Unlocking the Cells

DNA technology frees the innocent as well as convicting the guilty.

By Ronald Bailey

The impeachment of President Clinton underscored the growing importance of DNA evidence in criminal investigations. If it weren't for the telltale stain on a certain blue dress, the president might still be insisting that he "never had sexual relations with that woman, Ms. Lewinsky."

DNA testing was first used in Britain in 1986 to prosecute serial rapist and murderer Colin Pitchfork. Today, DNA testing is regularly used to convict criminals, much as fingerprints have been for many years. "No other form of evidence for identifying human beings has gone through such a rigorous scientific and legal validation as DNA has," says Christopher Asplen, executive director of the National Commission on the Future of DNA Evidence, a panel of expert advisers set up by the U.S. Department of Justice. "Now it's the most reliable evidence we've got."

DNA testing is a powerful way to identify people because nearly every human cell contains it, and each person's DNA is unique (except in the case of identical twins). In 1998, the Federal Bureau of Investigation created the National DNA Index System (NDIS), which links the DNA databases of 18 states so far. Eventually, all 50 states are expected to participate in the NDIS. These databases currently contain the genetic profiles of some 210,000 criminals and are expanding rapidly.

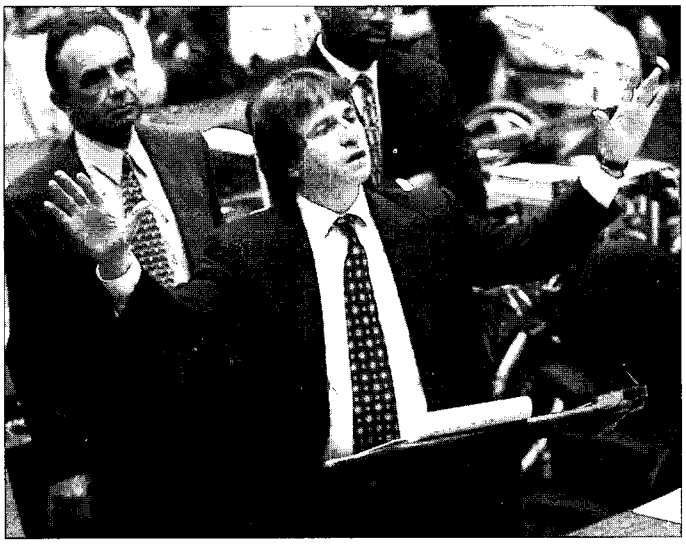
The profiles are based on DNA samples collected from people who have been convicted of murder, manslaughter, rape, or aggravated assault. Some states, such as Virginia, require that all convicted felons provide DNA samples for profiling. The databases are far from complete. Paul Ferrara, director of the Virginia Division of Forensic Science, estimates that the DNA of 1 million felons nationally should have been collected but has not been and that half a million samples that have been collected are still not profiled.

Despite these shortcomings, the databases have dramatically proven their value, solving scores of old murder and rape cases by matching DNA evidence from those crimes to DNA profiles. Florida claims to have made some 200 "cold hits" using the databases, and Virginia reports 78. A "cold hit" occurs when police who have no leads find a suspect by checking the DNA from a crime scene against the DNA profiles in the databases. Great Britain was an early innovator in DNA profiling, and British police claim to solve 300 to 400 crimes per week using DNA databases. DNA databases are effective because many criminals make a career of crime: In two studies, one in 1991 and another in 1995, political scientist John DiIulio reported that, based on interviews with prison inmates, they had committed an average of 12 crimes in addition to the ones for which they were caught and convicted.

Various types of DNA fingerprinting have been developed since the mid-1980s, but state-of-the-art DNA profiling depends on what are called "short tandem repeat" polymorphisms (STRs). STRs are segments of DNA that show considerable variation between individuals. Criminal investigators have adopted a standard using 13 STR core loci for identifying genetic differences between people. These loci are not genes but areas of "junk" DNA found in all human beings. Testing one locus gives a 1-in-500 chance that a particular sample of DNA came from a particular individual. Testing all 13 loci changes the odds to 1 in 82 billion. At $50 a profile, STR profiling is significantly cheaper than earlier technologies.

DNA testing is also a powerful tool for exonerating people who have been imprisoned for crimes they didn't commit. In September, the National Commission on the Future of DNA Evidence released a report, *Postconviction DNA Testing: Recommendations for Handling Requests*, addressing such cases. "Commission members have an absolute sense that every single day that some innocent person sits in jail is too long," says the DOJ's Asplen.

The commission's report outlines a process by which prosecutors, defense attorneys, and judges can evaluate requests by inmates for postconviction DNA analysis based on the likelihood that such an analysis, had it been available at the time of conviction, would have changed the verdict. The report recommends that prosecutors and judges, if they can, waive the time limits on mo-



Genetic Winner: The Innocence Project's Barry Scheck cross-examines a witness at the O.J. Simpson double-murder trial in 1995.

AP / WIDE WORLD PHOTO

tions for a new trial based on newly discovered evidence of innocence. States established such time limits because evidence deteriorates, memories fade, witnesses die or move, and courts should not waste scarce resources on retrying old cases. Moreover, many states mandate the destruction of evidence after a certain period of time.

