From the Director’s Desk:

Dear Centre’s Members, Associates, Colleagues and Friends,

We are well and truly in the second semester of the year, and this is only the second issue of our Newsletter. Not that we rested on our laurels – this is quite the opposite as I hope you will see in the next few pages.

Judging by the general feedback received from all around the world, this is a well appreciated source of information and undoubtedly a pivotal piece of our communication strategy.

While I am writing this message, research students and staff of CFS are working hard to be ready for the 7th European Academy of Forensic Science Conference held in Prague on 6-11 September (http://www.eafs2015.eu/). These efforts will surely pay off. CFS will raise the UTS flag at the premiere European forensic science conference with 26 oral presentations! Some CFS members are already in Europe presenting at the 26th Congress of the International Society for Forensic Genetics (http://isfg2015.org/). I expect much collaboration will emerge or further strengthen from this experience. And I am not only talking about trying to brew an improved Pilsner....

On a more serious and personal note, once again, I feel blessed to be leading such a dedicated and talented team. I also take this opportunity to thank all our external collaborators and partner organisations for their ongoing support. There is so much to do in and for forensic science that only our collective efforts in partnership with the industry and peer institutions can succeed.

Happy reading!

Professor Claude Roux

Research Spotlight – Maiken Ueland–

From Fibre to the Grave

Textile samples are a commonly encountered source of evidence in forensic cases. In the past, most research has been focused on how textiles affect the decomposition process while little attention has been paid to how the decomposition process affects the textiles.

Maiken Ueland a PhD student at the Centre for Forensic Science studies textile degradation patterns associated with decomposing remains. She specifically look at how the presence of remains appears to be protecting the textile and preventing them from degrading.

It has been speculated that this difference in rate of degradation, or lack thereof, is due to the leaching of the decomposition fluid, which then becomes embedded within the textile samples. During the natural decomposition process, lipids, proteins, and carbohydrates are broken down into smaller molecules. These decomposition by-products are the major components in decomposition fluid

Monitoring the changes in protein content and the lipid profile by monitoring the textiles associated with decomposing remains over time, Maiken hopes to demonstrate how, and during which decomposition stages, the decomposition fluid affects the textiles. It may also aid in understanding which decomposition by-product components are responsible for the possible inhibition of textile degradation.

http://www.anzfs2016.org/
**Congratulations**


- PhD student Anna Molnar recently submitted her doctoral thesis. We wish her the best of luck with her examiner reports.

- Honours student Amanda Troobnikoof received the University Medal for her honours thesis.

- Shanlin Fu and Unni’s paper titled ‘Oxidation of testosterone by permanganate and its implication in sports drug testing’ featured on the front cover of the *New Journal of Chemistry*.

- PhD student Katelynn Perrault and Professor Shari Forbes presented research at the 6th Multidimensional Chromatography Workshop in Toronto Canada.

- Two papers published by the Centre were recently recognised by the National Institute of Forensic Science (NIFS)

- **Best Technical Award or Note:**
  Kylie Jones, Sarah Benson and Claude Roux: *The forensic analysis of office paper using carbon isotope ratio mass spectrometry-Part 2: Method development, validation and sample handling.*

- **Best Paper in a Refereed Journal - Highly Commended:**
  Marie Morelato, Simon Baechler, Olivier Ribaux, Alison Beavis, Mark Tahtouh, Paul Kirkbridge, Claude Roux and Pierre Margot: *Forensic intelligence framework-Part 1: Induction of a transversal model by comparing illicit drugs and false identity documents monitoring*

- PhD students Rolanda Lam and Harmonie Michelot attended the 4th annual doctoral school hosted by the School of Forensic Science in Lausanne

- PhD Student Alexandra Summerell received an Australian Museum Research Institute grant.

**NIFS Best Paper Award**

Each year the Australian and New Zealand Policing Advisory Agency - National Institute of Forensic Science (ANZPAA NIFS) recognise the most outstanding publications by Australian and New Zealand forensic scientists. An award ceremony was held on the 24th of June where the Director of ANZPAA NIFS Alistair Ross AM presented Dr Marie Morelato and Dr Alison Beavis with their awards. Mr Ross spoke very highly of the Centre for Forensic Science and its members, highlighting that UTS is one of the top three universities in the world with regards to forensic science research both in terms of output and research quality. The Centre for Forensic Science has been very successful with NIFS awards over the years. In particular, research conducted at UTS has been awarded the Best Technical Article or Note and a total of 4 awards in the last 2 years.

