

**Australian and New Zealand
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NSW Branch Awards Evening

Wednesday 27th August 2014



NSW Branch

Welcome to the NSW Branch Awards Evening

The NSW Branch of the ANZFSS is dedicated to the continued support of its members and has created awards that recognise their members' excellence. The Michael Dawson and Rebecca Kendrew Memorial Awards, in addition to the Eric Murray Student Award, provide financial assistance to NSW Branch members wishing to attend the ANZFSS International Symposium. Awards to facilitate travel and or attendance to Symposia are based on the merits of the application.

Rebecca Kendrew Memorial Award

Dr David Bruce

Michael Dawson Memorial Award

Dr Jen Raymond

The Eric Murray Student Award

Laura McGrath

Regina Verena Taudte (highly commended)

Executive Travel Awards

Kate Grimwood

Michelle Franco

Fiona Jackson

Melanie Holt

Executive Travel Awards (Student)

Regina Verena Taudte

Maiken Ueland

Marie Morelato

Rebecca Lee

Katelynn Perrault



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Rebecca Kendrew Memorial Award

Rebecca Kendrew was a person who aspired to achieve through consistently demonstrating her passion for forensic science. Rebecca completed her Certificate IV of Mortuary Practice at the Sydney Institute of Technology, Ultimo before graduating from a Bachelor of Science in Forensic Biology at the University of Technology, Sydney. Her enthusiasm for forensic science was so strong that Rebecca went on to pursue a Masters in Forensic Science at the University of Canberra whilst working full time at the (then) Division of Analytical Laboratories.

Rebecca's long term goal was to become a crime scene investigator and she was determined to attain that goal. Not only was Rebecca unwavering about becoming and being a forensic scientist, she encouraged others with similar aspirations. For the dedication and commitment Rebecca gave to self development, learning and to forensic science, she will remain in our hearts.



It is the wish of the NSW Branch of the ANZFSS that the dedication Rebecca displayed towards forensic science be an inspiration to many forensic scientists currently practising and to those to come. This award, valued at \$1,500 is open to practitioners and students.



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Case Study: From Blood Groups to STR Mix – How Improved DNA Profiling Technology Provided Crucial Evidence in a Cold Case Homicide

Dr David Bruce

The increasing sophistication of DNA profiling technology together with the introduction of expert system software has facilitated the renewed forensic investigation of some unsolved historical cases. Many of these cases were well over 20 years old and the formation of a cold case review team resulted in several notable DNA successes. To illustrate this, a case study is presented, which follows the evolution of forensic DNA technology from the early nineties to the present time.

The case was the brutal sexual assault and murder of a woman in the nineties. Initial investigation involved grouping analysis of blood and semen stains from the crime scene, followed later by DNA RFLP analysis, and then STR profiling in the late nineties. The introduction of sample and person databases in 2001 resulted in the identification of a suspect from a mixed DNA profile recovered from samples taken from the victim at post mortem.

In 2013, the implementation of the Promega PowerPlex 21[®] expanded locus profiling kit coupled with the STR Mix[®] expert system software was invaluable in both implicating and supporting the inclusion of two other individuals in complex three or four person DNA mixtures recovered from various crime scene exhibits.



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Michael Dawson Memorial Award

Associate Professor Michael Dawson was a dedicated academic and an advocate for the student. Michael completed his undergraduate and postgraduate studies in Pharmacy which led to a lecturing position in Analytical and Environmental Chemistry at the University of Technology, Sydney.

It was during his early lecturing career that Michael recognised the potential for the introduction of Australia's first forensic science undergraduate degree, a vision and awareness that has had a significant influence on forensic science education in Australia.

During his career he was an active researcher in the field of analytical chemistry and its application to the analysis of licit and illicit drugs. His impact in this field can still be gauged by his extensive publication record and contribution to expert evidence testimony in court cases.



Michael's dedication to drawing the best from his students was renowned and in return Michael was loved and appreciated by them. It was a priority for Michael to help ensure the success of students and he never missed an opportunity to help them gain experience in the area of forensic science.

For the opportunities Michael helped orchestrate, he will never be forgotten and it is the hope of the NSW Branch of the ANZFSS that this award will add to his memorial. This award, valued at \$1,500 is open to practitioners and students.



