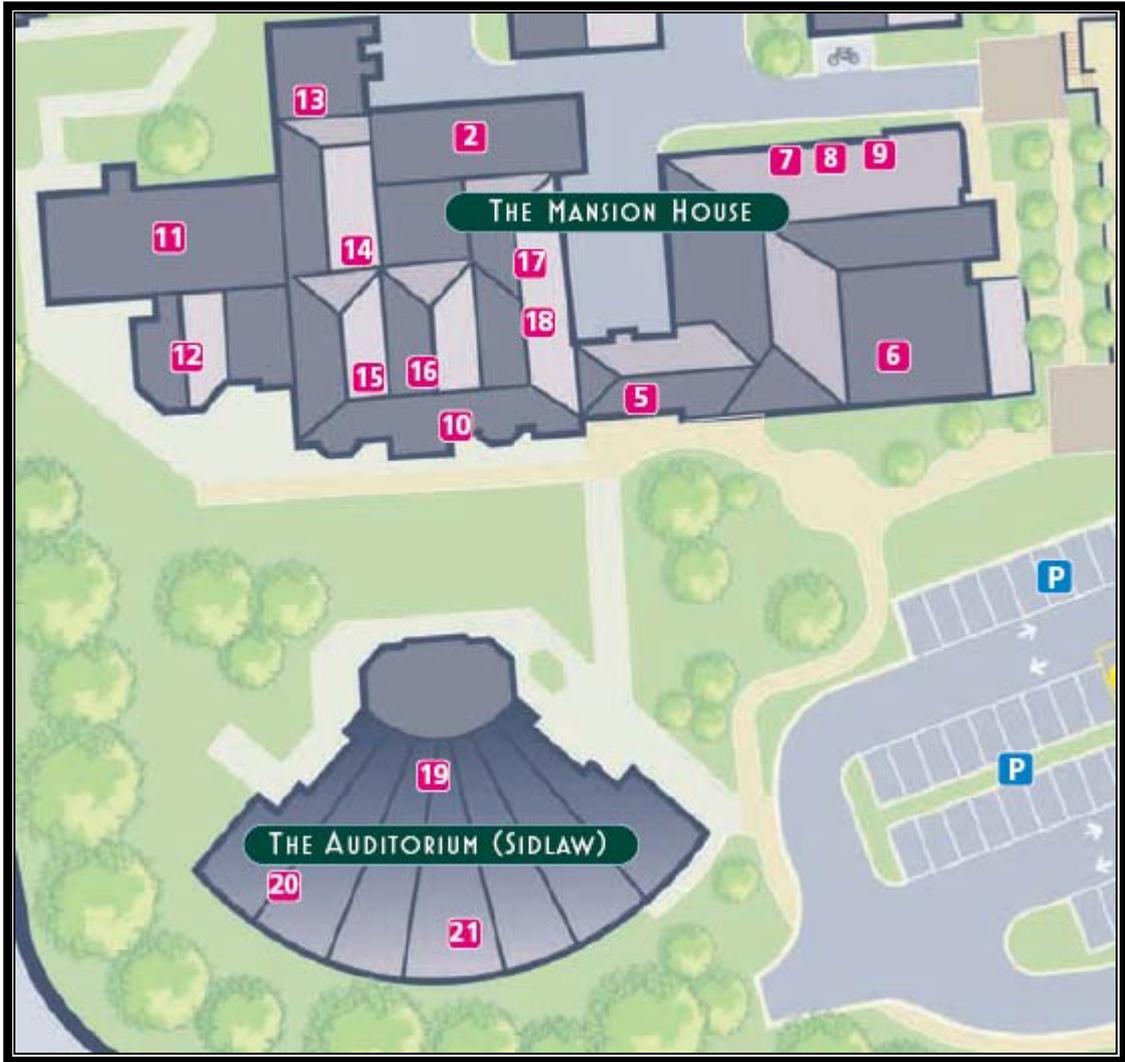
The theme of the morning plenary session, "Policing in an Age of Austerity", focuses attention on one of the most significant challenges faced for a generation by police leaders and those with responsibilities for policing in local and central government. Significant public spending cuts are already impacting directly on police force budgets but will also have wider implications for policing as fiscal constraints feed through into the broader social and economic environment and potentially affect levels of crime and disorder. Against this background, having a robust evidence-base of 'what works' and what's cost-effective' in terms of policing is vital. The strong collaborative partnership developed over the last four years by SIPR between Scotland's universities and police forces means that we are very well placed to address these challenges and to maximise the opportunities for innovation and reform that reductions in public spending will require as police forces seek to do 'more with less'. Focused research and knowledge exchange activities that draw on evidence from across Scotland, the UK and internationally can help the police meet the significant challenges they face over the next decade. I am delighted we have been able to assemble a group of speakers for the plenary session who bring a wealth of expertise and experience that will provide insights into the different ways policing can respond to a new environment associated with an 'age of austerity'.

In the afternoon there are two parallel sessions organised by SIPR's research networks. The Police-Community Relations and Police Organisation networks have jointly organised a session focusing on practitioner research. This will show-case findings from several SIPR Practitioner Fellowship projects where practitioners have worked in partnership with academics on an applied topic of relevance to policing. It also provides an opportunity to reflect more generally on the benefits, challenges and opportunities of practitioner research. The other session, organised by the Evidence and Investigation network and SPSA Forensic Services, focuses on the use of new science and technology in the investigation and prosecution of crime and marks the beginning of the 'New developments in forensic science' meeting that then extends into the following day and includes an opportunity to visit SPSA's new forensic laboratory in Dundee.

We are pleased to include a copy of SIPR's Annual Newsletter in your Delegate Pack, which highlights a range of our research and knowledge exchange projects with further details of all SIPR's activities being available on our website (www.sipr.ac.uk). I also take this opportunity to invite you to the SIPR Annual Lecture on 30 September 2010 at the University of Strathclyde, which will be delivered by Professor Nick Tilley (Jill Dando Institute of Crime Science, University College London) on 'Discipline and Discretion'. See: http://www.sipr.ac.uk/events/Annual_Lecture_2010.php

The annual conference requires considerable planning and organisation and I am particularly grateful to Tim Heilbronn, SIPR's KT Manager and Administrator for his skill and hard work in organising this event. SIPR is also very grateful for the financial support provided by ACPOS and the Scottish Funding Council, Dundee City Council for providing a Civic Reception, and to LGC forensics and the Forensic Science Service for their sponsorship of the New Developments in Forensics Showcase.

Nicholas Fyfe,
Director, Scottish Institute for Policing Research



Locations being used

Plenary Sessions: The Sidlaw Auditorium (19)

Lunch: Hendersons Restaurant (11)

Parallel Sessions (14th September):

New Developments in Forensics - The Sidlaw Auditorium (19)

Practitioner Research – Balbeggie Suite (6)

Forensic Showcase (15th September): Balbeggie Suite (6)

PROGRAMME

Tuesday 14th September

Policing in an age of austerity

09.00 Registration and Coffee

PLENARY OPENING SESSION (VENUE: Sidlaw Auditorium)

Chair: Professor Nicholas Fyfe, Director SIPR

Plenary Session 1 Chair: Nicholas Fyfe (Director, SIPR)

10.00 Chair's welcome

10.05 Chief Constable Pat Shearer (President, ACPOS)

10.15 Keynote Speaker: Professor Martin Innes (Director, Universities' Police Science Institute, Cardiff University) **Paying the bill? Policing after the recession**

10.45 Discussion

11.00 Coffee

Plenary Session 2

11.20 Dr Ben Bradford (SCCJR, University of Edinburgh) **Using procedural justice to encourage cooperation with the police and compliance with the law**

11.50 Alan Dobie (Scottish Business Crime Centre) **Who pays? Prioritising prevention through collaboration in austere times**

12.20 Dr Wynsen Faber (Police Academy of the Netherlands) **The limits of the justice system: coping with Homeland security in today's society**

12.50 Discussion

13.15 Lunch and Poster Session (**VENUE: Lunch, Hendersons Restaurant; Posters, Sidlaw Foyer**)

PARALLEL NETWORK SESSIONS

14.30 Parallel Sessions – as detailed overleaf

15.40 Tea

16.00 Parallel Sessions - continued

17.00 Close of Conference

17.15 Coach departs for the Forensic Services Facility

n.b. The coach will leave from the bottom of the driveway for those who have requested transport. **Please be prompt.** Please see page 6 for directions for those making their own way.

17.30 Civic Reception, Forensic Services Facility

19.30 Conference Dinner, Apex Hotel (for those who have pre-booked this Optional Extra only)

c. 21.30 Depart

POSTER PRESENTATIONS (VENUE: Sidlaw Foyer)

See list of contributors on Page 17.

PRACTITIONER RESEARCH (VENUE: The Mansion House – Balbeggie Suite)

- 14.30 Chair: Dr Kenneth Scott (University of the West of Scotland)
- 14.40 Dr Penny Woolnough (Grampian Police Research Unit) **Missing persons: practitioner research to national practice**
- 15.10 CI Andy Brown (Scottish Police College) **An evaluation of operational deployment of police negotiators to incidents of deliberate self harm**
- 15.40 Tea
- 16.00 Professor David Bradley (Edith Cowan University Centre for Social Justice, Washington) **“Ending the ‘dialogue of the deaf’: evidence and policing policies and practices: An Australian case study**
- 16.30 **Panel discussion: Learning from Practitioners' Research Experience** Discussant: Supt Tony Beveridge, Tayside Police
- 17.00 Close of Conference

NEW DEVELOPMENTS IN FORENSIC SCIENCE (VENUE: Sidlaw Auditorium)

- 14.30 Chair: Professor Jim Fraser (University of Strathclyde)
Introduction: Evaluating the contribution of science to the investigation of crime and criminal justice
- 14.50 Graeme Malcolm (M Squared Lasers) **Remote chemical detection by tunable lasers**
- 15.15 Stan Brown (Chief Executive Forensic Science Northern Ireland) **Forensic Science Provision to the Criminal Justice system**
- 15.40 Tea
- 16.00 Prof. Christophe Champod (University of Lausanne) **Interpretation and evaluation of evidence**
- 16.45 Discussion
- 17.00 Close of Conference

Civic Reception, 17.30 – 19.00, 14th September

SPSA Forensic Services Laboratory, Rushton Court



On the 7th June 2010 the Justice Secretary Mr. Kenny McCaskill officially opened Rushton Court, a new 23 million pound facility created for delivering forensic services to Dundee, Tayside and beyond.

The building, named in honour of the late Dr. Donald Rushton, forensic pathologist in Dundee, is operated by the Scottish Police Services Authority, and is the first in the United Kingdom in which forensic scientists, crime scene investigators and fingerprint examiners have come together under one roof. Rushton Court also accommodates SPSA Information Technology staff who provide IT services to Tayside Police.

