casting doubt on studies alleging, for example, that an artificial sweetener causes brain cancer and that debt causes illness. He criticizes a handful of peer-reviewed articles, including some published in *Nature*, for making claims that, in his eyes, go beyond common sense. For example, Seife thinks it unlikely that wearing red helps Olympic fighters to win, offering his own analysis of results from the 2008 Beijing Olympics as proof. He dismisses other assertions, such as that wide-hipped women give birth to more sons than daughters, as mixing up cause and effect. Seife highlights how scientists can sometimes be seduced by models whose curves fit their data, attributing misguided efforts to find causal relationships to a "misfiring of our pattern-seeking behavior".

Moving on to the legal system, Seife describes how probabilities may be taken out of context in court. Statistics showing that particular crimes or events are rare have wrongly been cited as proof of innocence and guilt — delivering what Seife calls "judicial nonsense". In business, problems arise when numbers are used to under- or overstate potential dangers. Whereas the media tend to overplay risk, Seife reminds us that "underestimating risks, not exaggerating them, is where the money is". He points to prominent company directors who hid their firms' liabilities, and corporate banks that had to be bailed out by governments because of their reckless underestimation of credit risk.

Seife can overstate his case, as when he claims that proofiness is robbing us of "the democratic right to think for ourselves", oiling the "machinery of death" and "crippling our economy". He does little to explain why, given the onslaught of phony figures, many people remain susceptible to them, and he provides few practical suggestions for reducing their influence. Yet there is plenty of healthy scepticism and common sense in Seife's taxonomy of statistical malfeasance. In a world of unreliable numbers, *Proofiness* is a helpful guide. ■

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FORENSICS

Crime-scene science in the dock

Two books chart the growth of forensic science from its birth to modern times, finds **Laura Spinney**.

The Killer of Little Shepherds: A True Crime Story and the Birth of Forensic Science
DOUGLAS STARR
Knopf/Simon & Schuster: 2010/2011. 320 pp. $26.95/£16.99

The Murder Room: The Heirs of Sherlock Holmes Gather to Solve the World's Most Perplexing Cold Cases
MICHAEL CAPUZZO
Gotham/Michael Joseph: 2010. 448 pp/384 pp. $26/£17.99

Here are two books that span an era. Douglas Starr's *The Killer of Little Shepherds* describes the birth of modern forensic science in France in the late nineteenth century, revealing how it led to the capture of a serial killer. Michael Capuzzo's *The Murder Room* revisits cold cases from the past 50 years, just as the field of forensics is beginning to modernize and move in a new direction. Both accounts are riveting. But whereas Starr knows he is writing about a period of intellectual upheaval, Capuzzo seems impervious to the winds of change.

Starr's hero is the French physician and criminologist Alexandre Lacassagne, who established the ground rules for many forensic disciplines, from autopsy and blood-spatter analysis to toxicology and psychology. He worked in exciting times for the field. Between 1885 and the First World War, when Lacassagne's school of forensics in Lyons was influential, anthropologists Francis Galton in Britain and Juan Vucetich in Argentina were classifying fingerprint types for identification purposes, Austrian physician Karl Landsteiner discovered blood groups and, in 1897, a Parisian blaze provided the backdrop for the first identification of corpses by their teeth. The application of probability theory to the interpretation of forensic evidence in court was highlighted by the Dreyfus affair — the trial in France of artillery officer Alfred Dreyfus for treason, which hinged on the analysis of handwriting in an incriminating document.

Lacassagne brought such forensic advances to bear on the case of Joseph Vacher, a serial murderer whose victims included young shepherd boys out watching their flocks in rural France. Through analyses of the crime scenes and victims' bodies, the criminologist showed that Vacher's crimes were premeditated and systematic, implying that the killer was not insane. Vacher was convicted in 1898, and executed by guillotine.

Similar forensic methods are still used more than a century later. Capuzzo's heroes in *The Murder Room* are William Fleisher, a former special agent with the US Federal Bureau of Investigation, and forensic psychologist Richard Walter and forensic sculptor Frank Bender, who together founded the Vidocq Society in Philadelphia, Pennsylvania, in 1990. Taking its name from the nineteenth-century French crook-turned-crimefighter Eugène Vidocq, the non-profit, closed society brings together 150 volunteer experts to solve crimes that have gone cold. From forensic scientists to business leaders, the membership pools its knowledge once a month, over lunch, to home in on perpetrators

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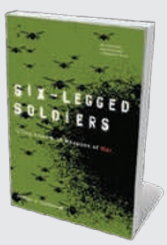
Origins of Human Communication
Michael Tomasello (MIT Press, 2010; £13.95)
Developmental psychologist Michael Tomasello examines the evolutionary origins of human communication. Sharing information with and helping others, he suggests, is the main purpose of speech and gesture. Such goals require the development of complex linguistic grammars.



Six-Legged Soldiers: Using Insects as Weapons of War
Jeffrey A. Lockwood (Oxford Univ. Press, 2010; £9.99)
From scorpions used by Roman armies to beetle infestations spread in the cold war, entomologist Jeffrey Lockwood reveals insects' military uses. Reviewer Kenneth J. Linthicum described it as "an excellent account" (*Nature* **456,** 36–37; 2008).

and to avenge forgotten victims. They do so because they value justice, and because they enjoy the chase.

Capuzzo describes the Vidocq Society's successes, including the identification of John List, who murdered five members of his family in 1971 and remained a fugitive for some 17 years. But what is striking about *The Murder Room* is that — with the notable exception of DNA profiling — the twentieth century added little to the nineteenth-century foundations of forensics. If Lacassagne attended a Vidocq Society lunch today, most of the techniques discussed would be familiar to him. Two modern techniques that he would not recognize — the lie detector and criminal profiling — are popular with law enforcers, although their efficacy has never been clearly demonstrated.

Together, these two books give the impression that the late nineteenth century was a golden era for forensic science and that the field has been treading water since then. Yet it is currently experiencing a crisis, which has been brewing since the advent of DNA profiling in the 1980s. Because DNA analysis had already been thoroughly validated in the academic context, its introduction raised the scientific bar for all forensic techniques — and many of them have been found wanting.

In February 2009, the US National Research Council (NRC) published a highly critical report that challenged forensic science to demonstrate its scientific credentials. The report pointed out, for example, that fingerprint analysts' long-standing claims of zero error rates were not scientifically plausible. Almost all of the techniques in use in forensic labs today — from ballistics to analyses of handwriting, shoe prints and blood patterns — came in for criticism. The NRC's message to forensic science was clear: either drag yourself out of the nineteenth century, or the police and the courts will sideline you. Yet the problem is not only in the United States — modernization of the whole field, along with the laborious empirical testing which that will entail, seems inevitable worldwide.

Capuzzo's book may unwittingly describe the end of an era. Because members of the Vidocq Society rely on law enforcers to feed them cold cases, they too will have to respond to the challenge of modernization. As nineteenth-century French forensics pioneer Alphonse Bertillon discovered to his cost in seeking the truth — his reputation was destroyed after he failed to apply probability theory correctly and wrongly attributed that damning scrawl to Dreyfus — the road to hell is paved with good intentions. It is better, in the end, to have good tools. ■

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