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Evidence Recovery: A Discipline in its Own Right?

Dr Jennifer Raymond, Michael Bell, Sim Te

Historically forensic services departments have been segmented into divisions based on the evidence types, for example Crime Scene/Physical Evidence, Fingerprints, Documents, Biology and Chemical Criminalistics. As a result, forensic examinations of scenes or items incorporating a number of evidence types may often be disjointed and delayed through the requirement for separate examinations by or in each department. Backlogs and time delays are often the unfortunate consequence of this policy.

Very recently, forensic organisations have commenced the implementation of Evidence Recovery sections to counter this problem by providing a 'one stop shop' for the detection and recovery of all forensic evidence types. However, comprehensive training course and standardised examination sequences have yet to be developed in regard to this new approach. Perhaps the recognition of Evidence Recovery as a specific discipline may help to increase the professionalism of this new area. This paper outlines the experiences of the NSW Police Force in implementing an Evidence Recovery section and the development of a national training course.



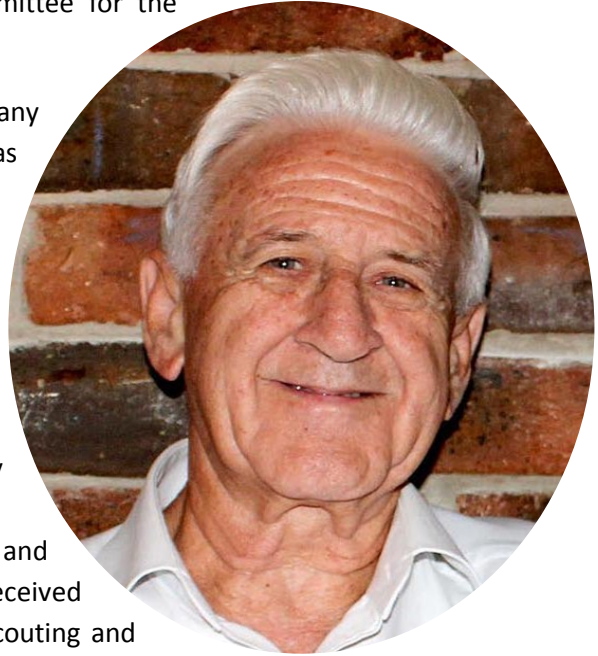
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Eric Murray Student Award

Eric Murray, an ANZFSS Life Member, has been paving the way for forensic science for the better part of 40 years. Eric is semi-retired from the Forensic Unit Corrections Health as Nursing Unit Manager but is still actively involved in the committee for the NSW Branch of the ANZFSS.

Eric's career started in nursing and involved many aspects of the nursing profession. However, he has also spanned chemistry, occupational health and industrial safety, rescue response, profiling and incident reconstruction in various roles.

The NSW Branch of the ANZFSS is not alone in acknowledging Eric's lifetime achievements. Eric's service to industry and the community has been recognised by the NSW Government for community



service including service to the NSW Ambulance and State Emergency Services. In addition, Eric has received awards from Her Majesty for his contribution to Scouting and the St John Ambulance Service throughout his life. Eric is tireless in his work to help others and that is shown by the extensive acknowledgements he has received. It is Eric's wish that a student member of the NSW Branch is provided an opportunity they may otherwise not get. He extends help to students aspiring to attend a biennial ANZFSS Symposium and enhance their career development through this award. Eric is also the benefactor of an award that is offered yearly to student members who may face adversity during their time of education (promoted separately by the NSW Branch). This award, valued at \$1,000 is open to current students only.



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An investigation of false response causation in detection dogs

Laura McGrath, Dr Tamsin Kelly, Dr Philip Maynard, Prof. Shari Forbes

Recent media attention has brought into question the efficacy of dogs as a scent detection device. There have been concerns about the occurrence of false positive responses in detection dogs.. This study examined the role of distractor (competing) odours in false responses of ignitable liquid residue (ILR) and drug detection dogs. Distractor odours were identified through a survey of detection dog handlers. The volatile organic compound (VOC) profile of distractor odours was compared to the VOC profile of target odours to determine whether a relationship existed between target odours and distractors, suggesting a possible cause for false positive responses. Sample odours were collected using headspace solid-phase microextraction (HS-SPME) and analysed using gas chromatography – mass spectrometry (GC-MS). Laboratory results were compared to the response of working detection dogs to the distractor odours. Results show that only a small number of items reported to cause false responses in detection dogs display similarities in VOC profiles when compared to detection dog target odours. This leads to a hypothesis that false responses are unlikely due solely to a similarity of odour. The findings from this research will assist in the understanding and potential improvement of detection dogs as a field detection device.



