FORENSICS

THE ANATOMY OF CRIME

VAL McDERMID

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First published in Great Britain in 2014 by
PROFILE BOOKS LTD
3A Exmouth House
Pine Street
London EC1R 0JH
www.profilebooks.com

Published in association with Wellcome Collection for the exhibition *Forensics: The Anatomy of Crime*, curated by Lucy Shanahan and Shamita Sharmacharja.

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London NW1 2BE
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10 9 8 7 6 5 4 3 2 1

A CIP catalogue record for this book is available from the British Library.

Hardback ISBN 978 1 78125 3199
Export ISBN 978 178125 1690
eISBN 978 184765 9903

Printed and bound in Great Britain by Clays, Bungay, Suffolk

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PREFACE

The face of justice we know today has not always been judicious. The notion that the criminal law should be based on evidence is a relatively recent one. For centuries, people were accused and found guilty because of their lack of status; because they weren't from round here; because they or their wife or their mother was handy with herbs; because of the colour of their skin; because they had sex with an inappropriate partner; because they were in the wrong place at the wrong time; or just because.

What changed that was the growing understanding that the scene of a crime held all sorts of useful information and that branches of science were emerging which could read that information and present it in a courtroom.

The trickle of eighteenth-century scientific discoveries that turned into a flood in the nineteenth century and beyond soon found practical applications far beyond the laboratory bench. The idea of proper criminal investigation was just beginning to take hold, and some of those early detectives were eager to find evidence that would back up their theories of the crimes they were investigating.

Forensic – meaning, a form of legal evidence – science was born. And it soon became clear that many branches of scientific inquiry would have something to contribute to this new methodology.

One of the earliest examples brought together pathology and what we would now call document examination. In 1794, Edward

Culshaw was murdered with a pistol shot to the head. Back then, pistols were muzzle-loaded and a wad of crushed paper was tamped down to secure the balls and the powder in the gun. When the surgeon examined the body, he found the wad inside the head wound. He opened it up and it was revealed to be the torn corner of a ballad sheet.

The murder suspect, John Toms, was searched. In his pocket was a ballad sheet, the torn corner of which matched exactly the pistol wad. At his trial in Lancaster, Toms was convicted of murder.

I can only imagine how exciting it must have been to see these developments making the law a more certain instrument of justice. The scientists were helping the courts turn suspicion into certainty.

Take poison, for example. For hundreds of years, poison had been the murder method of choice. But, without reliable toxicology tests, it was almost impossible to prove. That was about to change.

But even in the earliest stages, that scientific evidence was open to question. In the late eighteenth century, a test had been devised to detect arsenic, but only in large quantities. Later, the test was refined to become more effective, thanks to the British chemist James Marsh.

In 1832, the prosecution called on him as an expert witness in chemistry during the murder trial of a man accused of poisoning his grandfather using arsenic in a cup of coffee. Marsh had conducted his test on a sample of the suspicious coffee and had demonstrated the presence of arsenic. But when he came to show it to the jury, the test sample had deteriorated, the result no longer clear. The accused walked free on the grounds of reasonable doubt.

But this wasn't a setback for the fledgling experts. James Marsh was a proper scientist. He regarded this failure as a spur towards success. His response to the embarrassment of his court appearance was to devise a better test. His definitive test was so effective it could detect even a tiny trace of arsenic; it was ultimately

responsible for the hanging of many a Victorian poisoner who had reckoned without forensic science. And it's still in use today.

The story of forensic science, of that road from crime scene to courtroom, is the stuff of thousands of crime novels. The application of science to the solving of crime is the reason I am gainfully employed. Not for the obvious reason – that forensic scientists are generous with their time and their knowledge – but because their work has transformed what happens in courtrooms all round the world.

We crime writers sometimes like to claim our genre has its roots in the deepest recesses of literary history. We claim antecedents in the Bible: fraud in the Garden of Eden; fratricide by Cain of Abel; the manslaughter of Uriah by King David. We try to convince ourselves that Shakespeare was one of us.

But the truth is that crime fiction proper only began with an evidence-based legal system. And that is what those pioneering scientists and detectives bequeathed us.

