



Forensics: Beneath the surface

As criminals become more sophisticated, it is essential that our law enforcement agencies are equipped with the tools and information they need to do their job effectively. The demand on the AFP to provide quality forensic support for investigations, and to remain at the forefront of scientific and technical capability in the 21st century is considerable.

Reassuringly, the AFP have specialists in most disciplines of forensic science: biological and chemical criminalistics, computer and imaging science (electronic evidence), crime scene investigation, document investigation, firearms and ballistics, fingerprint science, post-blast analysis and disaster victim identification. This is because investigations often require the assistance of several forensic disciplines. An investigation involving computers, for example, will not just involve the computer forensics team examining the electronic/digital evidence but may also involve biological criminalistics and fingerprint science to examine monitors and keyboards for DNA and fingerprints respectively.

Services provided by the computer forensics team include examining and preserving electronic evidence from a range of electronic devices, data recovery, rebuilding of standalone and networked computers, password recovery and data decryption. Typically, electronic devices routinely examined include computers, thumb- and micro-drives, personal organisers, mobile telephones, smart cards (including stored-value and controlled-access cards as used by subscription services), flash cards (as found in hand-held devices and digital cameras), magnetic stripe cards (typically credit and access control cards), GPS systems, marine plotters, navigation units and networks transmitting live data.

The AFP's Forensic and Data Centres don't just contribute to AFP and ACT Policing investigations. The Data Centres play an important part in protecting Australians and Australian interests. Their primary role is the collection, collation and dissemination of information concerning events relating to improvised explosive devices and the components they are made of, as well as biological, chemical, nuclear and radiological material that may be used or impact in a negative manner on the wellbeing of Australian citizens. This information is broadly shared with State, Federal and international government departments.

Drug intelligence can often be supported by scientific analysis and used strategically to identify, from samples collected during a drug seizure, a drug's area of origin. This information develops the AFP's understanding of how the illicit drug trade works. For a specific investigation, comparisons can also be conducted within and between seizures to identify different

batches in a single shipment or demonstrate links between individuals and/or networks. Forensic Drug Support is the AFP's producer of this intelligence. The team also provides technical assistance to AFP crime scene scientists. Its charter is to produce forensic drug intelligence through the physical and chemical analysis, or profiling, of seized illicit drugs and any associated physical evidence.

As part of a range of Government initiatives, AFP Forensic and Data Centres is providing capacity building assistance to overseas law enforcement agencies. This includes assistance to the Royal Thai Police Forensic Sciences Department in a range of forensic disciplines, including the establishment of a Thai Bomb Data Centre in Bangkok, the creation of the Indonesian National Police DNA Laboratory and Indonesian Bomb Data Centre. Currently Forensic and Data Centres is training 154 Iraqi police in various forensic disciplines here in Australia and embarking on assisting Pakistan and several African nations develop their forensic capabilities.

Disaster Victim Identification (DVI) is another specialist function that Forensic and Data Centres provides. Sixty specialists from the AFP were deployed to Victoria to help the Victorian Police with the victim identification process following the recent Black Saturday bush fires. Disaster Victim Identification involves the physical recovery and identification of the remains of disasters both natural and those caused by human actions. Forensic and Data Centre personnel record victim details on PlassData®, a software system specifically designed to aid identification of disaster victims, whether there are several thousands victims to identify as in Thailand after the tsunami, or hundreds, as they had in Bali and Victoria.

Continually developing and implementing new and emerging technologies is absolutely crucial for the AFP to remain ahead of the criminal and terrorist capabilities. Innovations like digital imaging and new detection equipment such as the field-based, infrared spectrometer that can operate in the hot zone of CBRN (chemical, biological, radiological, and nuclear) environments to get real-time information on the types of material they might be dealing with.

In the past few years it has become obvious, through significant research and development, the potential that Isotope Ratio Mass Spectrometry (IRMS) has for criminal investigation. One of the applications the AFP forensic scientists have been using IRMS for is the identification of unique sets of characteristics that can be found in samples of explosives, raising their capacity to link chemicals found at a bomb-making site with those found at a blast scene.

In this vein, fibre analysis conducted recently by AFP forensic scientists assisted the Australian Defence Force to identify the remains of Australian soldiers who had died nearly 90 years ago while serving in World War One.

In this case, five Australian soldiers were found near the small town of Westhoek, Belgium in 2006. Based on the items found at the site the Australian War Memorial was unable to assist in the identification. The AFP's forensic scientists were then requested to examine colour patches found on the recovered uniforms as the official identification cards and badges could no longer provide identifying information. (One of the soldier's remains had the remnants of a colour patch attached, and it was hoped this could be used to indicate at least the battalion he and his fellow soldiers had served with.) Using Raman Spectroscopy, a technique that was developed in the early 1920s but more typically used in disciplines like archaeology and art restoration and preservation, the AFP's Chemical Criminalistics team was able to measure the small amount of dye residue found on the badge flash. Combining the spectroscopy findings with Army historical information, the Australian War Memorial could then establish a physical link between their list of names and the remains of the soldiers.

Forensic Science interests most of us, as the popularity of various police/forensic-type shows on TV and crime novels attest. Possibly because if we should be a victim of crime we would like to think that someone would be clever enough to nab our killer.

In spite of their increasingly heavy workloads, five members of the Forensic and Data Centres group managed to complete their doctorates in various forensic disciplines over the past two years while other forensic personnel contributed 29 chapters to the recently-released *Encyclopaedia of Forensic Sciences* that was published recently in the United Kingdom.

For the scientifically-inclined, careers in forensics may be busy, but they will never be dull and always worthwhile, especially with law enforcement agencies like the AFP. For those interested in having a closer look at this fascinating area, the AFP Mobilab will be at a mock crime scene that Forensic and Data Centres will be setting up at the AFP's Open Day to be held in November at the International Deployment Group's Training Village at Majura.

There will be fingerprinting and other demonstrations from the documents, chemistry and biology teams and the Data Centres (chemical, biological, radiological and nuclear) and the Australian Bomb Data Centre will be there too to discuss what they do.