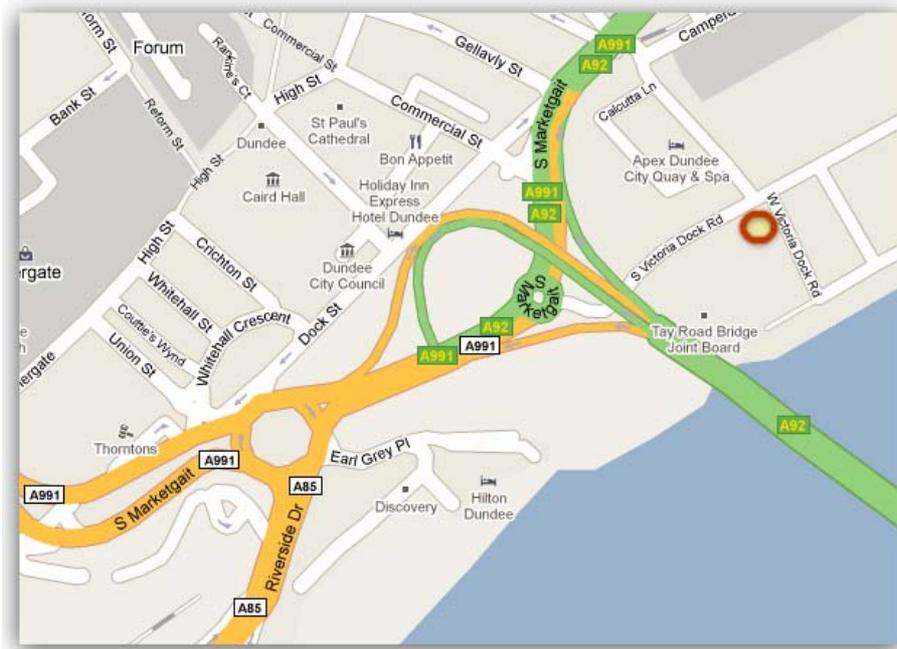
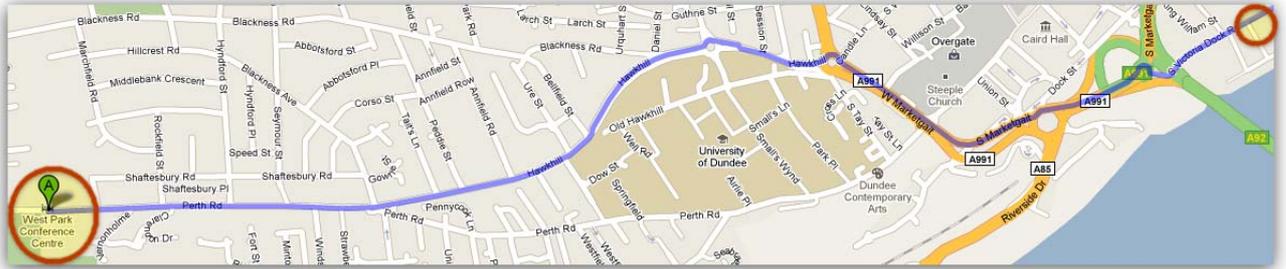
The building, consisting of five floors, has been fitted out to a high standard, and houses the latest state of the art equipment for the scientific investigation of crimes ranging from vandalism to homicide. With access to such advanced technology, the staff working within Rushton Court can quickly identify even the latest “designer” drugs, generate DNA profiles from microscopic spots of blood, and locate and recover fingerprints from previously impossible surfaces.

The Scottish DNA Database and laboratory also operates within the walls of Rushton Court and is responsible for producing DNA profiles from persons suspected of committing crimes, and this facility is also responsible for administering the use of the DNA Database for identifying persons who may be responsible for carrying out criminal acts.

Since the opening of Rushton Court, scientific examinations of items in relation to a number of serious crimes have already contributed in a significant way to the investigation of a number of serious crimes.

Through the provision of intelligence and scientific reports to our main customers and partners, the Police and the Procurator Fiscal Service, the services provided from Rushton Court will continue to help to keep Dundee a safer city for its citizens for many years to come.

Directions to the SPSA Forensic Facility



A coach will be provided for those who do not have their own transport. This will depart at 17.15. Please be prompt!

For those making their own way:

At the bottom of the West Park Centre drive, turn left, and head along the Perth Road. At the junction with Hawkhill, bear left, then follow the road round until you come to West Marketgait. This then leads into South Marketgait. Enter the dock area via South Victoria Dock Road (under the access road to the Tay Road Bridge). Please park in the Apex Hotel Car Park.

Wednesday 15th September

New developments in forensic science

(VENUE: Sidlaw Auditorium)

Chair: Tom Nelson, Director of Forensic Services, SPSA

- 09.00 Chair's introduction
- 09.10 Niamh NicDaeid (University of Strathclyde) **Development in forensic science research - looking to the future**
- 09.40 Martin Bill (Forensic Science Service) **New DNA developments**
- 10.10 Jim Thomson (LGC forensics) **Cannabis DNA**
- 10.40 Coffee and Forensics Showcase (**VENUE: BALBEGGIE SUITE**)
- 12.00 Kenny Laing **Powder Suspensions – Operational perspective**
- 12.30 Lunch

Chair: Professor Jim Fraser, University of Strathclyde & Associate Director, SIPR

- 13.15 Richard Sleeman (Mass Spec Analytical Ltd., Bristol) **Isotope Ratio Mass Spectrometry**
- 13.45 Sue Black (University of Dundee) **New methods in human identification**
- 14.15 Marielle Vennemen (University of Strathclyde) **RNA in Forensic Science**
- 14.45 Tea
- 15.15 Patrick Sears (DSTL) **Developments in explosives research**
- 15.45 **Panel discussion**
Professor Jim Fraser (University of Strathclyde), Tom Nelson (SPSA), Roddy Ross (ACPOS),
Liam Murphy (CoPFS)
- 16.30 Close of Conference

EXHIBITORS AND POSTERS (VENUE: BALBEGGIE SUITE)

See page 21 for full listing

BIOGRAPHIES AND ABSTRACTS

These Biographies and Abstracts are presented in the order shown in the above Programme

Policing in an age of austerity

NICHOLAS FYFE Session Chair

Nicholas Fyfe is the founding Director of the Scottish Institute for Policing Research and Professor of Human Geography in the School of Social Sciences at the University of Dundee. Over the last 20 years his research on policing has included studies of police-community consultation in London, the design of police user surveys in Scotland, the use of CCTV surveillance, and the policing of wildlife crime. Much of his most recent research has focused on witness protection and he conducted the first ever independent evaluation of a police witness protection programme, funded by the Scottish Government. He has also undertaken an international review of measures to facilitate witness co-operation in organised crime investigations for the Home Office and acted as an adviser to the Canadian Government on witness protection arrangements in Canada. He acted as the adviser to the Scottish Parliament's Justice Committee inquiries into the effective use of police resource and community policing.

PATRICK SHEARER QPM

Patrick Shearer has been Chief Constable of Dumfries and Galloway Constabulary since May 2007. He was appointed President of ACPOS on 1 April 2009.

He is a graduate of Aberdeen University having attained an Arts Degree and a Law Degree. He joined Grampian Police in 1983. He was one of the first Officers to qualify for, participate in and successfully complete the first Scottish Strategic Command Course and in April 2001 he was appointed Assistant Chief Constable of Grampian Police and subsequently Deputy Chief Constable in January 2005.

In July 2005 he undertook the challenging role of Mutual Aid Coordinator for G8, working within the Scottish Police Information Coordination Centre, (S-PICC).

In January 2006, he took on a leading role in driving up performance in the Scottish Police Service, working with others to develop the Scottish Policing Performance Framework and relevant performance induction. He is currently chair of the Performance Management Business Area.

MARTIN INNES

Martin Innes was appointed Professor and Director, Universities Police Science Institute, at Cardiff University School of Social Sciences in March 2007. Prior to that he was Senior Lecturer in Sociology, at the University of Surrey for 2 years, and from 2003 to 2005 was Head of Research, National Reassurance Policing Programme. His research interests are organised around four themes: The Signal Crimes Perspective and Signal Events Theory; Reassurance and Neighbourhood Policing; Crime investigation and detection; Logics and practices of contemporary social control.

Paying the Bill? Policing After the Recession

Although the recession in the UK has technically ended, it is clear that it will have deep and long-lasting social impacts. In respect of policing, these are likely to be both direct (reductions in funding) and indirect (increasing demand stemming from amplified social stress in communities). In sum, the police are now going to have to find ways of doing more with less, following a decade of increased investment within and across the policing sector. This presentation seeks to examine some of the potential ways of responding to this situation and how policing might be strategically reconfigured for the new operating environment that it confronts. In particular, it will outline how the development of a 'social harm' perspective might afford a way of developing a more outcome focused approach to service delivery. The discussion will be illustrated by findings from a programme of empirical research that has been conducted in collaboration with, amongst others, ACPO and HMIC.

BEN BRADFORD

Ben Bradford is a Research Fellow within the School of Law at the University of Edinburgh and a member of the CJ-Quest network of the Scottish Centre for Crime and Justice Research. His research interests include: public trust and confidence in the police and constructions of police legitimacy; distributions and experiences of police-public encounters; and the impact of personal experience on opinions of the police and other legal authorities. Ben has worked with the London Metropolitan Police on a number of research projects, mainly concerned with improving police understanding of public opinions and priorities.

Using procedural justice to encourage cooperation with the police and compliance with the law

According to Tom Tyler's procedural justice framework the police can generate and sustain institutional legitimacy by wielding their power in a fair, equitable and respectful way. Procedural justice instils feelings of shared group membership with, and motive-based trust in, the police. If people feel that they and the police are 'on the same side' they are more likely to defer to officer's instructions, more likely to offer their cooperation, and may even be more likely to comply with the law. In this paper these issues are explored with reference to survey data collected in England and Wales. In contrast to models that stress the demonstration of police effectiveness and the importance of adequate deterrence mechanisms police fairness and community engagement are shown to be consistently stronger predictors of public cooperation and compliance with the law. These findings have implications for the way police performance is measured and, more importantly, how cooperation and compliance might be maintained and even enhanced in financially straitened times.

ALAN DOBIE

Alan Dobie was appointed as Executive Director of the Scottish Business Crime Centre (SBCC) after a career of 30 years with Royal Mail. A graduate of the University of Edinburgh, he has successfully increased the profile of business crime and the work of the SBCC throughout the wider Scottish business community and beyond.

Alan is a member of the Board of Crimestoppers, Scotland, is a member of the National Identity Fraud Consumer Awareness Group and is a Director of the Home Office funded Best Bar None initiative for England and Wales.

Alan chairs The Prince's Trust committee for the Edinburgh area and has a Postgraduate qualification in Marketing. He is a member of the Chartered Institute of Marketing and a fellow of the Institute of Direct Marketing and is a Chartered Marketer.

Who pays? Prioritising prevention through collaboration in austere times

This presentation will build on the presentation by Martin Innes, discussing the progress that is being made in Scotland towards working in partnership. The business community is increasingly recognising the value to be gained from working with key partners to control costs in these times of financial constraints, whilst at the same time helping to secure their long term viability.

