NSW Branch Newsletter

Issue 37 August / Sept 2012

Australian and New Zealand FORENSIC SCIENCE SOCIETY

- Hobart Symposium; 23-27 Sept, 2012
- Public Night with Special Guest Speakers (topic: DVI & disaster response), Wed 17 Oct
- Save the Date; Annual Dinner, 23 Nov 2012

Inside this issue:

Membership Notice:

Members are kindly reminded to use their full names when making direct deposits via online banking to the Society. If you are unable to fit your full name in please forward receipt of payment to the secretary. This assists the processing of membership payments and ensures we don't have "mystery" members who could miss out on receiving Society information. The Annual Dinner is not too far away and an online payment system will again be used so keep in mind that by including your full name, we are able to arrange your tickets without delay.

Thanks also to all members who have supplied their email address (or updated their email addresses recently) in support of receiving newsletters and Society notices by email and helping us go green.

Here's wishing all members attending the upcoming Symposium a great time. It is sure to be an educational and fun event! *- Aldo*

New Society Members:

The NSW Branch of ANZFSS warmly welcomes the following new members:

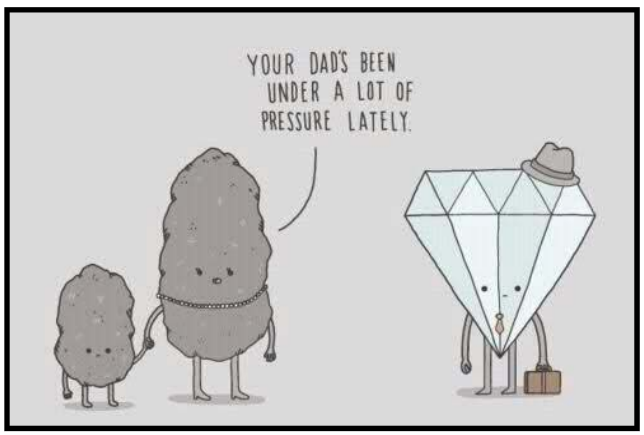
- Ryan ANDERSON
- Shari FORBES
- Samantha GUINN*
- Tim KELLY
- Edward KWAN
- Sandra TRABUIO

**There was a spelling error in Issue 36 published in June, regarding new member Samantha GUINN (not QUINN). This is now rectified above and the Editor apologises for this error.*

President's Messsage:

Dear Members,
2012 seems to be rapidly moving along, with the beginning of Spring upon us. As I'm sure you're aware, September means none other than the 21st International Symposium on the Forensic Sciences (often called the "ANZFSS conference") in Hobart. By all reports the Symposium planning is shaping up well, with over 700 delegates registered and an impressive guest speaker list from international and local speakers from within the forensic world. If you are lucky enough to be going along, you will certainly be in for a treat, especially when you look at the great social program – of which the ANZFSS has become famous for!! Look out for some interesting synopses and photos in our next newsletter.

On a more serious note, the Annual General Meeting of the ANZFSS is scheduled to be held during the Symposium in Hobart on the 27th of September. The current Executive is standing for re-election. As part of the move to bring a truly professional status to the Society, a review has been undertaken by the Executive and Council on proposed changes to the Society's Rules of Association. Essentially the two main issues were clarifying the governance of our Society, in particular the relationship between the Executive and Council; and introducing the concept of professional conduct (to replace the code of ethics). All information relevant to the AGM including the proposed changes to the Rules can be viewed online at http://anzfss.org.au/annual-general-meeting/. All members should have received a mail out from the Executive with paperwork for the AGM, and the NSW Branch has also forwarded a copy to your email or postal address. If you would like to make comment regarding these changes and are unable to attend the AGM, please email us at nsw.anzfss@gmail.com. Additionally, if you would like to vote on these changes and won't be attending Hobart, you can complete a proxy voting form available in your mail out or on the ANZFSS website. If you haven't received this information by post or email, please let us know via our email.



We wish a belated Happy Fathers Day to our members and of our Forensic Forefathers, as we look ahead to a pressure-free year.

