Pick your poison

TELEVISION

The US public broadcasting service recently showed a film adaptation of Deborah Blum's 2010 book, *The Poisoner's Handbook*, as part of its history series, *American Experience*. For the uninitiated, the book is a story of the early days of toxicology and forensic medicine, and the pioneering work that revolutionized criminal investigation. It is also a story of death, greed, corruption, business and government policy, and jealousy. The film adaptation — a seamless combination of dramatizations and interviews with experts — closely follows the book's narrative. It tells the tale of Charles Norris who, in the early 1920s as the newly appointed chief medical examiner for New York City, set out to develop a science-based system of detecting poisons and determining causes of death (before Norris's appointment anyone could be a coroner, appointments were often political favours and corrupt coroners were common). To assist him with this goal he hired Alexander Gettler, a determined young toxicologist, to run the chemistry lab.

The story arc of Norris and Gettler's life is told through the lens (or rather, the flask) of the poisons they studied. The film is broken up into sections: cyanide, arsenic, methanol, lead, carbon monoxide, radium and thallium. In each section, Blum and other toxicology experts describe how that particular poison can kill and how Norris and Gettler went about detecting its effects. These grim details are coupled with dramatizations of victims who fell — sometimes accidentally, sometimes deliberately — to these poisons. Each story tends to revolve around a particularly difficult case facing Norris and Gettler; the film is like a scientifically correct version of the *Crime Scene Investigation* franchise.

One of my favourite stories from the film adaptation was that of Frederick Gross, who had been wrongfully accused of poisoning his family. From the perspective of police officers the case seemed trivial: Gross had access to the poison in the form of pesticide; his family had all died whereas he was unharmed; and thallium was found in the cocoa tin that Gross had brought home for his family. Surely Gross was guilty of murder? But the district attorney remained unconvinced. Gross had little obvious motive for killing his family — he did not stand, for example, to gain financially — so the case was referred to Alexander Gettler's lab. Gettler, for the first time in toxicology history, used spectroscopic techniques to test for the presence of the suspected poison: thallium. His new technique paid off. He discovered that the family's cocoa had been contaminated with copper — known to give false positives in the original testing regime — rather than thallium. The bodies were exhumed and retested, this time using Gettler's spectroscopic technique to verify the previous results. This revealed that, although Gross's children had indeed been poisoned with thallium, his wife, Katherine, had not. She had died as a result of an unrelated case of encephalitis. Katherine had recently discovered she was pregnant and could not bear the thought of having to stretch the family budget to support another child, so she devised a plan to poison their children. This story, although tragic, meant that Gettler's creative lab work prevented the conviction and imprisonment of an innocent man.

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The story of Frederick Gross is an example of what I think makes *The Poisoner's Handbook* so great. It doesn't dumb down the chemistry; it draws the audience into it. A viewer at any level of chemical education would benefit from its explanations and dramatizations. There is usually a quick explanation of how the experiment works. Most of the experiments involve grinding, boiling and distilling flesh, and the book does not shy away from sharing all the gruesome details. There is also just the right amount of detail to keep the more experienced audience members interested as well (although watching chemists sniff a sample for the "nose-stinging whiff of formaldehyde" is a bit horrifying).

Watching the show, I couldn't help but feel a great deal of respect for these scientists. Norris and Gettler worked seemingly endless hours in pursuit of rigorous testing methods for many toxins, all the while using a lab that most chemists today would consider seriously lacking in resources. Norris didn't analyse his samples with the aid of nuclear magnetic resonance or gas chromatography–mass spectrometry. The closest we get to a modern analytical tool is a crude visible light spectrometer for detecting and distinguishing metals. The rest of the analysis was left to wet lab techniques, many of which Gettler himself developed.

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Chief Toxicologist Alexander Gettler holds a test tube, while Dr Charles Norris looks on.

The triumph of the story is the acceptance of science in the world of crime scene investigation. During Alexander Gettler's first appearance in court he was discredited by the prosecutor; the science he presented was questioned and his moral character was put on trial. By the end we see a complete role reversal, with prosecutors nearly shaking at the mention of his name. This change wasn't because Gettler had become more powerful — he was still just the toxicologist to the chief medical examiner — but because he had perfected his technique, convinced his peers and made it known that chemistry had the answers. Here, I see a parallel to modern chemistry and its communication to the public. We may have better equipment and more precise methods but our goal should still be to convince the public that chemistry has the answers they are looking for. ❐

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