Trials and Error · TheWalrus.ca

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Crime

Trials and Error

Bad forensic evidence and junk science continue to send innocent people to jail

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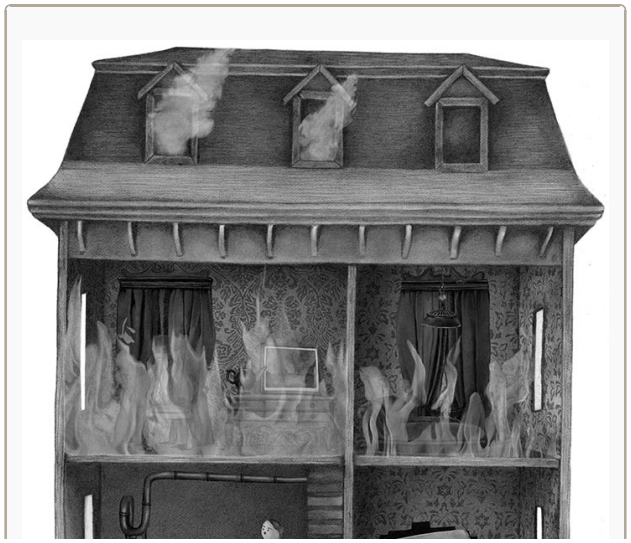
On a cold March night in 1998, volunteer firefighters found Leon Walchuk with traces of blood on his face, standing outside his burning farmhouse on the outskirts of Melville, Saskatchewan. Flames shot from the windows and the roof, and the fire lit up the prairie sky. His two small children, who had been staying with his parents nearby, had already rushed to the scene. “My dad came running out. He was all out of breath,” remembers Kimberly, five years old at the time. “We stood there watching the whole house burning.”

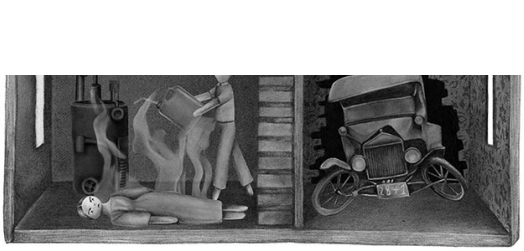
By the time the firefighters brought the blaze under control, much of the house was in ruins. Kimberly and her older brother, Steve, would soon discover that they had lost much more than their home. The body of their twenty-nine-year-old mother, Corinne, was found at the foot of the basement stairs, horribly burned, bruised, and beaten. Leon, then thirty-four, was promptly arrested, put on trial, and sentenced to life in prison two years later for setting the fire that killed her.

The tragedy tore the family apart: Walchuk’s two children, now adults, and his in-laws do not speak to him. And there is a bitter twist: from the beginning, he has insisted he is innocent. “The evidence speaks for itself: I didn’t set the fire,” he told me the first time I spoke to him, in June 2011. He was incarcerated at the Saskatchewan Penitentiary, beginning his second decade behind bars.



He will never become a poster boy for the wrongly convicted in Canada. At the time of Corinne’s death, the couple was in the midst of a nasty divorce. By all accounts, including Walchuk’s, they had had a vicious fight that evening. The case against him went like this: he beat his wife with a hockey stick in the basement, then poured gasoline inside the house and set it on fire to cover up his crime. The trial judge said in his ruling, “It has been proven that an accelerant was present,” a key factor in determining arson. “I have no reasonable doubt that Leon intentionally

started the fire which caused the death of Cory." A former fire chief testified that he was "100 percent sure a flammable liquid was used," and the medical examiner's autopsy report entered as evidence stated unequivocally that it was "an unnatural death by fire."



Burden of Proof In such cases as Leon Walchuk's, forensic evidence can be mistaken, misused, or misunderstood.

Case closed—or so it seemed. Forensic science, especially when it comes in the cloak of certitude, can go a long way to dispel reasonable doubt as a trial stumbles on in search of the truth. As an investigative journalist, I first became interested in the dangers of our justice system's reliance on forensic science when I produced a television documentary in 2000 and later wrote a book on the 1959 trial of Steven Truscott. The then fourteen-year-old was sentenced to death for murder, based on scientific evidence that was later discredited. The Truscott case was instrumental in shaping our views on wrongful convictions and ultimately contributed to the abolition of the death penalty in Canada in 1976.