The NSW Branch also recently enjoyed a presentation on Forensic Taphonomy by Dr Shari Forbes. It was a very interesting topic and those who attended were rewarded with an insight into research and casework Shari has been involved in in Canada, Hawaii and Australia. It was great to see many of you there. Our next newsletter will include a review on Dr Forbe's presentation.

Also, I am happy to announce an exciting Public Night to look forward to on 17th October, at UTS's Guthrie Theatre - further details will be supplied closer to the date, stay tuned. This event will include presentations by members of the Australian team (NSW Fire Brigade Search & Rescue team and NSW Police Force DVI team) who assisted following the Japanese earthquake and tsunami, as well as the Christchurch earthquake of February 2011. This promises to be an insightful foray into Australia's capability to respond and assist at such natural disasters.

I hope you enjoy this edition of your NSW Branch newsletter.

- Alison Sears
President
NSW Branch ANZFSS

Recent Branch Meeting - 7th September, 2012:

Guest speaker, Australian Research Council (ARC) Future Fellow, Dr Shari Forbes.

Dr Shari Forbes will present an overview on her extensive research on Forensic Taphonomy to the NSW Branch of the ANZFSS. Her presentation will prove to be very interesting, but members and guests are warned that images that some may find disturbing will be shown during the presentation.

The discipline of Forensic Taphonomy investigates the processes of decomposition after death. It's a field within forensic anthropology that examines how taphonomic forces can alter evidence in medico-legal investigations.

WHERE: University of Technology, Sydney Building 4, Level 2, Room 2.36 (corner of Thomas St & Harris St, opposite ABC)

WHEN: Friday 7th September, 6:00pm refreshments for a 6:30pm start

COST: FREE for members, $5 for non-members

Also see promotional flyer & map emailed separately.

REVIEW: "Forensic Image Analysis; A Review of FBI Casework" presented by Dr Richard W Vorder Bruegge (branch meeting 20/06/12).

Dr Richard Vorder Bruegge is a Senior Photographic Technologist with the Federal Bureau of Investigation (FBI) in the USA. He has worked for FBI since 1995. His work involves film, video and digital image analysis related to crime and intelligence matters as well as expert witness testimony in federal and state jurisdictions across the United States and internationally. His research includes forensic image analysis including facial identification. From 2000 to 2006 he was Chair of the Scientific Working Group on Image Technology (SWGIT) and Chair of the Facial Identification Scientific Working Group (FISWG) in 2009. Dr Vorder Bruegge has published extensively in forensic and biometric literature. He is a Fellow of the American Academy of Forensic Sciences and the FBI's point of contact for face and iris recognition.

The FBI's Operational Technology Division includes the Digital Evidence Section which conducts Forensic Audio, Video and Image Analysis. During his presentation, Dr Vorder Bruegge detailed the organisations specialist units and their roles. The Image Analysis Section involves facial and clothing comparison, height determination, image authenticity and enhancement. The Video Unit looks at video enhancement and authenticity, video restoration, audio enhancement and video special effects. And the Audio Analysis Section involves audio enhancement and authenticity, signal analysis and voice comparison.

Types of Cases and Evidence Submitted for FBI Investigation

Cases submitted include:

- terrorism
- homicide
- armed robbery
- financial and health care fraud
- corruption and money laundering.

Evidence submitted includes film, photographs, video tapes and digital and video images.

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Forensic Photographic Evidence

Dr Vorder Bruegge discussed photographic evidence being images consisting of facial comparisons / personal identification, identification of the camera as the source of the image, and objects such as clothing, vehicles etc. He also mentioned the technicalities of digital photography and techniques used in image manipulation, artefacts, image authentication and detection and information extraction from the enhancements of images.

The positive identification of individuals from an image depends upon the presence, location and visibility of individual identifying characteristics such as ear patterns, moles, birthmarks, skin tags, freckle patterns, scars, tattoos and knuckle crease patterns. Some of these characteristics have been utilised in DVI work and in routine post mortem identifications.

Photographic Facial Comparisons

Characteristics in photographic facial comparison are classified as either *class* or *individual characteristics*. A similar classification is used in other forensic disciplines, including forensic medicine with identification of deceased bodies and forensic handwriting analysis.

