

Leading the way in investigative technology



A police photographer uses a Graflex camera to record an image of a palm print left on a motor vehicle in Brisbane, circa 1963.

Mr Burns said he used a large-format press camera which took 5in x 4in black and white negatives or sheet film when he began working as a police photographer.

“This was very cumbersome because of its size and weight. Officers could only carry six magazines—each containing six negatives—so they would have to go back to the office to reload if they were photographing a big case,” Mr Burns said.

“Colour photography and printing came into use in the 1960s but the process of colour printing was very slow and labour intensive so we limited its use to more serious crimes such as serious assaults. Injuries in colour looked more realistic for court presentation.

“A big step forward for police photography was the introduction of roll film cameras in the early 1970s. This gave us flexibility in the stock we used and allowed us to travel lightly.

“It was also around this time that Scenes of Crime Officers were introduced into the Queensland Police Service (QPS). An officer was assigned to each district to take both photos and fingerprints.”

Forensic photography—forever changing

Anyone who has a digital camera built into their mobile phone knows how accessible photography is today. Digital cameras are not only lightweight but provide an instant image review.

Back in 1839, French inventor Louis Daguerre took up to 15 minutes to expose the very first photographs called ‘daguerreotypes’—it was an intensive process to bring those images to life.

It wasn't until 1892 that photography was introduced into Queensland policing as a way of identifying criminals. Queensland's first police photographer, Acting Sergeant John Thompson, was paid £10 extra to photograph prisoners and record major crime scenes.

The first functional Queensland Police Photographic Section began operating in 1905. In the early

days, a photographer based in Brisbane responded to requests from metropolitan and outlying areas. The limitations of transport would often mean lengthy delays in attending crime scenes.

Retired Inspector Bob Burns worked as a Queensland Police photographer from 1966 until 1995 and saw first-hand the transition of black and white photography to colour.

1886

Acting Sergeant John Thompson becomes the first Queensland Police photographer.

1892

Fingerprint Bureau is established.

1904

Photographic Section begins operation.

1905

The Battley System is introduced for cataloguing single fingerprints.

1934

Composite imaging

In the late 1960s the Identikit was developed. A series of overlays with sketched facial components such as eyes, noses, mouths, chins, foreheads with hair, moustaches, and beards were compiled to build a composite image of an offender. In the early 1970s, the Photo-Fit process was introduced, whereby a composite image was created by sliding facial features into a frame.

These methods were superseded in 1993 when Senior Sergeant John Garner, a trained freehand forensic artist, developed a computer-based image system known as Computer Facial Identification Technique (Comfit).

A Comfit book containing 29 head shapes, 145 pairs of eyes, 80 hairdos, 36 noses, and 27 mouths was distributed to every police station in the state. A witness could choose

a facial feature from the book and these details were sent to a trained operator at the Visual Identification Unit in Brisbane. Within minutes a computer generated image would be faxed back to the witness for approval or modification.

Senior Sergeant Garner said he developed Comfit because of the inadequacies in freehand drawing methods and the existing systems, which were heavy and required the operator and witness to be in the same room.

"Forensic artists had to travel all around the state to compile a composite, which was not only costly but often meant delays due to travel time," Senior Sergeant Garner said.

"The previous methods didn't show variations in skin, eyes or hair. I compiled and designed a range of facial features to suit the Queensland ethnic community incorporating

these variations and allowing for facial proportions that vary with age and race.

"Comfit technology provides a state-wide service, which in a practical sense didn't exist previously. The number of composite images I was able to create went from 300 to 1,000 per year using the new system."

Since 2007, the Comfit book has been supported by an electronic version, which allows a witness to view facial components online at any police station. This means a witness can view the operator's work in real-time on the computer screen, allowing them to offer immediate feedback via telephone.

New technology

The QPS is one of the first police services in the world to use an Interactive Forensic Imaging System (IFIS). Originally known as interactive crime scene recording, the tool was developed in 1997

to produce a 360° image of a crime scene by linking a series of conventional photographs together with computer software.