WYNSSEN FABER

The limits of the justice system: coping with Homeland security in today's society.

Dr Wynsen Faber, Police Academy of The Netherlands, will provide a critical reflection on the limits of the judicial system that exists today. The assumption of his contribution is that the police-function is distributed over society. Effectiveness of the judicial system must focus much more on the abilities of the private sector. Lack of budget reinforces this need.

Practitioner Research

Alongside initiating research into key areas of Scottish policing policy and practice, one of the key aims of SIPR is to encourage those involved with policing to engage in research activity. This has been assisted by the creation of practitioner fellowships and small-scale research projects in which those who work in police-related areas are supported by academic researchers from Scotland's universities. The purpose of this session is to consider the value of practitioner research, to celebrate some examples of projects supported by SIPR, and to discuss some of the present and future issues facing practitioners in undertaking research.

KENNETH SCOTT Session Chair

Dr Kenneth Scott is Director of the Centre for Criminal Justice and Police Studies at the University of the West of Scotland (Hamilton Campus) as well as being Associate Director of Network 3 (Police Organization) at SIPR. He was co-editor and contributor to the book Policing Scotland (2005), and has researched and published in a range of topics relating to the police in Scotland, including governance, accountability and training. He is currently involved in a number of research projects for various police organisations and a three-year SIPR project on Local Policing in Scotland.

PENNY WOOLNOUGH

Dr Penny Woolnough is Senior Research Officer for Grampian Police. She is also an Honorary Research Fellow in the School of Social Sciences at the University of Dundee and a Visiting Lecturer at Glasgow Caledonian University. She has over fifteen years of applied policing research, including work with Her Majesty's Inspectorate of Constabulary (England and Wales) and the Home Office Research Development & Statistics Directorate. She is a Chartered Psychologist and Fellow of the Royal Society of Arts. In 2004 she was awarded a Fulbright Commission Police Studies Fellowship to study missing person behaviour in the US. She is an Expert Advisor to the National Policing Improvement Agency on matters relating to missing persons.

Missing persons: practitioner research to national practice

Estimates suggest more than 300,000 people are reported missing to UK police every year. Despite the huge impact of cases on police resources, problems of risk assessment and vulnerability, as well as the emotional nature of the incident for friends and family, very little research has considered the behaviour of missing persons: Where do they go? How far do they travel? Where will they be found? How will they be found? In order to address this, a police inspector and a trained researcher analysed over 2000 closed UK missing children and adult police reports. This practitioner-led research resulted in the production of predictive behavioural profiles, based on key characteristics (e.g., age, gender, mental condition), to facilitate the expeditious and safe location of missing persons. This presentation will showcase this innovative, award-winning research conducted by Grampian Police as an illustration of what is possible through practitioner research.

ANDREW B BROWN

Chief Inspector Andrew B Brown has been a serving police officer of Northern Constabulary for over 24 years. He is currently seconded to the Scottish Police College as the Deputy Head of the Leadership & Professional Development Division, responsible for Divisional management and the provision of quality leadership, business management and operational command training to the Scottish Police Service and also to international Police Officers in leadership roles. Prior to this, he was the Area Commander (Chief Inspector) of Caithness, Sutherland & Easter Ross. Trained at the Scottish Police College as Licensed Negotiator in 2001, he has significant experience of negotiating, ranging from suicide intervention, siege incidents and hostage incidents – mainly involving hostage children, throughout the Highlands and Islands. He is a co-opted member of the Aberdeen Centre for Trauma Research at the Robert Gordon University, Aberdeen.

An evaluation of operational deployment of police negotiators to incidents of deliberate self harm

Awarded a Practitioner Fellowship with the Scottish Institute for Policing Research, University of Dundee in 2010, he is currently conducting research into effectiveness of police negotiator training and their operational deployment, the value of national Police Hostage/Crisis Negotiator Training at the Scottish Police College and the effects of operational negotiator deployment to incidents of attempted suicide/self harm. This involves a systematic literature review on the effectiveness of police negotiator training and their operational development, an evaluation of the perceived effectiveness of current training at the SPC, and an evaluation of the perceived effects of operational deployment of trained Police Negotiators to incidents of attempted suicide/self harm with the subjects of such action.

DAVID BRADLEY

Professor David Bradley was a co-founding member of the Centre for Police Studies, University of Strathclyde, from 1982 – 1986, before being appointed Foundation Dean of Studies, NSW Police Academy, Australia in 1987. He held several Director posts at the Academy, before joining RMIT University in June 2002 as Victoria Police Research Fellow. He has returned to Scotland following his recent retirement, but remains Adjunct Professor, Centre for Social Justice, Edith Cowan University.

His work in New South Wales involved aiding in the academic development of the police college enabling it to develop strong partnerships with universities in the delivery of police education and training, including relocation of foundational training to a university setting. In Victoria he has, over the last seven years, facilitated a large applied research policing program, consisting of 21 ARC Linkage Grant Projects, and is currently a co-researcher (with lead investigator Professor Caroline Taylor, Edith Cowan University) on the Australian Research Council funded research project “Policing Just Outcomes: the Police Response to Adult Sexual Assault”, and designing a research project on the subject matter of false allegations of rape.

“Ending the ‘dialogue of the deaf’: evidence and policing policies and practices: An Australian case study

Two current police research traditions are examined, the critical police research and policy police research, as they have evolved in the United States, the United Kingdom and in Australia. Each tradition has developed a typical pattern of relationship between researchers and police practitioners, but both suffered from what we call the ‘dialogue of the deaf’. While acknowledging the continuing importance of each approach to police research, we suggest the need for a third new approach to be developed in which academics and police work in close and continuous collaborative relationships.

TONY BEVERIDGE

Superintendent Tony Beveridge joined Lothian and Borders Police in 1994 and served as a uniformed Constable in the West of Edinburgh for 5 years before being promoted to Drylaw where he worked as a Sergeant and Detective Sergeant. On promotion to Inspector, he worked in various headquarters and operational posts across Edinburgh, as well as going on secondment to Strathclyde Police and Fife Constabulary. He has commanded many sporting and public events as well as firearms incidents and in August 2010 he transferred to Tayside Police on promotion to Superintendent.

Over the last few years Tony has worked closely with the Law School at the University of Edinburgh to facilitate police-related research by postgraduate students and has collaborated with SCCJR and SIPR colleagues to jointly develop a range of research projects into community policing and vandalism. He holds degrees in Politics and Criminology and also completed an MBA in 2010.

New Developments in Forensic Science

As science and technology continues to develop it offers increasing scope in the investigation and prosecution of crime. New technologies have the potential to rapidly or remotely analyse forensic materials which may provide intelligence, investigative leads or eliminate suspects and the innocent. However, the application of new technology is set in a complex legal environment involving many stakeholders (prosecutors, investigators, scientists) with overlapping but distinct roles and aims.

Much of the evidence presently available suggests that available technologies are not always used effectively and there is the potential for new techniques to be 'over sold' or their applications misunderstood. The effective use of novel science and technology in such an environment demands close cooperation and interaction of all stakeholders.

This conference aims to explore the distinctive issues that arise in the development and implementation of new forensic technologies, showcasing novel science but also considering its potential in a criminal justice system of increasing expectations and fiscal constraints. The requirements for sound evaluation of technology, developing new standards and interpretation and evaluation of evidence are all matters that will be explored in presentations by internationally recognised experts.

JIM FRASER Session Chair

Jim Fraser is Professor of forensic science and Director of the University of Strathclyde's Centre for Forensic Science. He is Associate Director of the Scottish Institute for Policing Research, and a Past President of the Forensic Science Society. He has extensive experience as an expert witness in criminal courts in the UK and has been involved in many high profile cases (e.g. Damilola Taylor, Rachel Nickell, Shirley McKie) as an expert witness, reviewer or adviser. Jim also has significant experience in strategic and policy matters in relation to forensic science in the UK and internationally. He has advised a range of agencies on forensic, scientific and investigative matters, including the police organisations in the UK and abroad, the Home Office, the Scottish Parliament and the UK Parliament. His teaching and research interests focus primarily on the role of science and technology in criminal justice. He is the co-editor (with Robin Williams) of the Handbook of Forensic Science (Willan) and author of Forensic Science a Very Short Introduction (OUP).

GRAEME MALCOLM

Dr. Graeme Malcolm has been a pioneer of growth photonics companies in Scotland over the last 16 years. In 1992 he co-founded Microlase Optical Systems Ltd which rapidly became one of Scotland's most successful optoelectronics companies and was sold to a major US corporation. He has developed a number of important technologies across many end-use market sectors and has built strong collaborative alliances within the commercial sector and with several of Scotland's Universities. Currently he is Chief Executive Officer at M-Squared Lasers, a high growth company developing new laser technologies. Graeme is also a visiting Professor at the Institute of Physics at the University of Strathclyde in Glasgow.

Remote chemical detection by tunable lasers

STAN BROWN

Stan Brown has been, since 2006, Chief Executive of Forensic Science Northern Ireland (FSNI), an Executive Agency within the recently devolved Northern Ireland Department of Justice. The Agency employs approximately 220 staff and covers a comprehensive range of forensic specialisms which are closely integrated, in terms of sequencing and control, in order to optimise evidential recovery, especially in the most serious cases. Between 2002 and 2006, Stan was Business Development Director and later Acting Chief Executive of the Ordnance Survey of Northern Ireland.

Most of Stan's Private Sector work involved applied surface chemistry in the area of contamination and corrosion control and prevention in industrial manufacturing processes, including Food and Beverage, Pulp & Paper and Water Treatment. He was particularly involved internationally with Quality Management aspects of industrial Food and Beverage Hygiene, including the development of HACCP (Hazard Analysis & Critical Control Points) procedures (now mandatory across the EU). Contamination Control and Quality Management are of course key generic aspects of forensic science.

Forensic Science Provision to the Criminal Justice system

CHRISTOPHE CHAMPOD

Professor Christophe Champod, from the Institute of Forensic Science in the Faculty of Law and Criminal Justice at the University of Lausanne, received his M.Sc. and Ph.D. (summa cum laude) both in Forensic Science, from the University of Lausanne, in 1990 and 1995 respectively. He remained in academia until holding the position of assistant professor in forensic science. From 1999 to 2003, he led the Interpretation Research Group of the Forensic Science Service (UK), before taking a professorship position at the School of Criminal Sciences (ESC) / Institute of Forensic Science (IPS) of the University of Lausanne. He is in charge of education and research on identification methods (detection and identification), currently deputy director of the ESC. His research is devoted to the statistical evaluation of forensic identification techniques and the interpretation of evidence.

Interpretation and evaluation of evidence

The aim of this presentation is to review some essential principles of evidence interpretation and to discuss some of the misconceptions raised against the use of "Bayes theorem" or "likelihood ratios" in forensic science. In addition to the current state of affairs, some of the major future interpretation challenges will be discussed. Two cases heard at the UK Court of Appeal will help in that purpose: R. v. Barry George, UK Court of Appeal, [2007] EWCA Crim 2722 and R. v. Peter Weller, UK Court of Appeal, [2010] EWCA Crim 1085. Finally the specific interpretative issues observed in the area of marks (finger-, footwear-, tool-) will be discussed to show that these fields require a major shift in the way they are reported in court in order to match good practice of evidence interpretation.