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The Development and Comparison of Techniques for the Combined Collection of Organic and Inorganic Gunshot Residues

Regina Verena Taudte, Prof Claude Roux, Dr Alison Beavis

Scanning electron microscopy coupled with energy dispersive X-ray spectrometry (SEM-EDX) is considered the gold standard for the detection of gunshot residues (GSR). The advantage of this technique lies in the ability to obtain simultaneous elemental and morphological information about inorganic gunshot residue (IGSR) particles. However, the recent introduction of lead- and/or heavy-metal free ammunition has the potential to reduce the reliability of SEM-EDX for GSR analysis, highlighting the need to incorporate additional techniques that facilitate the detection of alternative components of ammunition, such as the organic compounds found in propellants and primers (OGSR).

This paper presents the development and comparison of different techniques applicable to the collection and extraction of both IGSR and OGSR, with the main aim to integrate OGSR analysis (e.g. liquid chromatography coupled with UV detection; LC-UV) into the current standard operating procedures (SOPs) for GSR investigation. Work conducted to date includes the development of a validated LC-UV method for the detection of 33 OGSR related compounds.

It is argued that the sequencing of techniques for the analysis of both IGSR and OGSR will provide complementary information to that derived from SEM-EDX only. This will ultimately strengthen the value of GSR analysis in forensic science.

***Regina Verena Taudte was also awarded
a Highly Commended for the
Eric Murray Student Award***



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The development of The Incendiary Device Database (IDD): A forensic fire investigation tool.

Kate Grimwood, Sonia Scott

Databases are used in almost every aspect of forensic science to record specific intelligence. The manipulation of gathered data is focused toward the development of intelligence based actions to prevent future incidents occurring. An Australian example of a state and territory fed database is the National Automated Fingerprint Identification System (NAFIS).

Presently, information such as the specific details of an incendiary device remain a part of an individual fire investigator's report and is not easily accessible to be used for intelligence-led fire investigation (FI), whether by the internal organisation or other stakeholders.

It was proposed that the development of a repository for information pertaining to incendiary devices would be beneficial for forensic FI.

To facilitate data gathering, preliminary surveys were compiled and distributed to Australian and International FI agencies. Fire investigators were invited to provide information pertaining to incendiary devices they have encountered. This process initiated the data gathering process required for the set up and population of the fields proposed for the database.

Subsequently the development of such a tool has commenced. This presentation will provide information regarding the progress of the database to date.



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What Happened Last Night? The Important Role That Forensic Evidence Can Play When the Victim Has No Recollection of Events. A Case Study.

Michelle Franco

What happens in a possible sexual assault when the victim has no recollection of whether or not she has been assaulted? This question is explored in the light of a recent case where a young lady was asleep during a party and she woke up to find her underpants on the floor. Other circumstances suggested that a person had broken into the room via a window as items within the room had been disturbed. After police were called it was suggested that the victim undergo a forensic medical examination.

The evidence in this case shows how different types of DNA evidence can assist an investigation when there is no real knowledge of a crime being committed. Even when semen was not detected on intimate swabs, the DNA and fingerprint evidence was able to identify a suspect and give weight to different case scenarios. The original charge to the suspect of 'Break, Enter and Steal' was upgraded to 'Indecent Assault' after the forensic testing results came to light.

This case study will outline the investigation culminating in the beginning of the court process and the production of opinion evidence.



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Surveys of Vehicle Colour Frequency and the Transfer of Vehicle Paints to Stationary Objects in Sydney, Australia

Fiona Jackson, Dr Joanna Bunford, Prof Claude Roux, Dr Philip Maynard

The interpretation of vehicle paint evidence in forensic casework is dependent on a number of factors including the type of paint, colour, number of layers, and background information. Vehicle colour surveys are an important source of information for the forensic paint examiner when interpreting the level of significance of an alleged paint transfer between vehicles involved in a collision or smears of vehicle paint left at the scene. This presentation will focus on two surveys: (i) the frequency of the colour of vehicles observed on both a motorway and suburban roads in Western Sydney and (ii) the frequency of vehicle paint colours transferred to car park pillars and walls in five different car parks within North West Sydney, Australia.