Class characteristics are general and shared by persons as a group such as shape of faces, chin, mouth, nose, eyes and ears etc, as well as shape of hairline, facial hairs and eyebrows. *Individual characteristics* such as moles, freckles, birthmarks, chipped teeth, tattoos etc, differentiate persons from the group making the person (and their image) unique.

Important factors with facial comparisons between questioned and known individuals are camera-subject geometry with angles and distance/perspective, lighting /shadows, and image resolution. Factors affecting analysis can be facial expressions, changes in age and weight, the addition and removal of hair and transient blemishes. Intentional alterations can be performed with plastic surgery and make-up etc. Poor quality images can be due to multigenerational copies, image compression, improperly photographed originals and intentional image alterations.

Knuckle and Freckle Pattern Comparisons

In some instances images do not involve faces. Dr Vorder Bruegge showed examples of child abuse / pornography cases where the suspect's hands and fingers were accidentally or unknowingly placed in the picture during photography of the abuse. In these cases, it is possible to conduct a comparison of the hands observing position and number of patterns of creases on knuckles and palms. The presence and morphology of scars, freckles, etc is important as well as hair on the back of the hands. This type of image analysis is also used in cases involving "trophy shots" related to kidnappings and homicides.

A composite image demonstrating reverse photogrammetry; an initial photo is taken with a person holding a measuring stick and then the subject is superimposed over the top to enable height determination. Source: FBI presentation.

Height Determination

The determination of a questioned individual's height is done by two methods; *reverse projection* and *analytical photogrammetry*.

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These images illustrate the possibility of enhancing a digital image to provide information, from CCTV camera still photos. A suspect's height may be determined through such methods utilised by the FBI. Source: FBI presentation.

Reverse projection involves reconstructing the original scene of the image and taking an additional image with a known scale such as height chart placed into the scene. Utilising geometry and perspective analysis to establish the proportions of the scene will determine the height of a questioned individual in the scene, which is used to eliminate or link a suspect to multiple crimes; however this does not allow individualisation of the person.

Analytical photogrammetry is performed with specialised instruments with solutions obtained by mathematical methods and formulae. A mathematical solution establishes a relationship between an object and image. Analytical photogrammetry has high costs with associated instrumentation producing high accuracy, reliability and measuring efficiencies.

Ear Comparisons

Ears comparison studies have shown that ears are unique. The 3D nature of ears makes ear comparisons sensitive to image perspective. Difficulties arise via the common obstruction of the ears in digital images by hair and headwear.

Digital Camera Use

Dr Vorder Bruegge discussed digital camera operation. Digital cameras use light sensitive computer chips. These chips separate the image into thousands of *pixels* or picture elements, each with an electrical charge; the more pixels, the more digital information, meaning greater image depth and resolution of the image. Currents in the camera convert each pixel charge into a number representing digitalised information. The use of digital cameras has become popular in forensic science, not least for their ability to capture crime scenes and specific exhibits.

An issue in forensics is the quality and authenticity of digital images and their admissibility in court. Digital images can be manipulated and alterations created using software such as Photoshop. Changes made to the primary image in this manner are difficult to detect and ultimately leave little trace to the photographs origin. Dr Vorder Bruegge discussed how it is possible to trace a photograph to a specific camera and also how specific software can be used to detect image alterations.

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Photo Response Non Uniformity (**PRNU**)
Getting information about the origins of a digital image or 'camera fingerprint' involves PRNU patterns, which represent a visual form of image noises. This is the variation of the output signal from pixel to pixel where light is falling on the sensor. Each pixel should output exactly the same value. Small variations in cell size and substrate material result in slightly different output values. The difference between time response from a sensor and a uniform response is the PRNU.

Forensic scientists are able to match images and cameras based on fixed image noises caused by the sensor being indicators for the camera used. These examinations are important in cases of child abuse and pornography. The same patterns of single suspect images is compared to the noise patterns of images created using a suspect camera (e.g. camera/s seized from a suspect) and other reference patterns from the same camera model. Results from this analysis and comparison can conclude if the suspect images were created using the suspect camera.