TOM NELSON (Session Chair)

Tom Nelson has been a Forensic Scientist for 25 years. Fifteen of those years were spent with the Northern Ireland Forensic Science Laboratory. He started work in chemistry but later developed an expertise in fire investigation. He has also worked extensively in the paint, glass and general chemistry departments. He has been heavily involved in shaping the new forensic service over the past few years. Tom previously held the post of head of Lothian Borders Police Forensic Science Support Department until his appointment as Director of the new Scottish Forensic Science Service.

NIAMH NICDAEID

Dr Niamh Nic Daéid received her Bachelor of Science degree in Chemistry and Mathematics from Trinity College Dublin. She completed her PhD in Biomedical Chemistry at the Royal College of Surgeons in Ireland in 1993. She is currently a Reader in Forensic Science at the Centre for Forensic Science at Strathclyde University in Glasgow.

Niamh leads and generates research funding for a team of 12 Mphil, PhD and post doctoral researchers, the largest multidisciplinary academic based forensic science research team of its kind in Scotland. She has published over 60 peer reviewed research papers and presented over 120 conference presentations at national and International meetings.

Development in forensic science research - looking to the future

Scotland possesses some of the best forensic science research institutes and centres in the UK and academic researchers in the area consistently deliver high quality research output. However it is increasingly difficult to obtain core research funding for forensic science related research from research councils. This has the potential to place future research development in a precarious position and one which will become increasingly reliant on synergistic relationships between the criminal justice sector, end users and academic partners. It is increasingly apparent that having a common understanding of the nature of research and developing a set of shared expectations will be a key to developing long lasting and productive research partnerships between the various stakeholders. This presentation will discuss the nature of research in forensic science and address areas of current and future development within Scotland and beyond.

MARTIN BILL

Martin Mill has been with the FSS for 14 years in a variety of role including operations, quality, IP and research. I now head up the software group and have responsibility for expert system development within FSS.

New DNA developments

JIM THOMSON (LGC FORENSICS)

Jim Thomson has over 20 years experience working in the fields of forensic identity testing and genotyping. He started his career at the Royal London Hospital in 1986, helping to establish the new DNA Fingerprinting techniques to support one of the first DNA based paternity testing services in the UK.

Since 1995 he has worked for LGC, where he heads the Forensic DNA R&D team and has played a key role in establishing and supporting a number of different DNA based forensic and diagnostic services. These have included LGC's National DNA Database reference laboratory which opened in 1997; the validation of STR systems as the method of choice for paternity and immigration case analysis; establishment of LGC's crime scene DNA laboratories in 2003; development and validation of a computer program for familial searching of the NDNAD; and, outside forensics, set-up of a high throughput sheep genotyping laboratory utilising novel MALDI-TOF mass spectrometry SNP detection systems.

Current R&D interests include the development of a rapid point-of-arrest STR typing technology based on novel HyBeacon probe technology, and the continuing development and characterisation of methods for analysing and reporting trace forensic evidence.

Cannabis DNA testing

Cannabis cultivation in the UK is increasingly dominated by organised crime networks with intensive growing methods based on propagation by cuttings. DNA analysis may help to identify grow rooms and seizures which share plants from the same motherplant and therefore provide intelligence on the structure of such networks. LGC Forensics has optimised a DNA STR test suitable for such analysis and has successfully typed over 500 cannabis samples from scenes across the UK. These data show that a number of common DNA types are found at many scenes, with some evidence of geographical clustering. Further work is needed before we can offer a robust intelligence service but the principles and methods have now been established.

KENNY LAING

Kenny Laing is Mark Enhancement Laboratory Manager at Forensic Services Glasgow. Employed for 13 years, he originally started as Scene Examiner, and has specialised in Mark Enhancement for 9 years. He became manager in 2006, and has been involved in the Home Office Scientific Development Branch (HOSDB) Fingerprint, Footwear Forensic User group for the past 6 years, representing Scottish Policing, concentrating on steering research projects based on operational requirements. He has been instrumental in developing Powder Suspensions through operational use, and has published several papers in this area.

Powder Suspensions – Operational perspective

Through collaborative work involving Strathclyde University and HOSDB, SPSA have become leaders in the use of Powder Suspensions for mark enhancement. Benefits have resulted in increased mark recovery and more efficient working practices being developed. Turnaround times have shortened and outstanding casework reduced by over 70%.

Results from the latest two research projects looking at recovery of marks from packaging contaminated with drugs residue and firearms will be presented. Results indicate that powder suspensions are a good 'one shot' technique for mark enhancement across a range of commonly encountered packaging types encountered in casework, being able to remove contamination and enhance marks at the same time. Powder Suspensions are an extremely effective technique for mark enhancement on firearms, in this study shotguns were used, and other factors are found to influence mark recovery more than choice of enhancement technique.

RICHARD SLEEMAN

Richard Sleeman studied for his PhD at the University of Bristol. He developed an interest in rapid analytical methodologies using little or no sample preparation by means of tandem mass spectrometry. He is now the Scientific Director of Mass Spec Analytical Ltd.

Isotope ratio mass spectrometry as a tool for forensic investigation

The versatility of isotope ratio mass spectrometry is demonstrated by reference to diverse case studies. Variations in the natural isotopic composition of non-biological, organic materials are compared as a means by which samples may be associated or discriminated. These techniques may be used to augment or compliment conventional forensic methodologies.

SUE BLACK OBE

Professor Sue Black is Director of the Centre for Anatomy and Human Identification at the University of Dundee. She is a founder and director of the Centre for International Forensic Assistance (CIFA), founder and past President of the British Association for Human Identification and advisor to the Home Office on issues pertaining to disaster victim identification (DVI). She is a fellow of the Royal Society of Edinburgh, a Fellow of the Royal Anthropological Institute and an honorary Fellow of the Royal College of Physicians and Surgeons of Glasgow. She was awarded an OBE in 2001 for her services to forensic anthropology in Kosovo, the Lucy Mair medal for humanitarian services and a police commendation in 2008.

New Methods in Human Identification

When we think about the concept of 'identification' we tend to concentrate on those biometric indicators that are of greatest value in high volume crime analysis i.e. DNA and fingerprints. However there are many biometrics associated with the individual and often the circumstances of a crime or an alleged crime, can call for unusual and innovative approaches. These in turn must be supported by the cornerstones of admissibility, including solid research, statistical analysis and peer reviewed reporting. However, a situation can arise in new areas where the science takes too long for the investigator's liking and the scientist must therefore operate within very different parameters until the two can be brought into alignment. This presentation reports on one such approach which has a validation from one sector of science and its forensic credibility must run to keep apace with the demand for its utilisation.

MARIELLE VENNEMEN

Dr Marielle Vennemann graduated in anthropology and human genetics from the University of Gottingen (Germany) in 2002 and carried out PhD studies at the Institute of Legal Medicine at the University of Muenster (Germany) before she became an independent researcher at the University of Freiburg (Germany) in 2005. Since July 2010 she is a lecturer at the Centre for Forensic Science, Strathclyde University, Glasgow.

Her research mainly focuses on the analysis of messenger RNA in post-mortem human tissue and the process of mRNA decay after death. Although she has also made significant advances in low-volume STR typing, Y-chromosomal SNPs, mitochondrial DNA, identification of hitherto unknown Alleles, and population genetics.

She was involved in the investigation of numerous crime scenes and provided written and oral expertises for German Police and courts

RNA in Forensic Science

Gene expression is tissue specific and therefore the composition of RNA pools is supposed to differ between different types of body fluid. In recent years numerous studies have been published focusing on the possible use of RNA markers for body fluid identification in forensic science. This talk will give a brief overview of different RNA species and their stability in crime scene stains. The potential use of RNA markers for body fluid identification, but also for post-mortem gene expression analysis, will be discussed.

PATRICK SEARS

Dr Patrick Sears completed his Doctor of Philosophy in Physical Chemistry from the University of Hull in 1999, focusing on the oxidation of small organic molecules catalysed by supported uranium oxide.

He has spent 5 years working in process safety for "Thermal Hazard Technology" before joining the instrument technology company "Syrris". Patrick joined the Defence Science and Technology Laboratory (Dstl), formerly the Defence Evaluation Research Agency (DERA) in 2008 in the Forensic Explosives Laboratory. He is currently the Technical Leader for the Forensic Research team.

Developments in forensic explosives research

The principal role of the dedicated FEL Forensic Research team is to conduct research and development in support of the operational capability and forensic service that FEL provides. As such, the principal requirements of the team are delivery of responsive operational development to improve the timeliness / effectiveness of forensic evidence and medium/long term capability development aimed at addressing future requirements for provision of a forensic explosives service, i.e. addressing capability deficiencies, changing threat, etc.

To facilitate the delivery of these requirements, the team operates a research and development strategy which currently incorporates three principal themes that have been identified as capability areas across the forensic service provided by FEL. The 'explosives analysis', 'forensic methodology' and 'threat assessment' capability areas are, broadly, related to the overall objective of providing a forensic service that adds significant value, reduces operational turn-around times and anticipates and makes provision for future threat materials.

This presentation will provide a short introduction to the forensic service that FEL provides, followed by a discussion of some of the research and development that underpins the operational capability.

RODDY ROSS

Detective Chief Superintendent Roddy Ross is the Head of CID for Tayside Police. He has 29 years service with the Force, most of it in CID. He is an experienced Senior Investigating Officer with a long-standing and enduring interest in the processes and mechanics of major and serious crime investigation. This led earlier in his career to a secondment to the Police Information Technology Organisation as the HOLMES 2 Liaison Officer for the UK. He is the Chair of the ACPOS Offender Management Working Group and the Visor User Group in Scotland. He is also a member of a variety of Government committees and working groups relating to the Management of sexual and other offenders. He is a member of ACPOS Investigation Sub Group and will take over from ACC Derek Penman as the chair of the Forensic Science Advisory Group in the near future.

LIAM MURPHY

Liam Murphy is a Solicitor and currently the Divisional Procurator Fiscal for Glasgow East Division. He was educated at the University of Dundee and Strathclyde and has worked in local government and in private practice undertaking criminal defence work and thereafter in the public sector as a prosecutor with the Crown Office and Procurator Fiscal Service for the past 12 years.

Liam has held a number of roles within Crown Office and the Procurator Fiscal's Offices in Hamilton, Crown Office and Glasgow. He was formerly Deputy Head of the High Court Unit at Crown Office before being appointed as Divisional Procurator Fiscal within the High Court Division at Glasgow. He moved to his current role in Glasgow East Division in September 2009.

Liam is the Chair of the Strathclyde Forensic Science Liaison Meeting and was involved in the revised National Forensic Science Protocol. He is the Glasgow lead for Counter Terrorism and is a member of the Disclosure Reference Group.

