It's all in the science

Forensic science has changed the way law enforcement agencies around the world solve crimes and conduct disaster victim identification.

These days it's hard to imagine a forensics laboratory without computers, especially since television shows such as *CSI* have become popular.

In the days before computers, forensics was less focused on chemical analysis and firearms testing and was very much a paper-based activity. Documents, and the tools used to create them, could provide important evidence to assist in successful prosecutions.

For example, comparing handwriting could reveal authorship, while examination of typewritten material and typewriter ribbons could identify the machine used to produce a document. Identity documents were tested to reveal forgeries and alterations, while the close inspection of one document could reveal indentations pointing to the existence of other evidence. The forensic examination of all documents for police matters in Australia was handled by the Commonwealth Police at its headquarters in Sydney.

Another responsibility of AFP forensics even then was to manage the substitution of illicit drugs for controlled delivery operations, just as they do today. Packages of drugs were replaced by replicas containing harmless substances, and when the offenders took delivery of the packages they were arrested by police.

Change has been a constant in the field of forensics over the past 30 years, and technological developments have had an impact on all areas. The use of computers and advanced instrumentation has enabled the AFP to conduct examinations and get results more quickly. As a result, procedures that once took days to complete can be performed almost instantly, with results available to police in the field through the use of portable technology such as laptop computers.

Whole new disciplines have emerged, while the use of computer forensics, DNA and advanced fingerprint techniques are now common practice in the course of a police investigation.

Dr James Robertson was the first non-sworn member of the AFP to be put in charge of forensics. Previously, most people working in the area were police officers. He began working with the AFP in the late 1980s, during a period of significant change instigated by the then Commissioner Peter McAulay.

Commissioner McAulay's experiences as head of the Northern Territory Police during the investigation into the disappearance of Azaria Chamberlain had convinced him of the importance of the forensic sciences. He was determined to improve the AFP's capabilities in this area to ensure that, where available, forensic evidence could be used to prove the facts of a case beyond any doubt.

His support of the area meant that for the first time forensic operations for the AFP were centralised into a single location at Weston in the ACT. The building was used for basic crime scene, fingerprint and firearms analysis, but has since been extended and refurbished as new technologies become available to forensic science. But Dr Robertson says there's still a need for better facilities.

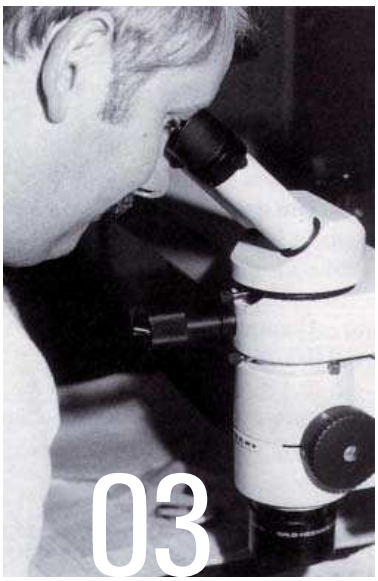
"The dream is to move to a purpose-built facility in the future," Dr Robertson said.

One achievement has been the realisation of his vision to bring all the forensic sciences together under one roof. Before that, fingerprinting was the domain of criminal records and was not connected to other areas of forensic operations.

Australia led the way as the first country to develop a National Automated Fingerprint Identification System (NAFIS). Initially it relied on a large cable linking Sydney and Canberra in order to operate.

According to Dr Robertson, the original NAFIS computer centre looked like a room full of huge industrial washing machines, but washing machines of extreme importance.

"The centralised NAFIS database made a huge difference to policing throughout Australia," he said.



01: Forensic scientists conduct testing on a powder substance **02:** Protective safeguards used by forensic scientists
03: Document examination circa 1995

"Fingerprints are one of the main means of identification used by police, and to be able to search computerised fingerprint records from every state and territory meant that results were achieved much more quickly."

The AFP introduced a quality framework and achieved national accreditation in 1996. Accreditation is granted by the National Association of Testing Authorities (NATA), and ensures that the AFP's laboratory processes meet international standards. The AFP has also developed a qualifications framework with the Canberra Institute of Technology (CIT). This national qualification is now mandatory for all fingerprint examiners in all Australian police forces.

In addition to fingerprinting, another essential element of forensic science is the use of images in building a case. Forensic imaging started with basic crime scene photography and fingerprint photography. Today it provides specialist 360 degree panoramic views of crime scenes, audio and visual enhancement, and the ability to perform digital facial reconstruction through the use of sophisticated digital technology. It also gives police the ability to create images from witness descriptions, which can be particularly useful in helping to identify bodies which are no longer recognisable.

This type of technology was employed in response to the Bali bombings in 2002. The AFP was able to take equipment to the island which was used to analyse evidence that proved to be crucial to police efforts in finding those responsible for the attacks.

Forensic expertise was also used to identify the suicide bombers and their victims.

Dr Robertson said one reason the forensic operation in Bali was so successful was because scientists were able to work in the field where their expertise was immediately available to investigators.

"Good forensic scientists have empathy with investigators, assist investigators to solve their cases and provide the evidence they need," he said

"Forensic scientists must think of all the possibilities when investigating a crime scene, but must be able to answer all questions impartially. We are still building on our ability to quickly deploy with the right equipment."

During the 1990s, the AFP introduced a graduate intake model, which meant that all forensic scientists working in the organisation would hold a degree. The AFP worked with universities and the CIT to develop forensic sciences courses appropriate to the needs of law enforcement agencies.

The number of women working in the area of forensic science has also increased over the past 30 years. This has created new challenges for managers in the areas of deployment, retention and work-life balance.

"Managers must take into consideration the impact of events, such as deployments at short notice, on parents who have young children to look after," Dr Robertson said.

"We need to be flexible to retain our staff. We invest in our people, and need to take a long term view to retain the investment we make in our staff."

The AFP encourages members to further their education and increase their skills, and Dr Robertson hopes that the programs and opportunities offered by the organisation will soon lead to a better gender balance in middle management.

"Most scientists want to be scientists, not managers," Dr Robertson said.

"We give them managerial skills, but don't want to push them out. We try to support the science and scientists.

While they have enabled police to get more definitive results, advances in technology have in some ways made the task of getting evidence more complicated. Thirty years ago, one forensic scientist could do all the different types of analysis for a crime scene. Now it takes five or six people to complete the specialised areas of analysis that are needed to process the crime scene properly. Unfortunately this kind of specialisation can result in a loss of knowledge and skills across other areas of expertise.

"The challenge for forensic scientists is to keep the lesser-known and old fashioned areas of expertise alive for those rare but unique cases where more modern technologies such as DNA profiling can't provide the answers required to solve the case," Dr Robertson said.

"We can only make a difference in the long term by having a comprehensive knowledge base."