Enhancement of images
A number of image based factors leading to poor target images include low resolution, poor contrast and over-exposure which hinder the accurate determination of persons in digital images. Image enhancing software can counteract these problems such as zooming in and adjusting brightness, levels, sharpness and contrast to allow for better definition.

Dr Vorder Bruegge's presentation was very interesting and provided a review of forensic image analysis and the work performed by one of the few forensic laboratories in the world accredited in image analysis. Photographic case histories presented were fascinating and demonstrated various investigation techniques used by the FBI. This June ANZFSS meeting was well-attended and the audience were full of questions. Again, we express our thanks to the presenter Dr Richard Vorder Bruegge for his time and providing us with an insight into the intelligent world of forensic digital image analysis.

References

- Content from the Presenters PowerPoint Presentation: Forensic Image Analysis. Dr Vorder Bruegge UTS 20th June, 2012. (ANZFSS NSW Branch)., reproduced here with permission.
- PowerPoint Presentation: Individualization of people from images. Dr Vorder Bruegge, FBI Operational Technical Division.
- Forensic Identification of people from Images and Video. Nicole A. Spaun & Dr Vorder Bruegge. http://searchfortruth.info/sites/default/files/_single-image-photogrammetry.pdf
- Camera Identification by grouping images from database based on shared noise patterns. T. Baar, Z. Geradts. Netherlands Forensic Institute, Digital Technology and Biometrics.

- Review by Glenn Wilcher.

NSW Branch Vice-President Alison Beavis with guest speaker Dr Richard Vorder Bruegge of the FBI at the June 2012 branch meeting. Photo by Annalise Wrzeczycki.

LIMITED TIME SALE on Selected ANZFSS Gents & Women's Shirts

SHIRT SALE: First in, best dressed (literally!). Contact the branch to ascertain sizes and availability. Please see http://anzfss.org.au/merchandise-specials/ for details.

Members Research Corner; Dr Joanna Bunford

We continue to highlight the research being conducted by Society members. This edition's Members Research Corner features work contributed to by ANZFSS member Jo Bunford. Dr Joanna Bunford, formerly of the UK Forensic Science Service, is now a Scientific Officer in the Chemical Criminalistics team of the NSW Police Forensic Services Group. With several others, Dr Bunford completed a survey of paint flakes on the clothing of persons suspected of involvement in crime and subsequently published findings in the journal; Science and Justice Volume 52 of 2012 (pages 96-101).

This survey was conducted because paint is widely encountered by forensic scientists working in the field of trace evidence and has considerable potential as a source of evidence. Its presence is usually governed by direct contact and its persistence dependent on the surface area, duration and force of contact, amount of material transferred, the activities of the recipient after contact and the resulting time interval until sampling.

There are few published paint data sets. The survey collected useful data that has can be used to estimate the probability of the defendant becoming exposed to an alternative source of the same paint in a restricted time frame and small geographical area.

In the interpretation of paint, as with any evidence type, it is important to consider how likely it is that paint flakes of a certain colour and layer sequence will be found at random on an item of clothing. In the absence of published surveys and similar exploratory work, the reporting scientist must rely on their own experience and ability to recall what is commonly or rarely seen amongst debris collected from garments. This published study set out to address the lack of contemporary paint flake data and to provide information that can be used as guidance when scientists need to consider the relative frequencies of paint flake size, colour and layer sequence.

Dr Bunford and her fellow researchers examined debris from 100 garments submitted for casework. The presence of paint flakes was recorded separately for the surface and pockets of each garment. Each recovered paint flake was characterised by recording its size, colour and layer sequence.

Dr Jo Bunford is a member of the NSW Branch of ANZFSS and internationally-regarded Chemist and paint expert. She is currently employed as a Scientific Officer with the FSG Chemicall Criminalistics Unit.

The following is the abstract from the Science and Justice article:

A survey was undertaken to determine the background level of paint flakes on the clothing of persons suspected of involvement in crime. The debris from 100 garments submitted for casework examination was studied and paint flakes recovered where present. Seventy two percent of garments bore one or more flakes. A total of 703 flakes were recovered; size, topcoat colour, and number and colour of any under-layers were recorded for each. The distribution of paint flakes on clothing surfaces and in pockets was also noted. Results were compared with the previously published survey of Pearson, May and Dabbs (1971). This survey provides scientists with an updated data set for reference when considering the strength of paint evidence.