EXHIBITS AND POSTER PRESENTATIONS

SIPR CONFERENCE (14th September)

A. Police Attitudes to Youth and Youth Interventions: A Case Study of Inverclyde

Amy Goulding
Glasgow Caledonian University
agould12@caledonian.ac.uk

The Inverclyde Initiative, a community safety partnership approach, has been developed by Strathclyde Police in Inverclyde Sub-division, as a means of tackling issues surrounding child protection and youth offending in the multi-member wards 3 and 4 of Greenock. The initiative runs on selective Friday and Saturday nights and provides young people with a safety zone. Those deemed most 'at risk' go through a process of 'restorative justice' and counselling with their parents/guardians. There are also opportunities for young people to be signposted to alternative activities and to speak to representatives from a number of different organisations. The Inverclyde Initiative has been described as 'ground breaking', as it uses a multi-agency approach, working with the Community Planning Partners to provide young people living in 'hot spot' areas with an alternative to hanging around on the streets and engaging in anti-social behaviour. The initiative was developed in response to local concerns about anti-social behaviour and underage street drinking. It aims to create public reassurance; promote parental responsibility; and encourage good citizenship and youth diversion. Consequently, the local media, namely the Greenock Telegraph, have worked in conjunction with the police to promote and support the initiative and provide coverage in the local press.

This research aims to explore whether this initiative has had an impact on policing and the behaviour of young people in the area. Specifically it aims to explore how the police perceive this "innovative approach" to policing young people and to assess their perceptions of the young people of Inverclyde. It will also examine young people's perceptions of this intervention: how it has impacted on their behaviour and how it has affected their view of the police. Data will be collected through semi-structured interviews with police officers in Greenock (wards 3 and 4); focus groups with young people; overt observations of policing and the initiative; and content analysis of the local media.

B. Fear at the airport: Treating Muslims as dangerous

Leda Blackwood
University of St Andrews
lmb11@st-andrews.ac.uk

In recent years, the alienation and social disengagement of sections of the Muslim population has become a major concern and there has been much controversy over both how this occurs and how to prevent it. We suggest that similar dynamics which can lead to alienation from authorities within crowds can also occur amongst more distributed groups and communities. That is, under conditions where the authorities treat all members of the group as potentially dangerous, then the potential for disaffection is likely to increase. We illustrate this analysis through a set of interviews with Muslims concerning their experiences when passing through airports. Whereas non-British Muslims voice fewer concerns at being stopped and questioned, the situation is very different for British Muslims. The chances of being stopped on re-entry to the country are high. Their experience of this is that, although they themselves are proud to be British, they are being treated as non-British and as dangerous. Having been treated as such, they are more likely to respect voices that are critical of British authorities. What is more, stories of their experiences circulate through social networks and can thereby have an impact which is far wider than the numbers who are actually stopped.

C. An evaluation of operational deployment of police negotiators to incidents of deliberate self harm

Andy Brown, Scottish Police College

Awarded a Practitioner Fellowship with the Scottish Institute for Policing Research, University of Dundee in 2010, Andy Brown is currently conducting research into effectiveness of police negotiator training and their operational deployment, the value of national Police Hostage/Crisis Negotiator Training at the Scottish Police College and the effects of operational negotiator deployment to incidents of attempted suicide/self harm. This involves a systematic literature review on the effectiveness of police negotiator training and their operational development, an evaluation of the perceived effectiveness of current training at the SPC, and an evaluation of the perceived effects of operational deployment of trained Police Negotiators to incidents of attempted suicide/self harm with the subjects of such action.

D. Inter-agency Co-operation: An effective anti-money laundering framework?

Mo Egan

Dundee Business School, University of Abertay Dundee, Bell Street, Dundee DD1 1HG
m.egan@abertay.ac.uk

The aim of this project is to assess the effectiveness of the police in tackling money laundering through the anti-money laundering framework currently in place. It is unique in that it will focus on Scottish based anti-money laundering operations, an area which has been neglected in previous research.

E. Resilience and Well-being in a Scottish Police Force

Ms Midj Falconer, Aberdeen Centre for Trauma Research, Faculty of Health and Social Care, Robert Gordon University, United Kingdom
Dr Susan Klein, Aberdeen Centre for Trauma Research
Professor David A Alexander, Aberdeen Centre for Trauma Research
Dr Penny Woolnough, Grampian Police
Contact: m.falconer2@rgu.ac.uk

There is a need for a paradigm shift in emergency services research from a "pathological model" of enquiry to an alternative approach which accommodates both positive and negative outcomes and identifies resilience and vulnerability factors. The objectives of this unique longitudinal study are to identify: (i) resilience and vulnerability factors (at individual, environmental, and organisational levels), and (ii) the mechanisms which promote positive and adaptive outcomes in two Scottish police forces. It is intended that the information derived therefrom will inform organisational practices that augment the resilience and well-being of police officers, and reduce sickness absences, and ill health and other premature retirements. This paper will present: (i) an overview of the methods employed to obtain police officers' experiences of contemporary policing and explore trauma-related factors associated with resilience and well-being, and (ii) preliminary findings from the initial assessment conducted by means of a specially designed online questionnaire and a selection of standardised measures, made available to all serving officers in both forces.

F. Information Sharing Syntax for Data Sharing between Police and Community Partners

Omar Uthmani; Prof Bill Buchanan; Alistair Lawson (Edinburgh Napier University)
Supt. Russell Scott, National Intelligence Model Development Team (Scottish Police College)
Burkhard Schafer (Joseph Bell Centre for Forensic Statistics and Legal Reasoning)
Chris Mooney (Glasgow Community & Safety Services)

o.uthmani@napier.ac.uk

A key barrier to effective information exchange in crime-prevention is the lack of uniform policy definition, interpretation and enforcement between police and community partners. A central aim of this research is to address this with a policy syntax definition which allows for efficient and verifiable information interchange between domains, and to define and evaluate context-aware methodologies for the interpretation of policies, from their high-level definition to their implementation.

G. Developing the role of the Police Early Intervention Officer in an Age of Austerity

Robert Smith, SIPR Lecturer in Leadership, Aberdeen Business School, The Robert Gordon University,
Aberdeen AB10 7QE
r.smith-a@rgu.ac.uk

The new innovative role of police ‘Early Intervention Officer’ or ‘Early Intervention Worker’ is the latest recruit in the portfolio of civilianized police specialisms to hit the streets in Scotland. As we enter into an age of austerity and with the threat of cuts to public service many police forces are under severe pressure to make financial and efficiency savings. In many cases yesterday’s specialisms such as The Anti Social Behaviour Officer, The Crime Reduction Officer, The School Liaison Officer and even the Community Beat Officer are under threat of further civilianization, a reduction in numbers and in some cases redundancy by natural wastage. In this study the author examines whether the new role has potential to add value to the policing process as a panacea, or whether it is a cynical but necessary austerity measure.

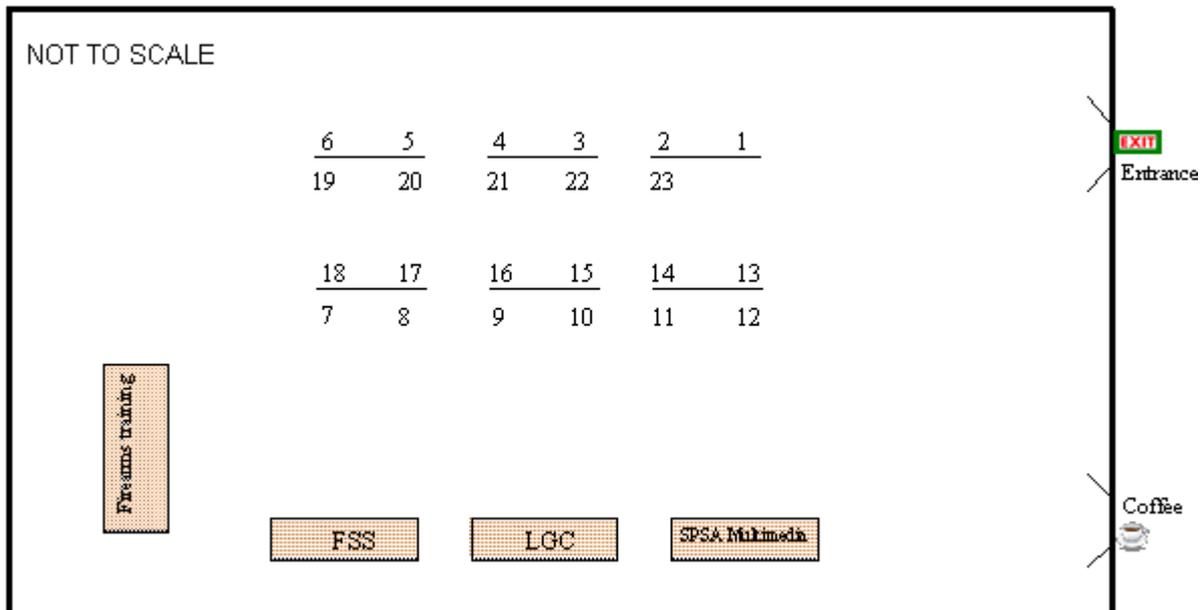
H. Science: there when you need it (Rapid Restricted Analysis (RRA) of Drugs)

Lindsay Wallace, Forensic Chemist (Drugs), Aberdeen Forensic Laboratory, SPSA

lindsay.wallace@spsa.pnn.police.uk

As a direct result of changes imposed by the Government onto the Crown Office and therefore indirectly onto the Police forces, a more efficient method was required for the turnaround time (TRT) between a drugs crime and the disposal of the case i.e. the result at court. In 2008, after consultation with the area Procurator Fiscal, SPSA and Grampian Police/Northern Constabulary, a number of amendments to the process for drugs identification were implemented within the Aberdeen laboratory. These amendments collectively had the potential to substantially reduce the time taken between the submission of the drug sample(s) and the provision of the analytical results. The crux of the matter was to develop a streamlined process involving a fit-for-purpose, value for money analysis without compromising the integrity of the case. To date this scheme has been hugely successful, reducing TRT from 5 months to 1 week, which in turn eliminated all backlogs. The process has now been rolled out to other laboratories, in one form or another, in order to meet the every changing demands of our customers

SPSA FORENSICS “SHOWCASE”, 15TH SEPTEMBER



Firearms Training Using Games Technology

Paul Robertson, Pat Cronin and Jim Bown, University of Abertay Dundee
Email : p.robertson@abertay.ac.uk

A police firearms officer faces the shoot no-shoot dilemma when confronting a suspect who is possibly armed. Within a fraction of a second the officer has to make the decision to shoot or not. The officer has several lives in the balance: his/her own, his/her team, the suspect's and other people in the immediate area. This situation is made more difficult because of a number of factors that may contribute to the decision, including high stress, low natural light, and prior information affecting context and accountability. Given the high impact of this decision, training is extremely important and an essential part of that training is undertaken in simulators. Current simulator training is supported by a finite set of film footage and images, and firearms officers follow the action sequences and make decisions based on their interpretation of observed events. Computer games technology has the potential to offer a highly flexible, adaptive and interactive training environment. We present the findings of a series of experiments with novice participants using the simulator in controlled conditions. Currently we are extending the study with trained firearm participants.