IFIS has now evolved to incorporate images and data from a variety of media

such as mobile phones and CCTV.

Police investigators can move through the scene at their own pace to gather intelligence and verify statements supplied by witnesses and suspects. IFIS has been used in court, enabling jury members to orientate the location of evidence in complex crime scenes. Research is now being conducted in the use of 3D technology to present crime scenes and other visual evidence in court.

The Photographic Section has been recording and processing images digitally since 2007 and has a digital minilab and printing facility. Digital technology has reduced film processing from 600 to 60 rolls per month.

Forensic-related images can be downloaded from digital cameras, mobile phones, CCTV, and the Taxi Security Camera System for further processing or analysis. The Section's electronic recording laboratory helps identify offenders through the enhancement of CCTV, video and audio media.

Each month, the laboratory produces on average 130,000 prints and processes approximately 4,000 metres of film from traffic cameras around the state.

*By Karen Downey,
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Senior Sergeant Kevin Darch of the Photographic Section creates a Comfit of an offender. More than 2,700 Comfits were created during the past year.

1936

The Technical Section, later known as the Scientific Section, is established to carry out forensic investigations.

1941

Central Fingerprint Bureau is established in Sydney.

1960s

Colour photography and printing is introduced.

1970s

Forensic resources are boosted with the setting up of the Scenes of Crime Unit.

1983

The first Blood Splash Pattern Evaluation course is offered.

Fingerprints...the original forensic method

With a casual glance at our palms and fingertips we may fail to notice the unique ridged patterns of arches, whorls and loops that make each of us different from the rest of humanity. But take a closer look and you enter the world of the fingerprint expert, who uses these distinguishing marks as a powerful crime solving tool.

identify people involved in criminal behaviour. There are two types of fingerprints—the inked ten-prints taken at the time of arrest and those left behind at crime scenes, known as latent fingerprints. Latent fingerprints can be found on surfaces such as glass, polished and painted timber, paper and ceramic.

collected. Fingerprints were catalogued under the Henry Fingerprint System using alpha/numerical classification. Searching the collection took two weeks or longer.

From 1934, fingerprints were catalogued using the Battley System where specific features within the centre of a single fingerprint, such as arches, whorls and loops, were used to classify the pattern. This classification system was used in tandem with the main filing system of the ten-prints inked onto a fingerprint form.

The Central Fingerprint Bureau was established in Sydney in 1941. This initiative enabled fingerprint bureaus throughout Australia to correlate records and identify interstate criminals who may have had previous criminal history records.

In 1987, the National Automated Fingerprint Identification System (NAFIS) became operational,

allowing forensic experts to access fingerprints via a computerised national database in Sydney. This enabled the sharing of all fingerprints around Australia for comparison purposes.

Livescan, a computerised device that scans and records fingerprints in digital format directly into a national database, was introduced in 2006. This system allows police to know within minutes if a person in custody has a criminal record and to determine in less than an hour if their fingerprints have been left at a crime scene.

NAFIS is now based in Canberra and is monitored by the CrimTrac agency.

Presently, the Fingerprint Bureau has more than 450,000 sets of fingerprints of individual offenders on its database.

*By Karen Downey,
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A fingerprint expert dusts a car for prints in 1967.

Fingerprinting is the oldest method of criminal identification known to man. The earliest ridged impressions date back 4,000 years ago to Egypt.

Since the early 1900s, Queensland's fingerprint experts have been dedicated to the task of capturing and studying these prints to

The Fingerprint Bureau was established by Acting Sergeant Duncan Fowler in 1904, and was located at Brisbane's Criminal Investigation Branch and Brisbane Gaol. The bureau was equipped with a bench, fingerprint forms, ink, roller and a slab. By the end of its first year of operation, 804 files of identifying prints had been



Equipment used in the early 1900s comprised a roller, metal slab, hand-held magnifying glass and fingerprint form.

1987

National Automated Fingerprint Identification System comes into use.

