

# The code OF A killer



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Wherever there is a crime, there is a trail of evidence leading to a perpetrator. And even if the evidence is microscopic, the chances of a conviction are greater than ever, writes **Sue Smethurst**.

**O**ne of the very first cases that came across forensic

biologist Sharon Neville's desk was the brutal murder of 37-year-old Pia Navida. It was 1992 and the young woman's body had been found off a bush track in the Royal National Park south of Sydney. Pia had been sexually assaulted

and bludgeoned to death with a rock during an attack so vicious it completely crushed her face.

Sharon recalls the case vividly. "At the time all we had to go by was this huge 14 kilogram rock covered in blood, but DNA wasn't an established science for us then so tracing the blood grouping was really our only avenue and unfortunately that didn't give us the answer as to who killed Pia," she says. But undeterred, the young scientist, fresh out of university, stored the precious crime scene evidence in the freezer at the New South Wales Forensic & Analytical Science Service and waited for the day technology would catch up with the crime. She knew that in the future, the tiny clues left behind, such as millimetre-thin fingernail cuttings, could unlock the identity of Pia's killer.

"We didn't give up and whenever new science became available to us, we'd go back to Pia's case and re-examine the evidence to see what we could uncover," Sharon explains.

"In 2005 we were able to take a tiny sample of the blood-stained rock and examine it for DNA, whereas previously we needed much greater volumes of the blood stain to work with."

In 2008 they were able to do more testing, this time on tiny fragments of Pia's fingernails that had been frozen. Those tests extracted further DNA, and in 2011 new computer programming allowed Sharon to narrow that DNA down to two men, one who'd had a consensual relationship with Pia and the other, Steve Matthews, who in the face of irrefutable evidence, confessed to being Pia's killer.

In May 2014, Matthews was convicted and sentenced to 16 years in jail.



**Sharon Neville and her team of forensic experts process more than 40,000 crime scene samples a year.**

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"We never forgot Pia, it took a long time – 22 years – to see justice and it was very satisfying when we did because it makes our work worthwhile," says Sharon. "Her case will stay with me forever, it was a demonstration of patience and persistence."

Sharon Neville is the Deputy Director of Criminalistics at the Forensic & Analytical

Science Service (FASS) in NSW. She leads a team of trailblazing scientists, including colleagues Dr Stephanie Hales and Dr Jodie Ward, who are at the forefront of a new high-tech era in crime fighting, an elite group of forensic experts providing the crucial clues to solving some of Australia's most complex criminal jigsaw puzzles and whose cutting-edge work is in demand around the world.

"The team at FASS are crucial to what we do as police," the Commander of the NSW Police Force Forensic Services Group, Assistant Commissioner Peter Cotter, says. "Their work is integral to our criminal investigations and ultimately the evidence we put before the court for prosecution."

Like a modern day Sherlock Holmes, Sharon and her team of Watsons are the NSW justice system's secret weapon, and they are called upon to help solve the most baffling of crimes.

When the heavily decomposed remains of a child were found inside a suitcase dumped on the side of a dusty outback highway in South Australia in 2015, it was Sharon and her FASS team who were on the scene.

They were able to identify two-year-old Khandalyce Pearce and her mum, Karlie Pearce-Stevenson, whose body had been found years earlier 1500 kilometres away in the notorious Belanglo State Forest in NSW. A suspect is currently awaiting trial for their murders.

"We had the unknown remains of a woman collected from Belanglo in 2010, we did DNA sampling and uploaded it into a national data base at the time but got no matches," Sharon >>



explains. “We kept going back to those samples to see if we could identify who she was. When Khandalyce’s body was found, we looked at the samples again and they were linked biologically, we were able to establish they were mother and daughter and then the pieces of their identification fell into place. It was a great outcome – 20 years ago we wouldn’t have been able to identify them, let alone establish a link.”

Sharon oversees a team that is responsible for processing more than 40,000 crime scene samples every year and can solve a crime from a sample as tiny as a fragment of a baby’s fingernail.

The work of colleague Dr Stephanie Hales, manager of the FASS chemical criminalistics lab, was pivotal in the recent prosecution of crooked cop Roger Rogerson and his accomplice, Glen McNamara, who murdered university student Jamie Gao in May 2014. The would-be gangster was shot in the head and his body was discovered by fishermen two kilometres off Cronulla’s Shelly Beach. Stephanie analysed a minuscule fragment of surfboard wax that supported McNamara’s involvement in Gao’s grisly death.

“We carried out tests on the surfboard bag which Gao’s body was found in and discovered tiny traces of surfboard wax,” says Stephanie. “That matched wax that detectives found on Glen McNamara’s boat, so the evidence of involvement was irrefutable.”