DNA Technology - Exhibit from the FSS

Ed Orgill / Martin Bill
Forensic Science Service
Email : ed.orgill@fss.pnn.police.uk

Exhibit from LGC Forensics

Jim Thomson
LGC Forensics
Email : jim.thomson@lgcforensics.com 07825234854

SPSA Forensic Multimedia Unit: Bringing Evidence to Life

Frank Brown, SPSA Forensic Multimedia Unit, Glasgow
Frank.Brown@spsa.pnn.police.uk

Through a variety of quality digital media including interactive presentations and 3D reconstruction, the SPSA Forensic Multimedia Unit have developed various techniques to present complex evidence in a way that is clear, concise and easy to understand.

We can instantly transport detectives, lawyers, jurors and judges back to a crime scene, taking them on an interactive tour of the criminal investigation without a single person leaving their seat.

Set up as a dedicated service for the Scottish criminal justice community, the SPSA Forensic Multimedia Unit has been formed specifically to embrace technology and provide a variety of digital media techniques that will support the presentation methods of criminal casework.'

1. Stable Isotope Profiles from a Lock of Hair Provide Information of Illegal People Trafficking Route used by a Vietnamese Organised Crime Group

W. Meier-Augenstein^{1,2}, H.F. Kemp¹, I. Brewster³ and G. Ronayne³

¹ Stable Isotope Laboratory, SCRI, Invergowrie, Dundee DD2 5DA

² Centre for Anatomy & Human Identification, University of Dundee, DD1 5EH

³ Gwent Police, HQ CID Operations, Croesyceiliog, Cwmbran NP44 2XJ

Email : Wolfram.Meier-Augenstein@scri.ac.uk

A young man with Asian features was left in the A&E department of a hospital in Gwent, South Wales (UK) by persons unknown and died shortly thereafter. A hit in the Interpol fingerprint database provided some information regarding the victim's nationality but there was no record of this individual ever having entered the UK, at least not legally.

On behalf of Gwent Police, stable isotope analysis was carried out on a lock of scalp hair to generate chronological profiles for diet or nutritional changes as well as a recent geographic life trajectory.

Moving from the oldest part of the hair (the tip) to the most recently formed part (near the scalp) the longitudinal ²H isotope profiles suggested the following. At 15 months prior to death, the victim spent approx. 2.5-3 months spent in Eastern Europe (most likely the Ukraine)) followed by a direct move to Central Europe (e.g. Germany). Subsequent to this move from the Ukraine to Germany, the victim lived in Germany for about 6 -7 months from where he moved to the UK eventually to arrive at his final location of residency on or near the UK's West Coast (South Wales). In contrast to the move from Eastern Europe to Central Europe, this move was not a direct transition from one location to another. This move either happened in stages over a period of 1.5 to 2 months interrupted by brief stays (< 0.5 month) at different locations, or the period between leaving Central Europe and arriving at the final location was characterized by frequent travel and change of location not necessarily related to or influenced by the final area of residency.

The information provided by stable isotope analysis in conjunction with enquiries carried out under Operation C#\$#\$## showed that the victim (a Vietnamese man) was indeed smuggled into the UK illegally and the trafficking route did run through the Ukraine via Germany into the UK. Once in the UK the victim was moved between Dover, London and Birmingham before eventually being settled down in South Wales, where he lived and was forced to work as Cannabis farmer for an organised Vietnamese crime group during the final 2.5 months of his life.

2. Human Provenancing: It's Elemental... Aiding Victim Identification through Stable Isotope Records of Diet and Geographic Provenance in Human Remains

W Meier-Augenstein^{1,2} and H F Kemp¹

¹ Stable Isotope Laboratory, SCRI, Invergowrie, Dundee DD2 5DA

² Centre for Anatomy & Human Identification, University of Dundee, DD1 5EH

Email : Wolfram.Meier-Augenstein@scri.ac.uk

Forensic science already uses a variety of methods often in combination to determine a deceased person's identity if neither personal effects nor next of kin (or close friends) can positively identify the victim. While disciplines such as forensic anthropology are able to work from a blank canvas as it were and can provide information on age, gender and ethnical grouping, techniques such as DNA profiling do rely on finding a match either in a database or a comparative sample presumed to be an ante-mortem sample of the victim or from a putative relation. Chances for either to succeed would be greatly enhanced if information gained from a forensic anthropological examination and, circumstances permitting a facial reconstruction could be linked to another technique that can work from a blank canvas or at least does not require comparison to a subject specific database.

With the help of isotope ratio mass spectrometry even the very atoms from which a body is made can be used to say something about a person that will help to focus human identification using traditional techniques such as DNA, fingerprints and odontology. Stable isotope fingerprinting works on the basis that almost all chemical elements and in particular the so-called light elements such as carbon(C) that comprise most of the human body occur naturally in different forms, namely isotopes. ²H isotope abundance values recorded by the human body through food and drink ultimately reflect averaged isotopic composition of precipitation or ground water. Stable isotope analysis of ²H isotopic composition in different human tissue such as hair, nails, bone and teeth enables us to construct a time resolved isotopic "fingerprint" that may not necessarily permit direct identification of a murder victim or mass disaster victim but in conjunction with forensic anthropological information will provide sufficient intelligence to construct a profile for intelligence-led identification stating where a victim was from (point of origin), how old they were, what their "life style" was and even if and where they had recently travelled.

Data from several criminal investigations are shown to illustrate potential and limitation of stable isotope analysis of human tissue in aid of victim identification.

3. Teeth as a Source of Information for Forensic Science

Stephen Hendry, Research Student UWS & Dr Calum Morrison, Lecturer Forensic Science UWS
Faculty of Science and Technology
University of the West of Scotland
Paisley PA1 2BE

Tel 0141 848 3973

Fax 0141 848 3204

Email : calum.morrison@uws.ac.uk, Stephen.hendry@uws.ac.uk

Research is currently being initiated at the School of Science, University of the West of Scotland in the above area, with particular reference to forensic age determination and metal profiling analysis. A University funded Ph.D. student is currently assessing the potential of analytical techniques when applied to age determination of teeth (chromatography of amino acids and X-ray analysis of layer thickness). The project involves input from chemistry and physics researchers at the University in collaboration with the Glasgow Dental School.

Teeth are the hardest structures in the human body, being preserved much longer than soft tissues and bones, while being least affected by mutilation, extreme temperatures and environmental factors, commonly associated with long post mortem intervals.

Comparison of ante and post mortem dental records is the method of choice for the identification of unknown remains. However the degree of accuracy attained by comparative identification through ante and post mortem dental records is only as reliable as the dental records permit.

Age estimation of teeth from unknown individuals gives investigators some information which decreases the sample population. The estimates of age can be accurately applied to archaeological samples, isolated teeth, as well as living, deceased or long post mortem individuals making the approach suitable to a wide range of applications.

Here the research has two strands, the first looking at racemisation of amino acids as an estimation of age aims to improve on published methods particularly in terms of accurate determination and extraction of amino acids from the tooth matrix. The comparison technique, X-ray analysis, has obvious advantages in particular the non destructive nature of the technique and potential application where non destructive analysis is essential (eg archaeology).

Metals found in the body may have dietary and/or environmental causes and analysis may help to indicate exposure to particular metals or geographical information which may assist forensic investigations of unknown individuals.

4. Novel Methods in Drug Profiling : Chiral Analysis of Methylamphetamine

Dr Calum Morrison, Dr Frank Smith, School of Science, University of the West of Scotland
Email : Calum.Morrison@uws.ac.uk

Drugs of forensic interest such as methylamphetamine are clandestinely manufactured. This substance has been identified as a threat by many organisations including the Association of Chief Police officers ,US Department of Justice and United Nations Office of Drugs and Crime. The drug is a particular problem in the US, SE Asia and Australia, and predicted as a potential problem for the UK. Law enforcement organisations are interested in generating further intelligence about the sources of the drug and method(s) of manufacture, using chemical profiling techniques. Information regarding illicit drug manufacture is well documented and readily available to the general public through internet and textbook publications.

Many robust analytical methods are currently available which give valuable information from seized drug materials concerning their composition, source etc. In addition many illicitly manufactured drugs are chiral and may also contain traces of starting materials/intermediates in the synthetic process which are also chiral. Analysis of these constituents may provide a distinctive profile and link the seized sample to other batches, route of manufacture and the origin of starting materials.

Here we will summarise some potential analytical approaches for investigations of illicit methylamphetamine manufacture with particular reference to chiral analysis using chromatographic and spectroscopic techniques.

5. Science: there when you need it (Rapid Restricted Analysis (RRA) of Drugs)

Lindsay Wallace
Forensic Chemist (Drugs)
Aberdeen Forensic Laboratory
SPSA
01224 306707

Email : lindsay.wallace@spsa.pnn.police.uk

As a direct result of changes imposed by the Government onto the Crown Office and therefore indirectly onto the Police forces, a more efficient method was required for the turnaround time (TRT) between a drugs crime and the disposal of the case i.e. the result at court. In 2008, after consultation with the area

Procurator Fiscal, SPSA and Grampian Police/Northern Constabulary, a number of amendments to the process for drugs identification were implemented within the Aberdeen laboratory. These amendments collectively had the potential to substantially reduce the time taken between the submission of the drug sample(s) and the provision of the analytical results. The crux of the matter was to develop a streamlined process involving a fit-for-purpose, value for money analysis without compromising the integrity of the case. To date this scheme has been hugely successful, reducing TRT from 5 months to 1 week, which in turn eliminated all backlogs. The process has now been rolled out to other laboratories, in one form or another, in order to meet the every changing demands of our customers.

6. Detection of Mephedrone in Biological Fluids using GC/MS, LC/MS and LC/MS/MS

Karen A. Kerr, Alanna de Korompay
Forensic Toxicologists, SPSA Forensic Services Edinburgh, 11 Howden Hall Road, Edinburgh EH16 6TL

Email : Karen.Kerr@spsa.pnn.police.uk

Mephedrone became highly popular in the UK in 2009 and 2010 and little was known about this synthetic stimulant. First described as a 'legal high' it was made illegal in 2010 following widespread use and media interest in suspected cases. SPSA Forensic Services (Edinburgh) currently receive all Scottish road traffic and criminal toxicology cases as well as morbid toxicology cases from the Lothian & Borders area. The aims of the project were to identify suitable techniques to enable the detection mephedrone and any metabolites in biological fluids, to identify appropriate cases to screen for the drug and to gather information regarding mephedrone use and associated fatalities across Scotland. Preliminary work has begun on the development of a mephedrone screen, which can be incorporated into the routine drug screen currently performed by the laboratory. Additionally, two separate quantitative methods are being developed using LC/MS and LC/MS/MS.

7. Turning on the Heat: Fingerprint Recovery from Banknotes that have been Heat-Treated for Trace Drug Detection

Karl A. Ebejer* and Paul Deacon†

*Mass Spec Analytical Ltd., Filton, Bristol, UK.