1993

Computer Facial Identification Technique (Comfit) is developed.

1997

Interactive Crime Scene Recording System is developed, enabling 360° views of crime scenes through computer imaging.

1998

An Offender Identification Recording program is developed, providing online access to photos of people charged or convicted of criminal offences.

Island killer trapped by fingerprints

Fingerprinting was the key to solving the 1949 murders of civil engineer William Allen and his wife Isobel May Allen on Ocean Island, a small tropical outpost just south of the equator in the Central Pacific.

The case was led by Cecil Earnest Smith, Officer-in-Charge of the Fingerprint Bureau, and proved to be a remarkable triumph in criminal history.

On the morning of April 27, the bodies of Mr and Mrs Allen were found in their bungalow with multiple stab wounds. One bloodstained palm print was found on the window frame and window sill, and one thumb print on the inside wall.

Fingerprint expert Smith and two detectives worked laboriously in sweltering humidity taking 18,432 prints of fingers, thumbs and palms from the island's 1,100 residents.

Fingerprints were taken with a metal slab, printer's ink, and a rubber roller. Spots of ink were put on the slab, the ink was rolled out to form a thin film, the fingers were placed on the slab and then onto a fingerprint form.

The fingerprints found at the crime scene were captured by throwing light powder onto the print and blowing off the excess to leave an outline. The print was dusted with a brush, before mercury, then chalk were applied to make the print more permanent.

After weeks of analysis, it was found that the bloodied prints left at the house matched those of Tai Shek, one of four electrical workers residing on the island.

The soles of Shek's sandals were inked with fingerprint ink and he was directed to walk over foolscap paper. The detectives then placed x-ray film, which had been treated to make it transparent, over the bloodied shoe prints at the scene and exact tracings were made. They matched the suspect's shoes in shape, size and detail.

Shek was convicted of the murders of Mr and Mrs Allen and sentenced to death.

Early pioneers of forensic science

The first department dedicated to the forensic examination of evidence in the QPS was known as the Technical Section. It was founded in 1936 and comprised a small chemical laboratory, darkroom and a firing range located in the basement of Morcom House on George Street, Brisbane.

The work of the Technical Section included ballistic examinations, crime scene investigations, physical comparisons of exhibits, and presentation of evidence in the courts.

By the 1940s, the scope had increased to include forensic chemistry, document examination, handwriting classification, blood tests and the use of ultraviolet and infra-red radiation.

During these formative years, equipment was scarce with the biggest expenditure being for a comparison microscope. During World War II, the two police scientists received a boost in their capabilities. The American Army financed the purchase of equipment to assist forensic work that, at the time, often related to offences committed by American armed forces personnel.

During the 1950s, the team grew to three members with the addition of a cadet. They were multi-skilled operators proficient in all aspects of physical evidence comparisons and crime scene examination. The trio's work included suspicious fire investigations, stolen vehicle identifications and forensic photography.

In 1959, a now-retired Inspector Neil Raward was a 17-year-old police cadet who had commenced his studies in Industrial Chemistry. This determined young cadet would later head the Scientific Section and would remain in this position for 19 years.

"On reflection of the forensic techniques used during the 1950s and 60s, it makes you realise the great technical advances that have been made," Mr Raward said.

"For example, at least 100mls of inflammable fluid was required for identification purposes; now all that is

required is micro amounts. Paints were compared with physical techniques, but now the scanning electron microscope is used."

Only very basic blood comparisons were carried out compared to today when it is possible to draw a DNA profile from a single cell.

During the 1970s, the role of the forensic scientist became more clearly defined with the multi-skilled officers starting to specialise in selected fields. Mr Raward said he recalled a shooting-related crime where ballistic investigation helped convict the offender.

One night in 1972, a hotel night manager was shot dead on his way home. His keys to the night safe were stolen. Numerous discharged .22 calibre cartridge cases were found at the scene.

A police investigation revealed the semi-automatic firearm used had been illegally fitted with a silencer by a Brisbane gunsmith, who then test-fired the weapon to check its working condition.