In the first survey, the most common vehicle colours recorded were white, grey, black and blue. The second survey resulted in very similar findings with the four most commonly seen colours across the five car parks being blue, white, red and silver. The results in the second survey take into account the potential for anomalies within the data due to the use of painted service vehicles used within the car parks, such as trolleys and trailers.

Interestingly, the results from both surveys were very similar to previous vehicle colour surveys that have been conducted over several decades and in different countries, and also corresponded to the vehicle colour registration data obtained from the NSW Roads and Maritime Service website. The results from these two surveys present up to date statistics that can provide the forensic paint examiner with valuable background data when assessing the significance of vehicle paint evidence in casework.



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Laser Reveals Hidden Information on Envelope Window

Melanie Holt

In a stalking matter the victim received a series of anonymous threatening letters in envelopes recycled from major Australian organisations such as banks and insurance companies. One particular letter was sent in a recycled glossy, window face envelope from the insurance company, AAMI. The envelope was received into the Document Examination Section (DES) of the NSW Police Force torn into pieces and during the reconstruction it was observed that toner, presumably from the original AAMI letter, has transferred onto the inside of the envelope. It was hypothesised that if the identity of the original recipient could be revealed, it could provide vital information leading to the identification of the offender. Unfortunately not all of the pieces were recovered and the area containing the recipient's identifying information was missing.

During the examination toner remnants were also observed on the window face of the envelope, however these were not legible as letters or numbers to the naked eye. Initial examinations to enhance the toner remnants on the window face were undertaken using the Video Spectral Comparator (VSC) with no success. With the assistance of the NSWPF Evidence Recovery Unit (ERU) using a high powered 532 nm TracER laser and an orange filter, it was possible to visualise the information contained on the window face. This, in collaboration with other investigative leads, helped to identify a suspect who subsequently pled guilty to a number of offences when faced with the evidence.



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The Effect of Tape Lifting on the Ability of the ESDA® to Recover Latent Indentations in Paper

Melanie Holt, Alison Sears, Prof Chris Lennard

Law enforcement agencies frequently receive questioned documents that require examination for both the detection of latent impression by ESDA® (Electrostatic Detection Apparatus) and for trace DNA, generally conducted using a tape lift. In order to determine which technique should take precedence in an examination sequence, it is vital to understand the impact each examination has on the other. To date, there is little research that specifically addresses these sequencing issues. Part of this research tested the impact of the tape lift procedure on subsequent ESDA analysis.

Whilst it was expected that tape lifting would have some effect on the recovery of latent indentations in paper, the severity of the damage to the paper was unexpected. In severe cases the tape lift caused tears and peeling of the paper's surface, whilst simultaneously 'pulling out' the indentations upon which ESDA examination relies, making them difficult to detect and decipher. Even in the best case scenario, the tape lifting action caused the fibre disturbance that resulted in the development of background noise on the ESDA foil, reducing the visibility, definition and clarity of the recovered indentations. Therefore, if both examinations are required it is necessary for the ESDA examination to be undertaken first.

Novel Use of Organic Solvents to Reveal Obliterated Serial Number on OC Canister

Amy Davies and Melanie Holt

A pepper spray canister was received into the Document Examination Section of the NSW Police Force with the serial number obscured with what appeared to be black marker. Since the provenance of the canister was in question, the objective was to differentiate the black marker from the original label print containing the batch and serial number. Initial attempts were made using various non-destructive techniques, including viewing the item under a range of forensic light sources, wavelengths and filters, however these yielded no results.

It was thought that the serial number may have been rendered visible from the reverse side of the label using transmitted light. An attempt was made to cut and remove the relevant part of the label using AK-225. However, due to the partially degraded condition of the label, this process caused further damage and it was feared relevant information would be lost.