It was clear, even in the early days, that while science could help the courts, so the courts could push scientists on to greater heights. Both sides have a key role to play in the delivery of justice. For this book, I have spoken to leading forensic scientists about the history, the practice and the future of their disciplines. I have climbed to the pinnacle of the highest tower in the Natural History Museum in pursuit of maggots; I have been transported back to my own confrontations with sudden violent death; I have held somebody's heart in my hands. It's been a journey that has filled me with awe and respect. The stories these scientists have to tell us about that often tortuous journey from crime scene to courtroom are among the most fascinating you will ever read.

And a firm reminder that truth is stranger than fiction.

Val McDermid
May 2014

ONE

THE CRIME SCENE

The scene is the silent witness

Peter Arnold, crime scene specialist

'Code Zero. Officer in need of assistance.' It's the call sign every police officer dreads. One grey November afternoon in Bradford in 2005, PC Teresa Millburn's broken words on the radio sent a chill round the West Yorkshire Police control room. Her message heralded a case that touched everyone in the police community. That afternoon, the fear that cops live with every day became a bleak reality for two women.

Teresa and her partner, PC Sharon Beshenivsky, just nine months into the job, were near the end of their shift in their patrol car, their task a roving, watching brief. There to intervene in minor incidents. To be a visible presence on the streets. Sharon was looking forward to getting home for her youngest child's fourth birthday party and, with less than half an hour till she and Teresa clocked off, it looked like she would be in time for the cake and the party games.

Then, just after half-past three, a message came through. A silent attack alarm linked directly to the police central control had been set off in Universal Express, a local travel agent's shop. The two women would be passing anyway on their way back to the

station, so they decided to take the call. They parked up opposite the shop and crossed the busy road to the long single-storey brick building, its picture windows obscured by vertical blinds.

As they reached the shop, they came face to face with a trio of armed robbers. Sharon was shot in the chest at point blank range. Later, at the trial of Sharon's killers, Teresa said, 'We were a stride apart. Sharon walked in front of me. Then she stopped. She stopped dead – she stopped that quickly that I overstepped. I heard a bang and Sharon fell to the ground.'

Moments later, Teresa was also shot in the chest. 'I was lying on the floor. I was coughing up blood. I could feel blood running down my nose and blood over my face, and I was gasping for breath.' Yet she managed to press the panic button and alert the control room with those fateful words 'Code Zero'.

Peter Arnold, a Crime Scene Investigator (CSI) for the Yorkshire and Humberside Scientific Support Services, heard the code call on the radio. 'I'll never forget it. I could see the scene from the police station; it was literally just up the road. And suddenly there was a sea of police officers running up the road. I've never seen so many police officers running at one time, it was like a fire evacuation.

'At first I didn't know what was going on. Then I heard over the radio that someone had been shot, possibly a police officer. So I just ran too. I was the first CSI to the scene. I wanted to support the officers in terms of getting the cordons up, making sure we'd got the scene preserved, because it was very emotive at the time, as you can imagine, and we just needed to bring some order to that.

'I spent the best part of two weeks processing that scene. Some very long hours. I'd start at seven in the morning and wouldn't get home till midnight. I remember being absolutely exhausted afterwards, but at the time I didn't care. That will live with me forever. I'll never forget that scene. Not because it was so high profile but because it was so personal, because it was a colleague that had been murdered. The fact that Sharon was a police officer made her part of my family. Others who knew her were even more upset,

Police Officer Sharon Beshenivsky, who died after being shot at point blank range by a gang of armed robbers

but they all swallowed their grief and got on with the job.'

'And we had some very good forensic results that really contributed to the case as well, not just at that scene but at the peripheral scenes as well: the getaway vehicles and the premises they went to afterwards.'

The men responsible for the armed robbery that left Sharon Beshenivsky's husband a widower, and her three children motherless, were later brought to trial and jailed for life. The conviction was mainly down to the work of CSIs and other forensic experts, people who find evidence, interpret it and eventually present it in court. We will follow that evidential journey in this book.

Every sudden violent death carries its own story. To read it, investigators begin with two primary resources – the crime scene and the body of the deceased. Ideally they discover the body at the scene; looking at the relationship between the two

Edmond Locard, who opened the world's first crime investigation laboratory, also coined the forensic scientists' watchword, 'every contact leaves a trace.'

helps investigators reconstruct the sequence of events. But that's not always the case. Sharon Beshenivsky was rushed to hospital in the forlorn hope that she might be resuscitated. Other fatally wounded people sometimes manage to make their way some distance from where they were attacked. Some killers move the body, either with the intention of hiding it or simply to confuse detectives.