"Forensic staff searched the gunsmith's shop for discharged cartridge cases," Mr Raward said.

"Approximately 10,000 cases were collected. Ballistic comparisons disclosed that three of them matched those recovered from the murder scene. This evidence further forged the suspect's links with the murder scene and he was subsequently found guilty of murder."

The Technical Section was renamed the Scientific Section in 1976, and by 1992 had relocated to Roma Street Police Headquarters. Staff numbered more than 30, with many specialising in selected fields of forensic identification.

Inspector Raward said both technology and interest in forensic science had grown consistently over the years.

"Developments in techniques have provided scientists with tools that were never envisaged by the early pioneers in forensic science," Mr Raward said.

*By Chrissie McLeod,
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2002

Disaster Victim Identification Squad officers are deployed to assist the Indonesian Government following the terrorist attack in Bali.

2006

Livescan is introduced, allowing fingerprints to be digitally scanned and recorded directly into a national database.

2007

The Photographic Section goes digital.

2008

The first Mobile Police Facility van is launched, which can be deployed at crime scenes, natural disasters, search-and-rescue operations and planned events.

2009

Technology builds on foundations of investigative technique

The Queensland Police Service embraces the use of cutting-edge technology in its investigations. However, police officers are quick to point out that, when it comes to solving crime, it's the fundamentals that count.

Proven investigative techniques, including canvassing witnesses, interviewing suspects, conducting research, collating evidence and managing information cannot be replaced, regardless of the era. Technology is remarkably useful, but it is only a tool to be used when appropriate.

The following two cases demonstrate how technology is a valuable adjunct to solid investigative work. In the first case, progress had stalled, and a sophisticated new scientific procedure reinvigorated the investigation and led to the arrest of an offender. In the second case, the crime was solved through deliberately executed traditional techniques.

Case One: Operation Echo Motto

Early one morning in January 2006, police were called to a park at Inala in Brisbane's west. A couple on a morning walk had found the body of a man partially hidden in bushes. The 60-year-old, who

lived locally, had been bashed and strangled before being dragged into the bushes. He was a quiet, religious man who lived alone and had no enemies.

Detective Sergeant Luke O'Connor (then Detective Senior Constable) and Detective Senior Constable Jack Maddock from Oxley Criminal Investigation Branch (CIB) took charge of the investigation.

Using traditional investigative techniques and following leads initiated from an informant, the detectives arrested a suspect in early February attempting to flee the state. He admitted to killing the man, saying he had needed money and had bashed his victim unconscious in order to rob him. He stated he had not acted alone, but refused to identify his co-offender or detail his level of involvement.

Detective Sergeant O'Connor said they had found no DNA at the scene that identified the second assailant, and had exhausted several other lines of enquiry.

"The job was a couple of months in and we had made no progress in identifying the second offender,"

Detective Sergeant O'Connor said.

"Forensic scientists have been extracting DNA from body fluids such as blood, semen and saliva for years, but there was nothing at the crime scene that didn't originate from the victim.

"The man had been dragged three to five metres into the bushes after being killed. His shirt had started to come off, but because he had the cuffs buttoned up, the shirt caught at his wrists and was pulled inside out.

"You could see the sleeve was crumpled at the wrist, as if someone had gripped him there. We thought surely there must be something there we could get DNA from."

Senior Constable Maddock said he and his partner then looked closely at a pioneering technology that had never been used in Australia before.

"We had been reading about new procedures working with

'touch' DNA—that is, dead skin cells that can be shed during contact," Detective Senior Constable Maddock said.

"It's hard to find cells on clothes, but there was a brand new technology where a 'tape lift' is used to pick up individual skin cells—just as you would use a piece of sticky tape to lift fluff off your jacket."

Despite some initial reservations, the investigators' ingenuity paid off. They conducted a re-enactment at the crime scene in the presence of investigators, forensic scientists and pathologists. The victim's last movements and where contact with the offender's skin would most likely have occurred were painstakingly re-created. An area on the inside cuff of the victim's shirt sleeve was nominated to be the most likely location to test for the touch DNA.



