

PREFACE

While giving a plenary presentation to a packed ballroom at a statewide conference of criminalists, Tina, a DNA analyst turned homicide detective, recounted her first cold case.¹ She stressed that forensic evidence is critical to the investigation of such cases:

I just got promoted to run with the big dogs up in homicide, and in my first month I got assigned a cold case, a sex crime case. Now that I am on the inside, I'm not wearing a white lab coat, I'm wearing a blue coat. Today I want to communicate how important it is for detectives to get information from you, the lab rats. Don't hold back—get it to us fast.

Displaying an image of side-by-side mug shots on the screen, Tina explained the background of the case:

This caper stars “Big Thunder.” Imagine this guy coming out of the trunk when you think you are going on a sex date, doing a stroll, as the call girls say. The two gals meet with suspect one, agree to sex, and then suspect two, Big Thunder, jumps out of the trunk. They beat the girls a little, find money on them, take them to a hotel room and rape them. On the way to the hotel they pick up a third assailant at a trailer park. The victims are repeatedly raped and beaten and the suspects take their IDs and cell phones. They think they are going to die.

In their investigation, the police tracked the calls made on the women's cell phones and interviewed a tow truck driver who identified two of the suspects. The investigators were familiar with these suspects, who had been arrested for a prior attack and for drunk and disorderly conduct. They found the two men and sampled their DNA for comparison with the rape kits from the women.

In her presentation, Tina projected a table of DNA profiles produced by the crime lab and took the audience through the results row by row:

The initial findings from the evidence kit from the victims shows semen on the vaginal swab and condom, amylase (found in saliva) on a neck swab. We have a huge amount of information, including DNA mixtures on a couple of these swabs. The profile on the vaginal swab matched the second suspect, Big Thunder, across the board, and the first suspect was a partial match to one of the mixtures. There are unknown profiles from some of the swabs and a condom.

Although the police were unable to identify the third suspect, the district attorney moved forward with the prosecution of the two in custody, typical in such situations. More unusual was what happened at the preliminary trial a year later. While telling the district attorney about the third man they picked up in the trailer park, one of the victims suggested that he looked like he could be the younger brother of the second suspect, Big Thunder. Hearing this, the district attorney decided to investigate whether the third assailant—the unknown source of DNA on the condom and other swabs—might be related to Big Thunder.

The police lieutenant asked Tina, as a former DNA analyst, to use her forensic science expertise to probe the details of the old case. Tina's work began with the DNA evidence. In her words:

I looked at the DNA results to do a familial DNA review. I compared Big Thunder's profile with the unknown profile, and it looked pretty familial: it matched at six loci and the remainder had shared alleles. Also, the transcripts in the file had the victims talking about a third assailant and we had a report in our database where all three of them were drunk and acting stupid, getting into fisticuffs.

Tina's familial DNA review was crucial for substantiating the hunch about the third suspect, and gave her the evidence needed to pursue him. As she described:

I do the legwork, find his driver's license and track him down in the Marines, which he had joined after his big brother was arrested. I lay out the "high degree of similarity" with a judge, who signed the arrest warrant.

I picked him up, submitted his DNA swab to the lab, and the victim picked him out of a photo array. Then I got the confirmation report back from the lab. In court, he was held to answer.

Tina's work enabled the justice system to convict all three suspects. In addition, her success in using her forensic expertise to crack a difficult case and find a dangerous suspect prompted the adoption of familial DNA profiling as a routine practice for cold cases in her jurisdiction.

Forensic evidence collected at crime scenes—DNA, fingerprints, bullets, and other materials—are a key tool for investigators in finding suspects, and stories like Tina's are commonplace. In one case that made headlines, the attempted 2018 pipe bombing attacks on US politicians and prominent critics of Donald Trump, a fingerprint on a package and DNA samples found on the devices in two others provided the clues needed for law enforcement officials to quickly locate and arrest the suspect.² More quietly, over the last several years thousands of backlogged rape kits have been analyzed through a funding initiative spearheaded by Manhattan's district attorney, which has so far resulted in sixty-four convictions.³ Forensic evidence propels investigations forward, links suspects to crimes, and exonerates those who have been wrongly incarcerated.

The work of the crime laboratory is critical to the pursuit of criminal justice. As a result, the stakes of that work could not be higher. Lives turn on the claims made on the basis of forensic evidence. And yet the evidence and those who analyze it are not infallible. Instances of laboratory error and malfeasance do occur, and their effects ripple throughout the criminal justice system. Problems with forensic evidence can undermine justice, waste taxpayer dollars, and damage public trust.

Consider the scandal stemming from the work of Annie Dookhan, a chemist in a Massachusetts state drug laboratory. In 2013, Dookhan pleaded guilty to multiple counts of evidence tampering and obstruction of justice stemming from her work handling narcotics evidence. She admitted to "dry-labbing," to identifying drugs without actually performing any tests. Dookhan had also contaminated evidence samples with known drugs, combined case evidence before testing, and forged signatures of other criminalists and evidence technicians.⁴

Dookhan's misconduct did not only compromise the lab. Because prosecutors, defendants, and juries depend on forensic science work, her crimes thoroughly shook the Massachusetts justice system. She had worked on thousands of drug cases during her tenure at the laboratory, and challenges to the convictions based on evidence she handled began to be heard in special courts almost immediately.⁵ The Massachusetts Supreme Court ruled that thousands of cases should be retried.⁶ Many people had been incarcerated for years on the basis of tainted evidence, while others "who deserve to be incarcerated for a very long time are going to walk," according to one defense attorney.⁷ Ultimately, over twenty thousand drug convictions in the state were dismissed.⁸

Errors in the analysis or interpretation of evidence have also led to wrongful imprisonment and individual harm. In one prominent example, Brandon Mayfield was jailed in Oregon in connection with the bombing of the Madrid commuter rail in 2004 on the basis of an incorrect fingerprint identification. In 2006, the US government formally apologized to Mayfield for his pain and suffering and awarded him a \$2 million settlement.⁹ DNA identifications are also fallible, as demonstrated by the release of Amanda Knox after four years of imprisonment in Italy for her alleged participation in the murder of her roommate. Geneticists working for her defense team argued that the amount of DNA found on the knife used as evidence to convict her was "vanishingly small" and could have been left there under innocent circumstances.¹⁰ Each of these cases show that forensic evidence is less a matter of black and white than the product of complex science entangled in high-stakes legal battles.¹¹

The cases we see in the news illustrate the significance of forensic science work: because it links suspects to crimes, this work has the power to change lives, making accuracy and expertise paramount. However, media stories largely obscure the true nature of the work of forensic scientists; their media portrayals as determined sleuths and unsung heroes are dramatically appealing, but they do not reflect what actually happens inside a crime laboratory.

The work of forensic scientists is both more mundane and more demanding than these images suggest. The analysis of forensic evidence is

highly technical, requiring painstaking effort at the lab bench. At the same time, forensic scientists evaluate evidence at the behest of investigators and prosecutors, within a hierarchy of courts and law enforcement agencies. Forensic science is performed in the service of justice, which means it is complicated by the relationships between the science and the law. The scientific work is intertwined with the other parties in this system and cannot be considered without examining these relationships. In this book, I will describe how those relationships play out, the ways in which they lead to tensions in the work of forensic scientists, and their implications for criminal justice as a whole.

BLOOD, POWDER, AND RESIDUE