That was well before the advent of DNA analysis and much of the high-tech evidence gathering played out in real-life courtrooms and on television. Sleuths on such shows as *CSI* and *Bones* often use invented scientific wizardry to catch bad guys, creating an appealing fantasy, in contrast to the at times frustratingly ambiguous world of criminal justice. Modern science has become better and more sophisticated, and our faith in its infallibility has grown. However, as any good scientist will tell you, science is a process, not an end point. The Walchuk case and many others I have probed over the years illustrate, all too often, that mistaken, misused, or misunderstood science is helping to send innocent people to jail.

"This is a very serious issue," says Alan Young, a professor at Osgoode Hall Law School, at York University in Toronto. He is the director of the Innocence Project, which filed an action for judicial review in 2009 to the federal justice minister on Walchuk's behalf. Founded by Young and a colleague in 1997, the Toronto organization encourages law students to re-investigate suspected cases of injustice. It has had some successes, notably helping to free an Ontario man, Romeo Phillion, in 2009 after he spent thirty-one years in prison for a murder he did not commit. Some of the most challenging cases it deals with involve forensic evidence that has been misinterpreted or is inaccurate. "People have to know how frequently bad science contributes to wrongful convictions," says Young.

Every year, as many as fifty law students apply for Young's Innocence Project class, and only about a dozen are accepted. The chosen few spend the school year talking to desperate inmates on the phone, sifting through mountains of court transcripts, and hunting for new evidence. On a rainy day last September, ten students sit in a small classroom at Osgoode Hall, their laptops open and fingers poised. The team has seven active cases and another eight under file review, selected from the thirty-four pleas they have received since last April.

"We're a clinic that flies by the seat of its pants," Young tells the students before launching into a sweeping history of wrongful convictions around the world. "Trials aren't about truth; they are about legal facts." Then he asks the class, "What do you think are the leading causes of judicial errors?"

Most get it right: faulty eyewitness accounts, notoriously unreliable, are the main reason for wrongful convictions. Then Young reveals that the second leading culprit is bad science and cites the most exhaustive research on the subject. A 2009 study published in the *Virginia Law Review* examined trial transcripts of 137 accused in the US who had been exonerated by new DNA evidence. In eighty-two of the cases—more than half—so-called forensic experts gave invalid testimony, including errors about shoe prints and hair samples.

The situation is as bad, if not worse, in Canada, Young tells me after class. By his count, bad science played a role in fifteen of the twenty-four most recent documented cases of wrongful convictions—more than 60 percent. "That's a shocking figure," he says.

It is common for prosecutors and the police in both countries to complain about the so-called "*CSI* effect," the largely anecdotal impression that jurors who are hooked on television police procedurals expect sophisticated crime scene tests and may well acquit criminals in the absence of such technology. But one could make a more plausible argument for the opposite: that we have developed a dangerous overconfidence in forensic science. A 2006 article in *Scientific American* estimated that 40 percent of the evidence gathering techniques shown on *CSI* do not exist. But that does not stop jurors or judges from placing enormous faith in science, and in untested or untrained experts.

Young calls it the "white lab coat" effect. "You have the man in the white lab coat stereotype approaching infallibility," he says. This worries him even more than the frequent occurrence of faulty eyewitness testimony: "It is far more sinister than eyewitness errors, because it has the sanctity and credibility of science. Judges and juries sleepwalk through this evidence. And this puts people in jail for life."

In early June 1959, the hunt was on for the killer of twelve-year-old Lynne Harper, whose body was found in the woods near an air force base in Clinton, Ontario. It took all of twenty-four hours for the police to arrest Steven Truscott, who had given the girl a lift on his bike around 7:30 on the night she disappeared. And it took all of two weeks for the trial to end with a conviction for her rape and murder. He was sentenced to hang.

In the largely circumstantial case, the linchpin for the prosecution was the testimony of John Penistan, the local coroner. He told the jury that his careful study of Harper's stomach contents had convinced him that she died between 7:15 and 7:45 p.m.—the exact window during which the police said Truscott was with her. As the prosecutor stressed in his summation, "Those facts [fit] like a vise on Steven Truscott and no one else."