NIFS Award Ceremony: Dr Alistair Ross (centre) with award recipients Dr Alison Beavis (left) and Dr Marie Morelato (right).
During the last 25 years the use of DNA profiling has absolutely revolutionized forensic investigation, providing an unprecedented level of sensitivity, specificity and statistical significance.

The current use of human DNA for the purpose of individual identification relies strictly on comparative grounds: DNA profiles obtained from crime scene material are compared with those of known potential suspects or in case of paternity, with alleged father. Similarly, in mass disaster or missing person cases, DNA profiles obtained from an unknown person are compared with those of known relatives, or with direct reference samples from items belonging to the missing person.

During my career as a forensic DNA officer overseas, I saw a lot of serious criminal cases. In many of them, I was able to obtain a DNA profile – that unique “barcode” used in human identification. From that, I was often able to find a matching suspect’s profile. However, in others, where the suspect was not available or no match was produced in the DNA database search, the so powerful DNA evidence provided no help in solving the crime.

Now, imagine that we can “convince” the DNA molecule to “talk” and to get information about the physical appearance of the person it came from. This kind of information would be absolutely invaluable. In the last few years this rationale gave rise to a brand new forensic discipline: Forensic Molecular Phenotyping or in other words, “Investigative Genetics”. This field of research seeks to obtain additional information about the source of a DNA sample, which might generate an ‘investigative lead’ such as skin, eye and hair pigmentation, ancestry and more recently, facial morphology. And that is exactly the focus of my research. In my recent PhD project I was analysing thousands of specific ‘bits’ of our DNA that are responsible for the differences in the way we look. For example: our face – the size and shape of the nose, eyes, ears and other facial features such as eye lids and ear lobes, or our pigmentation – the colour of eyes, skin and hair. These specific ‘bits’ called Single Nucleotide Polymorphisms (SNPs) and represent a single changes in our DNA. There is a remarkable variety of human facial appearances, almost exclusively the result of genetic differences. However, the majority of the genes and specific genetic variants that affect the size and shape of the cranium and the soft facial tissues are still largely unknown.

In order to achieve the goal of my research, I collected DNA samples and 3-D facial images from almost 600 volunteers along with extensive phenotypic information and ancestry. Those images were analysed with graphical software to collect over 100 craniofacial measurements. Then I used the Next Generation Sequencing platform and bioinformatical software to genotype and analyse the data to see which SNP corresponds to which facial features and other externally visible characteristics. Surprisingly, I was able to find significant associations between 19 craniofacial traits and 78 SNPs, many of them novel (a summary of these results has been submitted for publication).

These results will not only enhance our understanding of the genetics that underpins the normal craniofacial morphology, but also will be of particular value in the forensic field to allow prediction of a person’s appearance from a DNA sample. De-coding the DNA information about physical appearance will enable the development of a real image from a molecular identikit that could help to identify the offenders and assist with facial reconstruction in DVI cases.

Four months ago I was appointed as a new post-doctoral research fellow at Professor Peter Gunn’s group and currently, I’m about to start collecting more samples needed to continue and extend my previous research. I’m aiming to collect over 1,000 DNA samples and 3-D images and would greatly appreciate your participation and support in this fascinating project!
Royal Society


The Royal Society held a meeting gathering scientists and legal practitioners from around the world to discuss the future of forensic science and future directions for forensic science research. In 350 years of existence, it was the first time ever The Royal Society supported a forensic science conference on its own right, which is a significant sign of recognition. The significance of this event became even more obvious when wandering through the beautiful rooms of The Royal Society’s main venue in London, close to Trafalgar Square, with numerous portraits, statues and original books of Charles Darwin, 80 Nobel laureates and the like.

The meeting was well attended with some 300 delegates and high-profile speakers including The Rt Hon Lord Thomas of Cwmgiedd, Lord Chief Justice for England and Wales and Andrew Miller MP, House of Commons Science and Technology Committee, UK. Australia was represented by Alastair Ross and Claude Roux.

Full details including audio recording of the presentations are available at https://royalsociety.org/events/2015/02/forensic-science/. Full papers have been recently published at http://rstb.royalsocietypublishing.org/content/370/1674.

Welcome New Faces

Two new students from the University of Lausanne have recently commenced their PhD studies here at the Centre for Forensic Science. Harmonie Michelot and Matthieu Maitre whose projects are entitled ‘Further investigation into drug intelligence’ and ‘Transformation of forensic gunshot residue evidence’ respectively. Giuliana Schwenderner, on exchange from the University of Lausanne, completed a project that investigates the potential for fibre contamination through body bags. She worked with Honours student Jake Leite who is also looking into DNA contamination. We wish them the best of luck with their studies here at UTS.