†Scottish Police Services Authority, Forensic Services, Dundee,UK.

Paul Deacon
Fingerprint Unit Manager, Forensic Services, Scottish Police Services Authority, Rushton Court
3 West Victoria Dock Rd DD1 3JT
01382 315843

Email : paul.deacon@spsa.pnn.police.uk

The Proceeds of Crime Act 2002 is an extremely useful tool for law enforcement agencies in the UK, allowing the seizure of cash believed to have been obtained through unlawful conduct or which is intended to be used in unlawful conduct. Since April 2008, the British government has confiscated £99 million through POCA, a significant proportion of which relates to illicit drug involvement.

Mass Spec Analytical Ltd. (MSA) routinely analyses cash seizures for traces of controlled drugs, comparing the extent of contamination with that typical of the banknotes in general circulation. If seized cash is more heavily contaminated, the question arises as to why. This evidence has been used successfully in hundreds of court cases, but relies on a link being established between the contaminated cash and the accused. Where, the seized cash is not claimed by the suspect, the link must be sought

It has been recognised that, although fingerprint recovery from seized banknotes addresses exactly this issue, the process necessarily disrupts drug trace evidence. Conversely, MSA's analysis involves heating each note to 285°C to liberate the drugs for detection by tandem mass spectrometry, and this has been thought to hinder subsequent fingerprint recovery. The two techniques are, therefore, applied to different samples from a cash seizure, although it would be preferable to detect both fingerprints and high drug contamination on the same notes.

Recent successes in fingerprint recovery from fire scenes have suggested that fingerprints are more robust to temperature than at first thought. The SPSA Forensic Services Dundee and MSA have investigated this issue by effectively correcting the misconception that their respective analyses are mutually exclusive. Fingerprints were deposited on "fake" banknotes which were then subjected to thermal desorption at MSA. Subsequent recovery of the fingerprints was shown to be unaffected by MSA's analysis and providing further evidence of the stability of fingerprints to elevated temperatures.

8. The use of Vacuum Metal Deposition to Visualise Fingerprints and Grab Impressions on Fabrics

Joanna Fraser^a, Keith Sturrock^a, Paul Deacon^b, Stephen Bleay^c, David H Bremner^{a,*}

^a*School of Contemporary Sciences, University of Abertay Dundee, Bell Street, Dundee DD1 1HG, UK*

^b*Forensic Services, Scottish Police Services Authority, Rushton Court, 3 West Victoria Dock Rd, Dundee, DD1 3JT, UK.*

^c*HOSDB, Woodcock Hill, Sandridge, Herts, AL4 9HQ, UK*

Email : paul.deacon@spsa.pnn.police.uk

Vacuum metal deposition (VMD) is a highly sensitive technique originally introduced for detecting latent fingerprints on smooth non-porous surfaces such as carrier bags, plastic and glass but in the 1970s it was investigated as to its effectiveness for visualising prints on fabrics. The current study explored whether VMD could be used in the examination of clothing from physical and sexual assault cases in order to visualise identifiable fingerprint ridge detail and/or palmar flexion crease detail, thus allowing potential areas to be indicated for DNA swabbing and/or determine the sequence of events. Four different fabrics were utilised during this study – nylon, polyester, polycotton and cotton, along with 15 donors who ranged in their age and propensity to leave fingerprints, from good to medium to poor. Once samples were collected they were kept for a determined time (1, 2, 3, 4, 5, 6, 7, 14, 21 or 28 days) and then treated using the gold & zinc metal VMD process. From the results it appears that greater ridge detail is visible on the smoother fabrics, such as nylon whereas on rougher fabrics, such as cotton, where only empty prints and impressions, rather than any ridge details, were visible. All fabrics did however allow the development of touch marks that could be targeted for DNA taping thus leading to a DNA profile and possible identification of a suspect.

9. The Removal of Cocaine Impregnated in Clothing

Authors: Caroline Heron, SPSA Forensic Services (Glasgow)
Jacqueline McIntosh, SPSA Forensic Services (Glasgow)
Gail Alison Connolly, SPSA Forensic Services (Glasgow)

Caroline Heron, Assistant Scientific Officer
Scottish Police Services Authority, Forensic Services (Glasgow), Drugs Laboratory
0141 532 2168 or network 700 2168

Email : Caroline.Heron@spsa.pnn.police.uk

In December 2009, a consignment of clothing, suspected to be impregnated with Cocaine was submitted to SPSA Forensic Services (Glasgow) Drugs Laboratory. The consignment was found to consist of fifteen individual plastic packages, each containing a t-shirt or polo-shirt of varying colours, designs, styles and sizes. The items had no obvious unusual characteristics other than a strong

solvent-like odour. The clothing was viewed under a Foster & Freeman Video Spectral Comparator (VSC) 5000 at a wavelength of 365nm when areas of fluorescence and/or darkness were visualised on most of the garments, however the distribution was uneven. A small area of material, which did not change appearance when viewed under the VSC 5000, was immersed in a small quantity of Methanol and the extract analysed on a Gas Chromatography – Mass Spectrometer (GC-MS) when the presence of Cocaine and Lignocaine was observed. This result confirmed that the Cocaine was distributed throughout the entire area of the garment and not confined to the areas showing fluorescence or darkness. A further small section of material was subjected to a Methanol extraction and the resulting solution dried down until a solid material was achieved. This material was then analysed by a Fourier Transform Infra-Red (FTIR) Spectrometer when Cocaine Hydrochloride was identified. The clothing was separated by style and a proportion of each of these styles was subjected to an extraction process in order to recover as much Cocaine as possible and to provide an estimation of the total quantity of Cocaine within the clothing. The selected items were washed for at least two cycles in water and the washings collected. The Cocaine was precipitated out of the collected washings by the addition of concentrated sodium hydroxide solution, filtered under vacuum and dried into a solid material. This material was analysed using GC-MS when Cocaine only was observed and FTIR analysis showed that the Cocaine was now in its base form. The results illustrate that an average of 8.2 % of the weight of the clothing can be attributed to Cocaine Hydrochloride.

10. Murder: Assailant's actions verified by Bloodstain Pattern Analysis and DNA findings

Pauline McSorley [**Presented by: Lisa Duffy**]
Senior Forensic Scientist, Biology Unit, SPSA Forensic Services (Glasgow)
0141 532 2841

Email: lisa.duffy@spsa.pnn.police.uk / Pauline.McSorley@spsa.pnn.police.uk

On the morning of 30 May 2008, Eleni Pachou was found fatally stabbed within her place of work at Di Maggio's Restaurant in Glasgow. Both safes had been tampered with therefore she had apparently been the victim of a robbery.

Dropped spots of blood were present on the exit stairs. As the victim had not moved from the position in which she was found, it was apparent that the assailant had sustained a bleeding injury. This finding was further supported by the bloodied glove impressions on the main safe and on the banister leading to the second safe, which was similarly bloodstained.

The dropped spots of blood matched the DNA profile of former employee, Juan Carlos Crispin. He was known to have a cocaine habit and had a huge debt, due to be paid the following day.

The bloodstain patterns and DNA mixtures were used in court to highlight Crispin's actions following the murder. It was apparent that Crispin had cut his hand during the frenzied attack, depositing blood onto the waist clip of the backpack that Eleni was wearing. The DNA mixtures obtained showed that he had systematically carried out the robbery, depositing more of his own blood and less of Eleni's blood onto various surfaces, including the inside of the second safe. As the locus was fairly restricted this route would have caused him to step over her body more than once.

Crispin was subsequently convicted for the murder of Eleni Pachou.

11. Restoration of Stamp Marks and Development of an Etching Paste

Dr Graham Wightman,
Lecturer, Biotech & Forensic Science, University of Abertay
Email: G.Wightman@abertay.ac.uk

Stamped identification marks may be erased or defaced by the criminal but the process of stamping deforms the underlying metal structure and this can sometimes be recovered by etching. The use of a liquid etchant is, however, not very convenient in the field or when dealing with surfaces that are not flat. An investigation was therefore carried out to see whether a suitable etching paste could be made. The study also examined the conditions necessary to completely remove the underlying changes to the crystal structure and a tentative model is proposed to explain how deep the underlying damage is. This may help assessing the potential success of recovering marks.

12. The Behaviour of Air Rifle Pellets in Ballistic Gel

Dr Graham Wightman, Lecturer, Biotech & Forensic Science, University of Abertay
Email : G.Wightman@abertay.ac.uk

Although air weapons are considerably lower in power than other firearms, there is increasing concern that serious injuries can result from their misuse. The present study was therefore carried out to improve understanding of the terminal ballistic behaviour of air rifle pellets. Pellets were fired into ballistic gel under a variety of conditions, and the pellets penetrated further than anticipated from their low cross sectional density. Test firings were also carried out firing pellets into ballistic gel that contained sections of animal bone and computed tomography (CT) and visual observation were employed to record the interactions.

13. A study of blood patterns on clothing and footwear from kicking and stamping reconstructions and its application to case assessment and interpretation

Arlene Whigham¹, Elaine Tucker¹, Benjamin Mallinder², Kathryn Robertson², Graham Jackson³, Rami Abboud⁴, Graham Arnold⁴, James Fraser⁵

¹MSc Project Placement Students, University of Strathclyde

²SPSA Forensic Services, Dundee

³University of Abertay,

⁴TORT Centre, Dundee University

⁵University of Strathclyde

Email: kathryn.robertson@spsa.pnn.police.uk

Blood pattern analysis of staining found on clothing from persons involved in violent crime is routinely carried out by Forensic Biologists. Expert opinion on the findings is given in report form or testimony in a Court of Law. Case assessment and interpretation (CAI) is a framework for presenting scientific evidence in a balanced and robust fashion. This approach will assist the police and/or legal system by providing clear conclusions as to the strength of evidence, and represents a significant improvement to the service provided by the forensic scientist.

Reconstruction of kicking and stamping actions into wet blood were carried out, using human volunteers and a mechanical simulator. Datasets were produced regarding the blood patterns observed on clothing, footwear and at the locus. These datasets have been used in conjunction with the expertise of the Scientist to assign probabilities to the evidence, and using a Bayesian approach, to produce a Likelihood Ratio (LR). By doing this, the scientist can address the issues put forward by the prosecution and defence.

14. How the use of a Laboratory Information Management System (LIMS) in conjunction with an automated DNA profiling system can keep customers and staff informed

Susan Ure – Biology Team Leader – DNA
SPSA Forensic Services – Dundee Laboratory
Rushton Court, 3 West Victoria Dock Rd, Dundee

Tel 01382 315853
Email: susan.ure@spsa.pnn.police.uk

SPSA Forensic Services – Dundee Laboratory currently uses a Laboratory Information Management System (LIMS), namely Case Manager, in conjunction with a Qiagen BioUniversal robot to process the majority of the DNA samples submitted to the DNA casework section. The LIMS system – Case Manager – has become a vital part of the process incorporating several functions including chain of custody, consumable batch control and submission of information to the Scottish DNA Database. At the touch of a button staff can, with ease, gain access to information relating to whom has processed individual samples, when and where each step of the process was carried out and perform “global match” searches to check possible case to case and staff matches.