Only a last-minute reprieve by the federal government, which was embarrassed by the prospect of executing a teenager, saved the boy from the gallows. He was released after serving ten years, condemned to spend the rest of his life on parole as a convicted murderer. For three decades, he lived under an assumed name. In 1997, he was approached by CBC's *The Fifth Estate*, where I worked at the time. It would take another decade of investigations and judicial battles—the CBC documentary, a book I wrote on the case, and a relentless series of appeals by Truscott's legal team—before he would clear his name.

We uncovered a perfect storm of junk science and tunnel vision by the cops. Penistan's "careful study" turned out to have involved little more than holding a jar of the dead girl's stomach fluids to the dim glow of a light bulb. In 1966, just as the Supreme Court of Canada was set to review the case, Penistan had what he called an "agonizing reappraisal" and widened his tight window for the time of death by several hours. The police and the prosecution, however, concealed this new evidence, and the court reaffirmed Truscott's guilt.

Ottawa eventually ordered the Ontario Court of Appeal to review the case in 2007. Michael Pollanen, the province's chief forensic pathologist, testified that Penistan's rush to determine time of death was "fraught with difficulty," and that the condition of Harper's decomposed body suggested that she could have been killed much later than previously thought. Other experts presented new evidence about the extent of maggot infestation, which indicated that she had died after sunset, when Truscott was no longer with her.

The court ruled Truscott's conviction "a miscarriage of justice" that "must be quashed." It singled out as "scientifically untenable" the medical evidence that condemned him. Truscott was eventually awarded $6.5 million in compensation. It had taken five decades for him to clear his name. (Lynne Harper's killer was never found, which underlines another tragedy of wrongful convictions: the guilty may get away with their crimes.)

I caught up with Truscott last spring at his comfortable home on the outskirts of Guelph, Ontario, which he bought with his settlement money. In the fifteen years I have known him, his wife, Marlene—who spearheaded his campaign—and their children, I have always been struck by the man's inner calm. He was never bitter about his lost years, not stoic so much as solid: aware of his innocence and convinced the rest of the world would see it, too.

Still, the years of being branded a murderer have taken their toll. He never received an apology from the police, the prosecutors, or the coroner. “Even later, if they came out and say, ‘I made a mistake,’ it would be something,” Truscott says. “But who among them did? ”

Forensic science has made huge strides since 1959. It has better tools to discover and analyze evidence such as blood spatters and DNA. Yet decades after Truscott faced the noose, a single mother on welfare in Peterborough, Ontario, found herself the victim of bad science. One night in January 1997, Brenda Waudby left her two young daughters with a babysitter, a teenage boy who lived upstairs. When she returned home, she learned that her twenty-one-month-old infant, Jenna, had been rushed to the hospital, where she died from head trauma and more than a dozen fractured ribs. When I began investigating the case for a television documentary in 2010, Waudby told me, “I wanted them to catch the killer, but they thought the killer was me.”

I had gone to film her in her cramped apartment. A determined chain smoker, she looked much older than a woman in her mid-forties. She was frank enough to admit that she understood why in 1997 the police suspected her: “At that point in my life, I was a horrible mother.” As she discovered, the hard facts of science, which should make trials more fair, instead seemed to reinforce biases held by the police, prosecutors, and the public against someone already seen as less than credible.

Back then, Waudby was a recovering cocaine addict. She had relinquished her kids to child welfare services, but had regained custody weeks prior to Jenna’s death. Charles Smith, the pathologist who testified in the case, was the province’s leading expert. “He was a god in this field,” Waudby recalled. “How do you ever get anybody to listen [to the idea] that he might be wrong? ”

Hospital staff had found rectal stretching and vulval tears—as well as a pubic hair—on Jenna and had suspected sexual assault. Smith ignored these findings and determined that the fatal blows to the toddler’s ribs and other parts of her body occurred at least a day before her death, which made Waudby the prime suspect. The police arrested her on charges of murder, and, largely due to Smith’s testimony at a preliminary inquiry, she was committed to stand trial in 1998.

Police and prosecutors consulted other medical experts, who pinpointed the time of the beating at less than six hours before Jenna died, when she was in the babysitter’s care. However, the authorities never fully disclosed these doubts to Waudby; instead, in June 1999 they stayed the murder charge and had her plead guilty to the lesser charge of child abuse.

The police later arrested the babysitter for second-degree murder and sexual assault in 2005 after the young man, who cannot be named because he was a minor at the time, confessed to an undercover cop that he had beaten and molested the child. (He pleaded down to manslaughter, and as a juvenile was sentenced to twenty-two months.)