In 1981 Senior Scientific Officer Neil Raward conducts a ballistic identification under the comparison microscope.

“Not long after, the scientist phoned us with ‘great news’. They had found a single skin cell and were able to extract an unidentified mixed partial DNA profile,” Detective Sergeant O’Connor said.

“Touch DNA carries a risk—as with any DNA evidence—in that it could have gotten there innocently or accidentally. It could be anybody’s. But in this case that risk was negated because it was located on the inside of the victim’s shirt.”

The DNA didn’t match any of the samples on the national database, but it did strike a match with a crime scene in Cherbourg from a few years earlier. That homicide had been solved, but along with DNA from the victim and the offender, investigators had found an unrelated sample of blood that was never identified or explained. The detectives went back to Cherbourg to investigate the pool of blood.

Detective Senior Constable Maddock said they canvassed witnesses from the party at which the murder had occurred.

“One witness remembered that a man had been cutting the legs off his jeans and accidentally injured his knee. He bled out in the house, leaving a pool of blood unrelated to the murder,” Detective Senior Constable Maddock said.

“Still, we needed proof the blood really did belong to the man named by the witness. We had to get a sample of DNA from him directly to compare with the unidentified mixed partial DNA profile from Inala.”

As the suspect was wanted on another matter, investigators were able to collect a DNA sample, and analysis revealed a match with the skin cell found on the victim’s shirt. Detective Sergeant O’Connor said once they had the man in custody, he made a full admission.

“He said he had been drinking heavily on the day of the murder. He caught a train to Inala and on the way the principal offender had struck up a conversation with him. He asked him to help ‘roll’ someone to get money. The principal offender bashed the

man, inflicting fatal injuries, and the secondary offender dragged him into the bushes in an attempt to hide the body.

“This case would have been difficult to solve without having access to the latest technology. There were two people involved in the murder, and traditional techniques had identified the principal offender. However we couldn’t find the link between him and the second offender—it was apparently a chance meeting on a train.”

Detective Senior Constable Maddock said technology had an important role to play when investigating crimes.

“DNA doesn’t solve a crime, but it’s a valuable investigative tool. In this case it gave us a crucial lead. Possibly we may never have found the second offender otherwise.”

Case Two: Operation Jarvis

In 2001, the body of a 27-year-old woman was found by council workers in bushland near a sewerage pumping station at Griffin, north of Brisbane. She had been strangled in a different location and then her body dumped.

Investigators from Petrie CIB interviewed several ‘persons of interest’ on the Sunshine Coast where the victim lived, however were unable to link anyone to the crime.

Then in 2005, new information came to light. A woman

told a police officer at Maroochydore she suspected her de-facto husband of being involved in the killing.

The information was passed to Detective Sergeant Andrew Ayres, North Brisbane CIB, who had been in charge of the original investigation while at Petrie CIB in 2001. He said he met and appraised the informant before being seconded into a homicide team to finalise the investigation.

“Her suspicions were aroused by comments her de-facto husband made during local news reports at the time of the victim’s death,” Detective Sergeant Ayres said.

“Five years on, she felt for the parents of the victim and didn’t want to carry the information around anymore without telling someone.”

Detective Sergeant Ayres approached the Cold Case Investigation Team within the Homicide Investigation Unit, State Crime Operations Command (SCOC).

At the time, Detective Senior Sergeant Scott Knowles was in charge of the team. He said SCOC often collaborated with detectives in the regions to formulate strategies for solving complex cases.

“SCOC can bring experience and resources to the table that the regions don’t have access to,” Detective Senior Sergeant Knowles said.

“An officer working in a region may investigate six homicides in his or her career, while the Homicide Investigation Unit

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A forensic officer works from a mobile laboratory at the rear of a Scientific Major Response Vehicle (SMIRV). The laboratory has a hydraulic lifting platform for heavy objects, a generator, refrigerator, oxy-acetylene equipment, plastic bag dispenser, and a heat-sealer.

attends approximately 60 per year.”