In the future this system can be expanded to include information gained by scene examiners and inputted at the scene and be accessed not only by SPSA staff but by relevant customers eg Procurators Fiscal, Police Officers and Forensic Gateway Staff.

15. Development and Implementation of DNA Mixture Interpretation Software

Benjamin Mallinder¹, Mark Grundy², Dave Inglis¹ and Peter Gill³
¹SPSA Forensic Services, Dundee
²National Policing Improvement Agency
³University of Strathclyde

Email: ben.mallinder@spsa.pnn.police.uk

Mixed DNA profiles are routinely obtained when DNA from two or more individuals is present in casework samples, especially those from drug and volume crime cases. The interpretation of these complex DNA profiles is an important but challenging process for the forensic scientist. Interpretation of these profiles can clarify the individual DNA contributors and statistical evaluation can be made of these findings. Published interpretation and statistical formulae are employed in this process but this process is time consuming and prone to calculator or operator error.

The *MixtureCalc* computer software has been designed and developed for the de-convolution and statistical interpretation of two person mixed SGM+/SGM DNA profiles. This fully validated bespoke in-house software has been used in preference to commercially available products and has saved the Scottish Police Service Authority laboratories significant time and money. A Freeware version of the software has been presented and launched to the International Forensic Community and the software is being further developed through collaboration with academic partners.

16. NABIS (National Ballistics Intelligence Services) has recently been introduced into Scotland by SPSA

James Govan
Senior Scientist (Firearms), Scottish Police Services Authority, Forensic Services (Glasgow)
0141 532 2905
Email: James.Govan@spsa.pnn.police.uk

NABIS will provide a comprehensive intelligence database linking firearm incidents by recovered firearms, bullets, cartridge cases, DNA and fingerprints. The forensic input is provided from high resolution digital image comparison of bullet striations and cartridge case headstamp marks against a National database. Comparison against an International database can be provided if there is a requirement. These functions are linked by a complete registry of all firearms and ammunition coming into police possession.

The forensic casework aspect has been operative in Scotland since April 2010. The registry function has been running in SPSA West for Strathclyde Police since April 2010. By fast time linking firearm crimes by bullets or cartridge cases from crime scenes there is a huge saving in police investigative time and resources.

17. Limb Vein Pattern Analysis for Human Forensic Identification

Helen Meadows
Centre for Anatomy and Human Identification, University of Dundee
Email: h.meadows@dundee.ac.uk

Biometrics are commonly used in forensic investigations to reliably identify individuals, and new biometric technologies are subsequently under development to increase the accurate individuation of subjects. Vein pattern recognition is an example of a developing biometric modality, and was introduced to UK courts in a ground-breaking criminal trial where vein pattern analysis was applied to the comparison of a suspect and offender in a case of alleged child abuse.

The aim of this research is to investigate the potential of vein mapping as a reliable and statistically robust method of comparison in forensic investigations. Veins lend themselves to this type of assessment as superficial veins are identifiable in the living using near-infrared light, consequently reflected or transmitted images of blood vessels can be detected via the reaction between light and the deoxygenated blood in the subcutaneous vessels. Due to differences in the absorbance between veins and other tissues, the reflected near-infrared rays produce an image in which regions of high absorbency (specifically the veins) appear as dark lines in an image. The venous pattern from the captured image can then be subjected to mathematical algorithms and modelling profiles for forensic/biometric identification purposes.

Following the assessment of superficial venous patterns, a number of specific points are being addressed. These include: (i) the constancy of individual vein patterns in the upper and lower limb over a three year period, (ii) extraneous influences on venous vascular pattern, (iii) the symmetry of venous vascular patterns in the limbs; and (iv) the assessment of factors affecting image enhancement constancy, thereby addressing admissibility requirements.

This research will enhance the work that has already begun in this area by combining anatomical, forensic and biometric expertise to examine and analyse superficial vein patterns of the upper and lower limbs, and to determine the veracity of such pattern analysis in a forensic environment. This is the first study of its kind and has the potential to offer considerable evidence to the biometric and investigative fields through the development of a large database on which the analysis is performed.

18. Advances in Burnt Bone Analysis: The Use of Micro-Computed Tomography and Histomorphometry to Assess Morphological Change

Patrick Randolph-Quinney¹, Craig Cunningham¹, and Niamh Nic Daeid²

¹Centre for Anatomy & Human Identification, University of Dundee, UK and ²Centre for Forensic Science, University of Strathclyde, Glasgow, UK.

Tel: +44 (0)1382 384220

Email: p.s.randolphquinney@dundee.ac.uk

An understanding of the heat induced alterations to bone is a necessary prerequisite for the subsequent identification of burned human remains. Fire, or any form of combustion, has the capability to alter, damage, or destroy evidence that is vital to the identification process. However, since bone undergoes extensive alterations when exposed to heat, the accuracy of standard identification methods will therefore be detrimentally affected – as such the analysis of burnt human remains is one of the most difficult and experientially-based areas of forensic human identification. Furthermore, there is still a great deal not fully understood regarding the transformative processes that heat causes to bone and the most appropriate method for study. This is in part due to the large variation in experimental models used by investigators. Different temperature intervals, recorded measurements, and statistical analysis have led to confusion in the literature regarding the typical mechanism and expression of heat alteration. Although there is a growing corpus now available to facilitate more accurate interpretation and analyses of burned bone, these studies are largely based on qualitative features and are, at best, misleading. Without quantitative measurements, there is no way to account accurately for the heat induced alterations that bone experiences, or modify current anthropological techniques. Recording quantitative measurements can therefore help to standardise burnt bone analysis, improve current analytical methods and, in the process, meet the imperative need to develop more accurate identification techniques for burned human remains.

The primary aim of this research was to quantify morphological and morphometrical differences between pre-burn and post-burn skeletal specimens (before and after burning comparison) using advanced micro-imaging and 3-dimensional volumetric techniques. The study found recognisable quantifiable morphological change between the pre- and post-burn homologues, some of which run counter to established expectations of thermal alteration from published sources. In particular, although an increase in trabecular thickness and subsequent decrease in trabecular separation was expected (due to the well-documented loss of carbonates during inversion and fusion) - this trend was not achieved during this investigation. The results show a decrease in trabecular thickness at 600°C and 900°C, and although recorded to initiate at 500°C, both features showed a marked change at temperature as low as 300°C. These deviations from the normal trend can all be explained by the high presence of bone marrow in the rib sections; this reflects the process of “normal” anatomical burning whereby tissues contain their full complement of inorganic and organic components (including marrow and fat), highlighting the need to establish element specific models for each anatomical region.

19. Age Assessment in the Living

Lucina Hackman

DVI Programme Coordinator, Centre for Anatomy and Human Identification
MSI/WTB/JBC Complex, University of Dundee DD1 5EH

Tel: 01382 386311

Email : l.hackman@dundee.ac.uk

The increase in asylum seekers as well as an increase in child trafficking has created a growing requirement for clinicians to undertake age assessment in the living. For forensic anthropologists, the assessment of age in juveniles depends strongly upon the correlation between skeletal maturation and chronological age. Imaging technologies such as Radiographs and CT allows the age assessment of

living individuals by skeletal changes. Traditionally this method of age assessment uses atlases of skeletal maturation developed during longitudinal studies completed in the 1940's and 1950's.

This project aims to examine the accuracy of these ageing methods in relation to two modern populations, one from a Scottish city and an equivalent population in New Delhi India. The information collected will form the basis of an online atlas which will allow practitioners to use reference material gathered from the relevant modern population to perform age assessments on individuals.

Radiographs which have been taken in the process of therapeutic interventions in hospital settings in Scotland and New Delhi form the data set which will be subject to analysis.

20. Forensic Image Enhancement

Dr Christopher Rynn and Prof Sue Black

Centre for Anatomy and Human Identification, College of Life Sciences, University of Dundee
DD1 5EH

Email : c.rynn@dundee.ac.uk

This presentation illustrates Adobe Photoshop techniques used in recent forensic casework to enhance poor quality digital images, to highlight anatomical features for anthropological comparison.

21. Conducting a Cognitive Interview and creating a Facial Composite Sketch remotely via Webcam

Heidi Kuivaniemi-Smith, Greg Mahoney and Dr Christopher Rynn

Centre for Anatomy and Human Identification, College of Life Sciences, University of Dundee
DD1 5EH

Email : c.rynn@dundee.ac.uk

The primary aim was to find out how the social dynamics and the communication works in this type of interview via the internet. The secondary aim was to produce accurate facial composite sketches. The success of the interviews was measured by participant survey. The results from these were encouraging and consistently positive. Some of the interviews will also be analyzed by Dr Ron Fisher: one of the developers of the cognitive interview.

This research project on whether 3D facial composite construction can aid or improve memory at interview level and subsequently recognition test level. For this I have been using the Freeform Haptic system we have in the Graduate Centre.

22. An accuracy assessment of forensic computerised facial reconstruction employing cone-beam Computed Tomography from live subjects

Won-Joon Lee, Caroline M. Wilkinson, Hyeon-Shik Hwang
Centre for Anatomy and Human Identification, College of Life Sciences, University of Dundee
DD1 5EH
Email : w.j.lee@dundee.ac.uk

The utilisation of 3D computerised modelling systems has allowed more effective procedures and reliable results for forensic facial reconstruction. This study produced three 3D computerised facial reconstructions employing skull models from live adult Korean subjects to assess the quantitative accuracy. The 3D skeletal and facial data was recorded from the subjects in an upright position using a cone-beam CT scanner. Shell-to-shell deviation maps were created using 3D surface comparison software, and the deviation errors between the reconstructed and target faces were measured. Results showed that majority of the three facial reconstruction surfaces had less than 2.5 mm of error when compared to the relevant target face. Also the facial features of the reconstructions demonstrated good levels of accuracy comparing to the target faces. The results were analysed and compared with previous research.

23. The Facial Composite in virtual three dimensions

Gareth Johnson
Centre for Anatomy and Human Identification, College of Life Sciences, University of Dundee
DD1 5EH
Email : g.z.johnson@dundee.ac.uk

With the prevailing viewpoint in facial composite images being a frontal view of the face, the obvious advantage to the use of 3D virtual software is that a dynamic range of viewpoints of the face can be seen during the composite creation. This raises several conditions previously unavailable when considering traditional methods of composite construction. This project set out to discover what advantages and disadvantages there were in the use of such software, particularly during interview stage, essentially the front end of the facial composite construction. Using similar methods in previous studies to test traditional methods a comparison was carried out between 3D and 2D practices to quantify the hypothesis.

The Scottish Institute for Policing Research

School of Social & Environmental Sciences
University of Dundee
Dundee DD1 4HN
Scotland

t: +44 (0) 1382 384425 / 384205
f: +44 (0) 1382 388588

www.sipr.ac.uk