Waudby’s battle was far from over. She had been one of the first to sound the alarm about Smith; as far back as 2001, she had written letters to the Ontario government begging it to investigate him, because his “oversights have destroyed many lives.” She found it hard to convince people to care about her case. “I made a lot of phone calls, I wrote a lot of letters, but it was difficult. Smith was way up there, and I was at the lower end. Accused of murdering my child, I was on the other side of that fence, at the very bottom of the scale.”

In 2008, after other wrongly accused people and their lawyers complained and journalists began to investigate Smith, a provincial inquiry, led by Judge Stephen Goudge, was called. He found that Smith had erred in his examinations in at least twenty child death cases, twelve of which had resulted in convictions. The Ontario government awarded some of Smith’s victims up to $250,000 in compensation.

Waudby used part of the settlement to buy a decent home for her family, and to pay for tuition at a community college, where she is completing studies to become a paralegal. Charles Smith was not the only one at fault,

she says. “It was all of the systems that work together to convict.”

In a bold speech at a Scottish law conference in March 2011, Canadian Supreme Court justice Thomas A. Cromwell told an audience of his peers that “when law and science meet in the courtroom, the encounter is often not a happy one.” Rather, the result can be “spectacular miscarriages of justice.”

The Goudge inquiry was just the latest in a line of provincial hearings into wrongful convictions based in part on bad science. In 1998, an Ontario probe into the case of Guy Paul Morin, sentenced to life for the murder of his nine-year-old neighbour, recommended sweeping changes to how the government handled forensic testing and testimony. In 2007, a Manitoba investigation into the case of James Driskell, jailed for fatally shooting a friend, pointed out problems with hair and fibre analysis.

All worthy endeavours, no doubt. But University of Toronto law professor Kent Roach, co-author of a legal textbook entitled *Forensic Investigations and Miscarriages of Justice*, worries that they have been piecemeal. “It seems to take a Dr. Smith, or some other discredited expert, to get people moving, but this is not a bad apple problem,” he says. “This is a problem with the whole orchard, in terms of how we understand and study forensic science.”

The American National Academy of Sciences published a landmark study in 2009, which found serious deficiencies in much of the forensic testimony that has become crucial to convictions. For example, fingerprint matches can be misleading. Here is a little-known fact: there have been no peer-reviewed scientific studies proving that unique prints can be matched accurately.

“There is no reason to believe that the concerns raised in the NAS report stop at the border,” says Roach. “When someone pops up and says the emperor is wearing no clothes, it is deeply unsettling, and I think the Americans have been prepared to do that more often than we have.”

The NAS report was particularly harsh on the state of arson investigation, focusing on analysis of burn or charring patterns, which were invoked in the conviction of Leon Walchuk and are sometimes used as proof of arson. I had a chance to see the tragic consequences of those errors in Texas, the death penalty capital of the United States.

In 1991, a fire tore through a rundown home in the small town of Corsicana, killing three little girls. Their father, an unemployed auto mechanic named Cameron Todd Willingham, was found guilty of arson and murder and spent twelve years on death row. In January 2004, just weeks before his scheduled execution, his attorney managed to get in touch with Gerald Hurst in Austin. Hurst is part of a new generation of arson specialists in the US, with training in chemistry, physics, or engineering.

Historically, arson investigators in the US were veteran firefighters who had come up through the ranks but had little scientific training. “They were relying on old wives’ tales, folklore, and fantasy,” Hurst explained when I spent an afternoon with him in 2010. With his thick grey beard and unruly hair, dressed in dusty black sweatpants, he looked more like an aging hippie than a Cambridge-educated doctor of chemistry. In his garage, which he uses as a makeshift laboratory, he lit several small, well-controlled fires to demonstrate his points.

Brown stains, or charring, were cited in the Willingham trial as proof of accelerant use. To demonstrate how these stains might be caused by other factors, he threw a lit match into a small pool of gasoline he had poured on the floor. When the flames were extinguished, it was the match, not the accelerant, that left the stain. He explained that objects such as falling debris may leave marks that can be misinterpreted as accelerant stains.

In the Willingham case, he argued that the marks at the house and other so-called evidence gathered by the fire investigators simply did not indicate arson. But his testimony was disregarded. The night before his execution on February 17, 2004, Texas governor Rick Perry refused to consider Hurst’s fresh evidence because, as he later put it, Willingham was “a monster who killed his children.”