**Stephanie Hales (left), Sharon Neville and Jodie Ward have been involved in some of Australia’s most high-profile criminal cases.**

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“A case can be solved using trace evidence so small it can’t be seen by the naked eye.”

Stephanie also works with ballistics and trace chemical residue, explosives and chemical warfare agents. In September 2014, she was called in to work on the investigation of an explosion at a convenience store in the Sydney suburb Rozelle, which killed three people.

The site of the blast looked like something from a war zone. Little was left of the property beyond debris, brick rubble and molten ash, but despite the intensity of the blast, Stephanie and her team were able to find trace samples of the accelerant used, which then enabled them to reconstruct the scene and timeline of the blast. Those samples were then compared with traces found on the hair, skin and clothing of the shop’s owner, Adeel Khan, who was charged and later found guilty of murder. Stephanie describes the presence of chemical particles as like a chemical fingerprint.

“We’re talking about particles that can be so small you can only see them with the most advanced microscope, sometimes only one thousandth of a millimetre, but each particle tells a story. It’s not quite *CSI*,” she laughs, “we can’t put the swabs into a computer and get a murderer’s nameprinted out, but the technology is developing rapidly. It’s much harder to get away with a crime now. Time and technology ensure we will catch up with you eventually.” »

When she was 23, Stephanie, who did a PhD in gunshot residue, established the first lab to examine gunshot residue in NSW. Previously, gunshot samples from crime scenes had to be sent to interstate labs for analysis. She saw the need for a quick turnaround and her work provided immediate results for police while they were still on the trail of a case.

But while time is crucial in many investigations, Dr Jodie Ward and her team specialise in solving crimes upon which the clock has stopped. She has the extraordinary task of identifying remains which can be decades old, or severely “compromised” in terms of their condition, bones that have been buried a long time, immersed in harsh saltwater, burnt or just very old.

Jodie’s lab uses a new technique to examine the fragments of bone for mitochondrial DNA, a relatively new DNA discovery which can trace a unique DNA code back generations.

Mitochondrial DNA, or mtDNA as it’s called, is a tiny piece of DNA only inherited down the female line. When it was first discovered, scientists labelled it the “Eve gene”. Every person alive today has inherited mtDNA from a female ancestor, mother, grandmother, great-grandmother, and by using mtDNA analysis, forensic scientists and detectives can in effective build a family tree.

“Mitochondrial DNA work is very new to NSW, but we are having success with it,” says Jodie, who recently won a Churchill Fellowship and visited some of the world’s best forensic labs last year, including the Federal Bureau of Investigation’s DNA laboratory in Virginia.

“Since we began using this technology we’ve solved the identity of 21 people who were previously unknown remains, which has been able to provide some answers and comfort to their families. It’s been quite a revelation for the closure of cold cases because we can rely on a mother, sister, aunt or even a great-grandmother to now assist us with identification.

“We can work with a sample as small as one gram. We’ve had tiny fragments of bone that have washed up after many years in salt water, I’ve had bones from an African grave for a lady wanting to identify her brother. We were able to get results.”

While the bulk of her work is in cold cases, Jodie is also called in to assist with cases that can’t be solved using regular DNA. “We can even analyse the tiniest of hair shafts to give us an answer,” she says, “it’s a very exciting field and

we’re only seeing the beginning of its application. The majority of what we do at the moment involves exclusion. While we can narrow down a list of suspects or victims, we can also exclude potential suspects.”

The mum of two loves her job and says her mind is constantly putting together criminal jigsaw puzzles.

“We are getting results today that you couldn’t dream of 20 years ago,” says Jodie. “It’s a really exciting time to be in science.”

All three specialists agree there’s even bigger developments on the horizon for forensic science: new gene sequencing technology may allow the scientists to fully estimate a victim’s ancestry, including creating a physical profile image with hair, eye and skin colour.

“The molecular photo-fit is a game changer,” says Sharon. “The DNA



Jodie (above) can trace DNA code back generations. Stephanie (right) specialises in gunshot residue analysis.



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instruments are getting smaller and quicker, you can get a DNA profile in an hour and a half.”

Stephanie agrees. “One day soon we’re hoping for a ‘lab on a chip’,” she says, “a piece of technology on a microchip you can take out to a crime scene to analyse samples immediately. We’re not there yet, but it’s coming.”

“It’s not a good time to be a criminal,” Sharon jokes. “If I swab the pen you are holding I will get your full DNA profile. We can pick up such sensitive trace of evidence that we can virtually guarantee that if you commit a crime, one day, you will get caught.”

As Sherlock Holmes would say, “when you have eliminated the impossible, whatever remains, however improbable, must be the truth”. **AWW**