Whatever the circumstances, scientists have developed methods that provide detectives with an array of information to read the story of a death. To make that story credible in a court of law, the prosecution has to show that the evidence is robust and uncontaminated. And so crime scene management has become the front line in the investigation of murder. As Peter Arnold says, 'The scene is the silent witness. The victim can't tell us what happened, the suspect probably isn't going to tell us what happened, so we need to give a hypothesis that explains what has taken place.'

The accuracy of such hypotheses has developed in tandem with our understanding of what it's possible to learn from the scene of the crime. In the nineteenth century, as evidence-based

legal proceedings became the norm, the preservation of evidence remained rudimentary. The notion of contamination wasn't part of the reckoning. And considering the narrow limits to what scientific analysis could achieve, this wasn't such a big problem. But the limits expanded as scientists applied their increasing knowledge in practical ways.

One of the key figures in the understanding of crime scene evidence was the Frenchman Edmond Locard. After studying medicine and law in Lyons, he opened the world's first crime investigation laboratory in 1910. The Lyon police department gave him two attic rooms and two assistants, and from these cramped beginnings he grew the place into an international centre. From an early age Locard had been an avid reader of Arthur Conan Doyle, and was particularly influenced by *A Study in Scarlet* (1887), in which Sherlock Holmes makes his first appearance. In that novel Holmes says, 'I have made a special study of cigar ashes – in fact, I have written a monograph upon the subject. I flatter myself that I can distinguish at a glance the ash of any known brand, either of cigar or of tobacco.' In 1929, Locard published a paper on the identification of tobacco by studying ashes found at a crime scene, 'The Analysis of Dust Traces'.

He wrote a landmark 7-volume textbook on what he called 'criminalistics', but probably his most influential contribution to forensic science is his simple phrase, known as the Locard Exchange Principle: 'Every contact leaves a trace.' He wrote: 'It is impossible for a criminal to act, especially considering the intensity of a crime, without leaving traces of his presence.' It might be fingerprints, footprints, identifiable fibres from his clothing or his environment, hair, skin, a weapon or items accidentally dropped or left behind. And the converse is also true – the crime leaves traces with the criminal. Dirt, fibres from the victim or the scene itself, DNA, blood or other stains. Locard demonstrated the power of this principle in his own investigations. In one case, he unmasked a killer who appeared to have a solid alibi for his girlfriend's murder. Locard analysed traces of pink dust found among the dirt under the suspect's fingernails and proved that the powder

was a unique make-up made for the victim. Confronted with the evidence, the killer confessed.

The influence of dedicated laboratory scientists continues apace. But without the initial fastidious work at the crime scene, science has nothing to work on. One unlikely pioneer of reading a crime scene like a narrative was Frances Glessner Lee, a wealthy Chicago heiress who founded the Harvard School of Legal Medicine in 1931, the first of its kind in the US. Lee constructed a series of intricate replicas of actual crime scenes, complete with working doors, windows, cupboards and lights. She christened these macabre dolls' houses 'Nutshell Studies of Unexplained Death' and used them in a series of conferences on understanding crime scenes. Investigators spent up to ninety minutes studying the dioramas and were then invited to write a report on their conclusions. Erle Stanley Gardner, the crime writer whose Perry Mason mysteries were the basis for a long-running TV series, wrote: 'A person studying these models can learn more about circumstantial evidence in an hour than he could learn in months of abstract study.' The eighteen models are still being used for training purposes more than fifty years later by the Office of the Chief Medical Examiner of Maryland.

While Frances Glessner Lee would recognise the principles of modern crime scene management, most of the details would be alien to her. Paper suits, nitrile gloves, protective masks – all the paraphernalia of modern CSI work has given it a rigour that early criminalists only dreamed of. Such was the rigour that was brought to bear on Sharon Beshenivsky's murder; a textbook example of investigators following every promising lead to its conclusion. As always, detectives relied heavily on the information supplied by the forensics team.

At the front line in this process are the CSIs. They start their career path on a residential development programme that gives them a grounding in basic skills and techniques for identifying, collecting and preserving evidence. When they return to their base, they are closely mentored while they build up on-the-job experience, starting with lower level crime and working their way