Eight leading fire scientists have since reviewed and confirmed Hurst's analysis, but that is no consolation. When I asked him about the case, he shook his head in sadness: "They executed an innocent man," he said. A Texas state investigation eventually found that flawed science had been considered in the trial, and last October Willingham's family filed a petition seeking a posthumous pardon. Defence lawyers in Texas, Pennsylvania, Iowa, and Massachusetts are currently fighting to reopen arson convictions.

But here in Canada, advances in fire science have only slowly made their way into crime investigations and trials. "We started hammering the scientific method in the late 1990s and driving it home to our investigators," says Chris Williams, the fire investigations manager for the Office of the Ontario Fire Marshal. After the execution, he invited a scientist who had investigated the Willingham case to train his staff. "There is no reason whatsoever for a fire investigator in our office to form an opinion that a fire is incendiary based on these old wives' tales. That's all bunk," he says.

Still, there are no nationally enforced standards for designation as a fire investigator. Peter McAdam, the past president of the Canadian Association of Fire Investigators and a twenty-five-year veteran Toronto firefighter, says the process is ad hoc. "You have fire investigators who have several degrees," he says, "and others who hang out a shingle and call themselves fire investigators."

Some 650 Canadians are charged each year with damage to property from arson, and they can serve a maximum of fourteen years behind bars. Another 169 are charged under the most serious arson offence, setting a fire with disregard for human life, which carries a possible life sentence. Others, like Walchuk, face murder accusations in cases where arson is alleged to have been central to the death—"alleged" being the operative word. "In a homicide, in many cases someone has a knife sticking out of their chest," says Wayne Chapdelaine, a Nova Scotia fire investigator who was consulted for Walchuk's case by the Innocence Project team. "But a fire scene can look exactly the same regardless of whether someone poured gasoline on it or whether the coffee pot started the fire."

Back in 1998, it did not take long for the crime scene investigators in Melville to decide that Leon Walchuk had poured gasoline in his farmhouse to start the fire that killed Corinne. According to Leon's account, Corinne had driven to the house to pick up their children, and when she arrived he told her they were at his parents'. He claims that she crashed her car into the back porch in a fit of rage and came at him with a hockey stick. The fight continued inside the house, at the foot of the basement stairs. He says he heard the smoke detector go off. He ran upstairs, where he found much of the house in flames, and he tried to put out the fire with his jacket.

He and his lawyer would later suggest that either gasoline leaking from the crashed car or an electrical short started the blaze. But James Fairbank, the lead fire investigator, saw it differently. In his version of events, Leon had staged the car crash. Fairbank alleges that after beating Corinne, Leon poured a flammable liquid near her body and up to the top of the stairs. "The fire was then ignited, and the car was driven into the house for effect," Fairbank concluded in his inspection report. "This fire was deliberately set with the intention of covering up a crime."

On his lawyer's advice, Walchuk elected to have a trial by judge. Testimony from Fairbank and other experts was central to the prosecution's case that Walchuk had murdered his wife with premeditation. Justice L.A. Kyle of the Court of Queen's Bench ruled that Walchuk indeed "had planned… her death in the fire." On June 14, 2000, he sentenced Walchuk to life in jail for second-degree murder with no chance of parole for sixteen years.

It was painful for his children, growing up as orphans because of a fire that killed their mother and sent their father to prison. "You're a kid, and both your parents are taken away from you," Kimberly told me in 2011. Troubled and torn as a teenager, she had visited her father several times in prison, longing for a confession. "I didn't need him to tell the whole world that he was sorry and he did it," she said. "I just needed him to step up

and be a dad and tell me."

But Walchuk could not give his daughter the admission of guilt she craved. "What she wants to hear and what is reality weren't lining up," he says. "I'm better off being truthful with her."

His efforts to reopen his case failed. Then, in 2006, he heard about the work of Gerald Hurst, who agreed to look into the case pro bono. Hurst visited the almost decade-old crime scene in Melville, performed a controlled burn on a replica of the basement staircase, and studied the court record and the inspection reports.