Associate Professor Zhiwen (Jack) Wei from Chanzi Medical university China is a visiting scholar working closely with Dr Shanlin Fu. Professor Wei will be here working on searching for unique biomarkers of organophosphorus pesticide poisoning.

Future VIP Visits

An exciting program of VIP visitors has been confirmed for the next few months, in part funded by the UTS Key Technology Partners Visiting Fellow Program. This will include:

Prof. Pierre Margot, former Director of the University of Lausanne’s ESC, Switzerland (and multi-awards winner: https://en.wikipedia.org/wiki/Pierre_Margot) - October;

Prof. Carol Henderson, Director of the National Clearinghouse for Science, Technology and the Law at Stetson University, USA, and past President of the American Academy of Forensic Sciences – November;

Prof. Niamh Nic Daeid, Professor of Forensic Science and Director of Research at the Centre for Anatomy and Human Identification, University of Dundee, UK and past Editor of Science & Justice – February.
UTSpeaks – Naming the Dead

In May, Professor Shari Forbes from the UTS Centre for Forensic Science, along with Dr Xanthe Mallett from the University of New England (UNE) (pictured right), presented a free public lecture titled ‘Naming the Dead’ as part of the UTSpeaks lecture series. The lecture promoted the research collaborations between UTS, UNE and many of our partner academic, police and forensic organisations, particularly those involved in the new Australian Facility for Taphonomic Experimental Research (AFTER – colloquially referred to as Australia’s first body farm). Shari and Xanthe discussed how the use of human cadavers for decomposition research could help to improve our methods of search and recovery as well as identification of victim remains. Approximately, 300 people attended the lecture with an extended question time at the end. AFTER has been receiving a lot of positive interest from the media and public, and this was one more way that we were able to promote the innovative research being conducted at UTS. A recording of the lecture can be found at the following link.

http://newsroom.uts.edu.au/events/2015/05/utspeaks-naming-dead

Inside the Forensic World 2015

The NSW Branch of The Australian and New Zealand Forensic Science Society (ANZFSS) recently hosted an event as part of National Science week on the 22nd of August to showcase the exciting areas of forensic science to the next generation of forensic scientists. The event had over 30 participants who were able to hear lectures from practicing forensic scientists and forensic science academics on a wide range of topics from forensic pathology to fingerprints, to trace evidence. The highlight of the day was when participants were able to ‘suit up’ and process their own crime scenes in the Crime Scene Apartment at UTS. They were then able to analyse their evidence in the forensic suite, which included fingerprint, document, footwear impression analysis.

The Intelligent Use of Forensic Data

ANZPAA National Institute of Forensic Science, in collaboration with CFS members and associates, recently released a handbook on the principles and practice of forensic intelligence titled The Intelligent Use of Forensic Data. This handbook is intended to raise awareness of the forensic intelligence principles and practice and be a valuable reference tool to jurisdictions and can be downloaded from https://www.anzpaa.org.au/upload/Corporate%20News%20and%20Publications/ANZPAA%20Publications/TheIntelligentUseOfForensicData.pdf
Inside the Forensic World 2015

Participants were also able to use the Superlab to perform a DNA extraction on strawberries, analyse blood splatter patterns and use Fourier Transform Infrared Spectroscopy (FTIR) to analyse ‘drug’ and fibre samples. The day would not have been as successful if it weren’t for the Centre’s members and research students who volunteered their time.

Centre for Forensic Science Members would like to acknowledge the following people for their participation in the event and assisting

**Presenters:**
Dr Alison Beavis  
Dr Scott Chadwick  
Professor Shari Forbes

**Volunteers**
Ms Prue Armstrong  
Ms Rebecca Buis  
Ms Alicia Khuu  
Ms Rebecca Buis  
Dr Marie Morelato  
Dr Sebastian Moret  
Ms Verena Taudte  
Dr Katie Nizio  
Dr Xanthe Spindler  
Ms Latara Rust  
Ms Alexandra Summerell  
Ms Maiken Ueland

Top right: Participants collecting evidence at the crime scene.  
Bottom right: Dr Scott Chadwick presenting on fingermarks  
Above: A very exhausted volunteer  
Photo credits: Dr Katie Nizio & Annalise Wrzeczycki
Publications


Publications


Roux C., Talbot-Wright B., Robertson J., Crispino F., Ribaux O. The end of the (forensic science) world as we know it? The example of trace evidence, Philosophical Transactions B, Volume 370, Issue 1674, 2015, DOI: 10.1098/rstb.2014.0260.

Publications