Finally it was suggested that chemical washing could be used to remove the black marker whilst still maintaining the integrity of the label and print. Trials were conducted using solvents of varying polarity to determine the most effective at removing the black marker yet least destructive to the original print. Butanone was found to be the optimum washing solvent resulting in substantial recovery of the serial number information.



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Textile degradation patterns of clothing associated with remains

Maiken Ueland, A/Prof Barbara Stuart and Prof Shari Forbes

Human remains are frequently found at least partially clothed. The impact clothing has on the decomposition process of the remains has been studied in the past, however the effect of decomposition on textile degradation is mostly based on observations. Analysing the degradation of textile with and without the presence of a decomposing body can aid in the development of post-mortem interval. It can also be crucial when only clothing remains at the burial site. The aim of this project was to analyse textile samples with and without decomposing remains in order to observe the effects of the remains on textile degradation patterns.

Pig carcasses were deposited on the soil surface clothed in three different textiles; cotton, polyester and a cotton-polyester blend. The clothing was examined visually and then characterised using attenuated total reflectance (ATR) – Fourier transform infrared (FTIR) spectroscopy. Distinctions between the experimental and control groups could be made both visually and spectroscopically. Statistically, the peak patterns from earlier sampling days could be distinguished from later ones.

A long-term study of this nature can be crucial in the development of a timeline aiding in the estimation of post-mortem interval by following the textile changes over time.



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The use of organic and inorganic impurities found in MDMA and MA police seizures in an intelligence perspective

Marie Morelato, Simon Baechler, Dr Alison Beavis, Dr Mark Tahtouh, Prof Olivier Ribaux, Prof Paul Kirkbride, Prof Pierre Margot, Prof Claude Roux

Forensic science plays an increasing role in intelligence through the extension of a case-by-case approach into a more phenomenological and proactive approach. This study focuses on the analysis of 3,4-methylenedioxymethylamphetamine (MDMA) and methylamphetamine (MA) profiles in an intelligence perspective, in particular the comparison process (i.e. extraction of profile, metric used and interpretation of the links between seizures based on the chemical profiles).

Psychotropic substance profiling involves numerous analytical techniques, and the whole process is typically costly and time consuming. This study investigates the possibility of prioritising common techniques used for the chemical profiling of MDMA and MA. Different metrics (e.g. Pearson correlation) were used to obtain a similarity degree between a population of linked samples (within seizures) and a population of unlinked samples (between different seizures). Discrimination between the two populations was achieved with gas chromatography-mass spectrometry shown to be well suited as a single technique to detect linkage between seizures. The research also showed that, although MDMA and MA share some chemical similarities, the homogeneity observed in the respective seizures varies considerably. This observation confirms that threshold values depend on the type of psychotropic substances.

Ultimately, this presentation describes a general forensic intelligence framework that could guide the use of any forensic science case data in an intelligence-led perspective. Indeed, it was observed that the comparison process can be abstracted from the type of trace considered.



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An Objective Assessment of Fingerprint Expert Opinion Using a Skin Stretch Model

Rebecca Lee, Bruce Comber, Michael Wagner, Prof Chris Lennard, Dr Xanthe Spindler, Prof Claude Roux

To support fingerprint expert opinion, this research proposes an approach that combines subjective human analysis (as currently applied by fingerprint practitioners) with an objective test of the result. This approach relies on the hypothesis that there are limits to the distortion caused by skin stretch. Such limits can be modelled by applying a multivariate normal probability density function to the distances and angle formed by a marked ridge characteristic and the two closest neighbouring minutiae. A proof-of-concept investigation using a single donor produced promising results. This led to a subsequent study that aimed to validate the model with an additional 4 donors, determine the “expected range” of distortion in a within-source comparison using 10 minutiae, and improve the ease of application of the model. Based on the analysis of both within-source and between-source data, the expected range of log probabilities for within source comparisons marked with 10 minutiae was determined to be from -33.38 to -60 , with all between-source data falling outside this range.

While the model is still in the initial stages, preliminary results suggest that this metric could be a powerful tool for the objective assessment of fingerprint expert opinion in future casework.



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Establishing the persistence of an odour signature in decomposition soil

Katelynn Perrault, Pierre-Hughes Stefanuto, A/Prof Barbara Stuart, Prof Jean-François Focant and Prof Shari Forbes

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



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