His findings were strikingly similar to the flaws he had uncovered in Texas. "Outrageous" and "patently erroneous" were some of the terms he used in his report to describe the testimony at Walchuk's trial. Fairbank had made much of a "very definite pour pattern" on the farmhouse stairs, including heavy char under the bottom step. But Hurst determined that the pour patterns were more likely caused by drop fires from falling debris. The heavy charring Fairbank found on the bottom step was not indicative of arson, Hurst argued, because liquid accelerants generally produce short-lived flames that do not last long enough to burn through wood.

Furthermore, Hurst pointed out that Corinne's hair was almost entirely undamaged—next to impossible in gasoline fires, which produce huge flames and have an almost instantaneous effect on thin materials such as hair. Finally, the fact that no traces of accelerant were found on the stairs was strong evidence that none had been poured there. (Fairbank has never spoken publicly about the case, except in a 2006 CBC TV interview, during which he stood by his findings.)

Hurst says the original fire investigators were too quick to rule out the possibility that an electrical short had ignited the gasoline spewing from the car Corinne had driven into the house. He concluded that the arson evidence that sent Walchuk to jail for life was "clearly wrong."

Armed with Hurst's report Alan Young and his students from the Innocence Project took up Walchuk's case in 2007. Other independent fire experts backed up Hurst's conclusions, and after two years of work the project submitted a lengthy brief to the Criminal Conviction Review Group at the Department of Justice, arguing that the expert testimony that convicted Walchuk "was, at best, deeply flawed." An independent expert hired by Ottawa to review the evidence seemed to agree. While not ruling out the possibility of arson, he found "the fire patterns and physical damage were not consistent" with the Crown's theory that the fire had started in the basement. On the contrary, he told the justice department that the criticisms by Hurst and other defence experts recruited by the Innocence Project "are likely correct."

In November 2011, two years after the Innocence Project filed the action for judicial review, the government responded. It was a remarkable feat of judicial sleight of hand. Rob Nicholson, Minister of Justice and Attorney General, rejected Walchuk's plea to reopen his case, even as he admitted that the new scientific evidence effectively wipes out the central allegation that the fire was deliberately set.

In a seven-page letter, Nicholson acknowledged that the numerous reports by Hurst and others "seriously undermine the Crown theory that Walchuk intentionally started the fire using an accelerant." But he argued that "while it may now be impossible to establish conclusively the origins of the fire, there are many findings of fact… that point to Mr. Walchuk's guilt," including that he left Corinne "dead or dying" in the basement, did not tell firefighters she was in the burning house, and had made previous threats against her. Stressing that the judge found the beating to be "a principal factor" in Corinne's death, Nicholson insisted that the new forensic evidence "would not have impacted the trial judge's decision to convict in any event."

Young concedes that there is no getting around Walchuk's beating of Corinne. But Young says that, however reprehensible the violence, the fire was not foreseeable, and therefore there was "a break in the chain of causation" of death. "This is a case where you may not be talking about angelic innocence, but there are degrees of guilt," he says. "Even if the guy was aggressive with his wife, it is still a wrongful conviction. To

make the jump to murder is a great leap."

When I told Gerald Hurst about Nicholson's ruling, he was angry. He zeroed in on Nicholson's argument that none of the experts could rule out that Walchuk "did not intentionally start the fire in another manner in another location." To Hurst, that is setting the bar so high that no arson conviction could ever be overturned. "Of course, you could argue it could have been done in another way," he said. "It could have been a Martian ray gun! But the burden is on the state to prove its case. You can never prove that a fire was not arson. The only thing you can ever prove is that the state doesn't have the evidence that it was arson."

In effect, Hurst says, by focusing on Walchuk's fight with Corinne and dismissing the arson science, Nicholson was making the same error as the Texas governor who had condemned Cameron Todd Willingham as a monster. "Your Canadian minister is no better in his reasoning than Rick Perry," Hurst says. "He's being ruled by his emotions: 'He must be guilty of something because I don't like him.'" Put another way, science does not eliminate irrational bias; it can even exacerbate it.

In the fall of 2012, a year after Nicholson's ruling, Young and his students were still working on Walchuk's case. One day when I visit, three students are crowded into Young's cluttered office. His desk is covered with legal folders and a well-thumbed copy of the Criminal Code. The phone rings non-stop. Walchuk's file has spanned five school years, and now the case falls to a determined student named Tiffany Ticky. As Young fires off judicial precedents and policies, she scribbles down notes, using a pen and a pad amid a sea of smart phones and laptops.