Detective Senior Sergeant Knowles said solving crime required a steadfast commitment to proven investigative techniques, including managing information, defining goals, conducting research and formulating strategies.

“An important rule is management of witnesses,” Detective Senior Sergeant Knowles said.

“The woman had implicated her boyfriend in the murder and as a result she needed to be safeguarded.

“Equally important is the management and protection of investigative information. You can’t let on to the suspect that the informant has implicated them. Maintaining the security and the integrity of your information is crucial, otherwise you may jeopardise the case.

“Planning your interview with the suspect is also very important. In this case, the secondary suspect had no criminal history, whereas the primary suspect had been in lots of trouble. Our strategy was to target the secondary suspect first and stress to him the seriousness of the situation. We did this and he subsequently admitted to driving the car and helping to dispose of the body.

“This then brings you to the point of whether to arrest and charge him. He could have been arrested that night for being an accessory, but the goal of the team, both SCOC and regional investigators, was to solve the murder.

“To have arrested him at that point would have resulted in a media release and the primary suspect would

have been tipped off to the progress of the investigation. Safeguarding the information at that critical stage was vitally important.

“We knew the secondary suspect had not contacted his co-offender or been in trouble with the police since. We let him go. It was a huge call. He could have walked out of the station and picked up the phone and told the primary suspect, but our research and profiling indicated he wouldn’t.

“The primary suspect was a completely different person. He was in jail, had a significant criminal history, and was experienced with police behaviour and techniques.

“We had to plan our strategy, and decided we could better manage the interview if it was conducted away from his usual environment, so he was taken to Maryborough Police Station.

“Interviewing someone is not just about what you hear when they answer your questions but about the suspect as a whole. You need to understand what they are telling you both verbally and non-verbally. In this instance the suspect started by denying everything. Verbally he was totally calm and cool, but his body was telling a different story. Under the table his feet were pumping and he was shaking.

“It was decided to have a break. There’s not much point in listening to repeated denials, unless that’s part of your strategy. Having a pause lets the suspect process things, and allows the investigators to reassess their approach.

“When we resumed, he’d obviously taken stock of

the situation and made a full admission. Just as importantly, he corroborated the story of the secondary offender. Corroborating evidence is crucial if the case is going to stand up in court. It was difficult in this case because it was five years old, and surveillance tapes from service stations and things like that were no longer available.”

The primary offender subsequently admitted that he and the co-offender had been driving along a street in Nambour when they saw the woman walking along the footpath. Being acquainted, they stopped and picked her up, and then drove south to Logan City to buy drugs.

Several hours later and high on amphetamines, they were driving north again when the primary offender related the story of a home invasion he had been subjected to some months previously. He mistook an innocent smile from the woman to mean she knew something about the invasion. In a fit of rage, he strangled her while the secondary offender was still driving. By that stage they were at Burpengary and in the gathering dark, they left the Bruce Highway to look for somewhere to dump the body.

Detective Senior Sergeant Knowles said being able to finally provide an answer to the woman’s parents was the rewarding part of the investigation.

“Andrew, the regional investigator, phoned them as we were on our way back from Maryborough after the arrest of the primary offender and told them that someone had been charged for the murder of their daughter. That’s the best phone call an investigator can make. The parents had been so patient—they’d been waiting five years for that call.”

Detective Senior Sergeant Knowles said the case was solved by grass roots investigation, both regionally and in a joint effort between the region’s and SCOC’s investigators.

“It’s all about footslogging, rattling cages, and shaking the confidence of the offender and their close group. Technology doesn’t solve crimes—it’s simply one of a number of tools an investigator may use. It’s good investigation, using the appropriate tools, that finally resolves most serious investigations.”

*By Paula Hedemann,
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A lonely patch of bushland near a sewerage pumping station north of Brisbane provided a hastily sought hiding place for the body of the murdered 27-year-old woman.