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*Advertisement**

Australasian College of Medical Sciences and Research (ACMSR):

To ALL Medical Scientists, Senior Technical Officers, Technical Officers, Trainee Scientific Officers, Trainee Technical Officers, Certified Phlebotomists & Certified Mortuary Technicians

On behalf of the board of the newly established *Australasian College of Medical Sciences and Research (ACMSR),* I would like to invite you to join us.

The aims of the established college are:

- To promote ongoing education in the medical sciences and research area and link scientists nationally and internationally through scientific forums.
- To collaborate internationally and work closely with national and international reputable educational, medical and scientific institutions. communicating with other reputable societies in USA and UK too.
- To provide strong educational program online, workshops and conferences.

Please note that although the college is newly established, it has already two branches in *China* and *Taiwan*. We are excited about the new ACMSR and we hope that you join us and contribute to the success of the college.

The college was established for you and for your fellow scientists to network and to make a difference in the current challenges that face our profession.

Please visit the website today www.acmsr.org.au to register online and check for planned activities in your area.

clinical, research, education
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Visit website for more details acmsr.org.au

Kind regards,
The Foundation Team (ACMSR Board)

** The NSW Branch of ANZFSS supports non-for-profit medico-legal societies. The Branch Committee has approved publication of the above advertisement solely to assist its circulation to other Scientists. The ANZFSS has no affiliation with the ACMSR and does not gain any favour from this advertisement.*

Contact Details - NSW Branch:

If you have any query, comment, suggestion or content idea for this newsletter or any Branch activities, please do not hesitate to contact us. ***All correspondence regarding general enquiries, membership renewal, payment etc, can be addressed to:***

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Haymarket NSW 1240

Email: nsw.anzfss@gmail.com

Note - specific recipients (e.g. President, Treasurer, Membership Officer) can be reached c/o these details.

Website: anzfss.org.au/nsw

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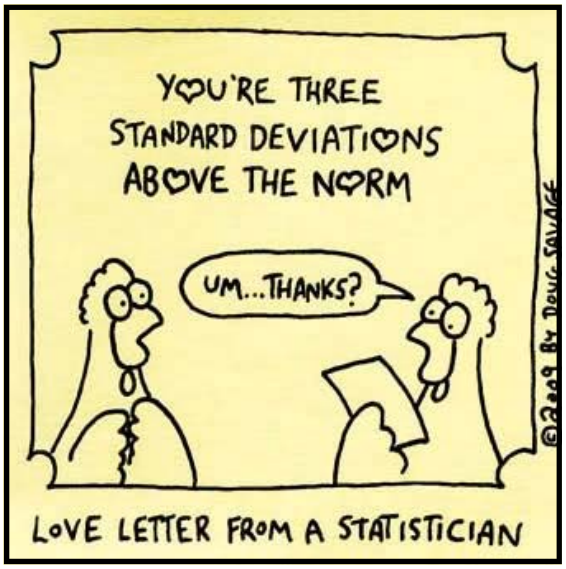
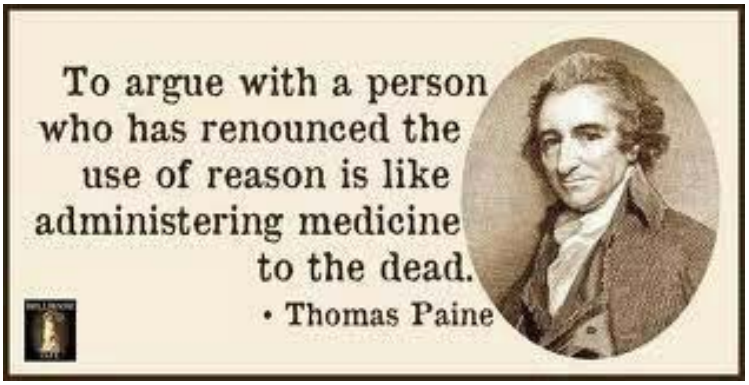
"Hey Brian, you know you said you were too old for TV appearances?"





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