Their strategy is bold. Although ministerial reviews under Section 696 of the Criminal Code are supposed to be the final word, the project is filing for a judicial review before the Federal Court of Appeal. Their argument turns on the narrow but crucial issue of whether Nicholson overstepped his legal bounds when he ruled that other evidence "point[s] to Walchuk's guilt."

"Despite clear factual and legal errors at trial, the minister upheld the conviction because he believes Leon is guilty," Young says. "But it's not a question of what he believes. It's a question of whether the record shows proof beyond reasonable doubt. So he employed the wrong standard in making his decision." It's a long shot. Judicial reviews of a justice minister's wrongful conviction decision have rarely been argued, much less won. But long shots are all that Walchuk, now almost fifty, has left.

I spoke with him again last fall. He was then incarcerated at Grande Cache Institution, a medium-security prison on the western border of Alberta. When he is not reviewing his case files, he watches police procedurals like the *CSI* franchise with the other inmates. He jokes that he wishes he had had some of TV's forensic super-sleuths on his team when he was on trial.

My investigations into these miscarriages of justice have taught me that the problem is not just bad science. There is closed-minded policing and overzealous prosecution. The accused are often outsiders who can be portrayed as deserving of punishment: a welfare mom on cocaine, an unemployed father, a man who beat his wife. Bad science adds a sheen of credibility to these stereotypes.

How to fix things? For starters, we need to improve the procedures used to train and certify forensic scientists. Among the key recommendations by the National Academy of Sciences in the US were rigorous, mandatory certification programs for forensic scientists, and strong standards and protocols for evidence used in court.

Canada does not have the equivalent of a national scientific body like the NAS. However, one of the recommendations from the Goudge inquiry was the establishment of accredited training programs for forensic pathologists. The University of Toronto has meanwhile set up the Centre for Forensic Science and Medicine to fill a major forensic research vacuum. It is headed by Michael Pollanen, the pathologist who testified at

Truscott's appeal hearing. "Wrongful convictions have raised reasonable questions about the reliability of science and medical evidence in the criminal courts," he told the audience at a conference he helped to organize in Toronto last fall. "Surprisingly, there is absolutely no structure in Canada for funding research into forensic science. There is no graduate program in forensic science at any Canadian university."

As well, judges are not educated properly to play a gatekeeper role in determining whether the scientific evidence is relevant and reliable. Goudge recommended that the National Judicial Institute conduct specialized science training for judges. There is now a two-and-half-day science course, but it is only held about every two years; the last one was in 2011, and the next is scheduled for 2014.

Justice Adèle Kent of Alberta's Court of Queen's Bench, who helps to design and organize the NJI's programs, points out that 90 percent of Canadian judges are generalists, so science training must compete with many other subjects. With that in mind, she is implementing another important recommendation from the Goudge inquiry: the creation of a scientific manual for judges. She hopes to have chapters on basic science and the law ready this year.

"Spectacular miscarriages of justice have taught us something," she says. "Judges have a heightened awareness that when they deal with science in the courtroom they must be careful with it. Will they understand every scientist that comes into the courtroom? Absolutely not. But I think they have the tools to be wary of science, and also to be unafraid to ask questions of scientists."

Perhaps that is the key: being respectful yet wary of uncertain science in a court of law that seeks judicial finality. Our courts are designed to issue a definitive verdict of guilt or innocence. But scientific conclusions are subject to constant testing and rethinking. "The law seeks to find a final resolution for a particular controversy, whereas scientific conclusions are subject to perpetual revision," said Supreme Court justice Cromwell in his landmark speech on the topic.

This is why law professor Kent Roach dislikes the term "junk science," because it implies that some science is patently false while the rest is 100 percent reliable. "It suggests that if it's science that somehow it's the magical answer," he says. "For all expert evidence, the judge needs to look at reliability. Has it been tested? Is it possible to come up with an error rate? Even fairly sophisticated science is not foolproof."

Brenda Waudby, for one, is not going to wait for judges to bone up on their science. She expects to graduate from college this spring and hopes to begin work as a paralegal. She is convinced that as a victim of bad science in the courts, she can bring some much-needed perspective to the halls of justice. "I can look at a case with different eyes than most," she says. "You have to be skeptical about the experts who are testifying. You can't take what they say as the only opinion, because we know that experts differ. And they get it wrong."

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