"The biggest problem with the commission's recommendations is that they are only recommendations," says defense attorney Peter Neufeld. "Prosecutors don't have to follow them if they don't want to." Neufeld and Barry Scheck, the DNA experts for O.J. Simpson's defense team, founded the Innocence Project in 1991 at Yeshiva University's Cardozo School of Law. The Innocence Project focuses on using DNA evidence to help inmates exonerate themselves. So far 65 inmates nationwide have been freed using DNA evidence, usually in cases where DNA testing technologies were not available at the time of the original trial.

Neufeld bases his concerns about whether prosecutors will follow the commission's recommendations on his experience that in most of the cases taken on by the Innocence Project, prosecutors refused to consent to DNA testing. Neufeld estimates that thousands of prisoners might be exonerated if DNA evidence were available for testing. But there is no biological evidence to evaluate in 70 percent of the cases initially reviewed by the Innocence Project. Nevertheless, Neufeld says they have a backlog of 1,000 cases, of which only 200 are being actively pursued.

Right now only two states, Illinois and New York, have laws giving prisoners the right to postconviction DNA analyses. Neufeld and Scheck propose that the federal government or every state adopt legislation that would permit postconviction DNA testing that would be paid for by the government.

Also, they want laws enacted that would allow access to evidence even for inmates who do not meet the threshold criteria for states to pay for DNA testing but who are willing to pay for the DNA tests themselves. Also, they want no time limits on new trials in which new DNA evidence could exonerate an inmate. Neufeld and Scheck recommend that biological evidence from a crime scene be preserved at least as long as an inmate convicted for that crime on the basis of that evidence is in prison—a point on which Virginia's Ferrara concurs.

As DNA testing improves, other questions will be raised. Now only convicted felons must submit to DNA testing. In the future, will police be able to require suspects and arrestees to provide DNA samples for matching against crime scene evidence and DNA databanks? Ferrara analogizes this use of DNA testing to fingerprinting. Today, arrestees must provide the police with their fingerprints. Someday they might have to hand over blood or other tissue for DNA sampling. Soon, Asplen notes, DNA testing technology will be able to use the cells left behind by ordinary fingerprints for DNA profiling.

Since it doesn't test for genes, STR profiling can only identify people and does not provide any genetic information that might be of interest to, say, health insurers. But even after the STR profiles are obtained, Virginia and other states keep the biological samples taken from felons. It is not too hard to imagine future researchers trying to gain access to those samples in order to prospect for genes that predispose people to violent or otherwise antisocial behavior. Also, British investigators are beginning go beyond simple STR identifiers to look for DNA markers in genes for eye color, hair color, and race that would help them construct fuller physical profiles of suspects.

Britain and France often use "voluntary" mass screenings to find criminals in a community. For example, in 1996 the murderer of a 15-year-old girl was caught through a mass screening of 2,000 local men in Cardiff, Wales. For those who say it can't happen here, Neufeld reports that a Florida investigator recently told him of a murder case in which 250 men were asked to provide DNA samples voluntarily. The investigator told Neufeld, "Not a single man we asked refused to provide a sample." The murderer was caught—not through DNA screening but when he tried to kill another victim.

In the science fiction movie *Gattaca*, which portrays a dystopian world of genetic haves and have-nots, the hero is nearly caught by the gene police when he leaves a stray eyelash in the wrong place. This scenario is not so far-fetched, since everyone is constantly shedding DNA-containing material such a dry skin cells, hair, and saliva. Improved DNA testing techniques could use this type of everyday DNA evidence to keep track of people.

Clearly, DNA testing is an increasingly powerful forensic tool, and we should be on constant guard for potential abuse of it by the authorities. But the exoneration of convicts based on DNA evidence shows that the technology can also be used as a check on government, and proposals for public financing of these tests make sense. Indeed, the federal and state governments should be eager to pay for DNA testing and analysis to be sure that no innocent person has been wrongfully imprisoned. After all, if the government isn't about rendering justice, what is it about?

Ronald Bailey (rbailey@reason.com) is REASON*'s science correspondent and the editor of* Earth Report 2000: The True State of the Planet, *published by McGraw-Hill in November.*

Electric Visions

Unleashing the market for power

By Ryan Oprea

Electricity isn't just one of the nation's largest industries. It's one of the most heavily regulated. More than a century's worth of federal, state, and local laws have straitjacketed it, stifling innovation, raising prices, and wasting resources. The industry that fuels the rest of American industry is in dire need of reform.

Congress recognizes this. But a lot of special interests are at work in Washington, pushing different ideas about what that reform should look like. Under America's complex regulatory regime, electricity has become a labyrinth of public and private sub-industries, each governed by different rules, each with its own interests—and each with its own lobby.

Outside the industry, several more lobbies have joined the debate, from environmentalists to retirees. The North American Electric Reliability Council, for instance, creates voluntary rules for the industry, and would like to make them mandatory. There's even a National Alliance for Regulatory Utility Commissioners, to represent state regulators' interests.

With so many voices, it can be difficult to discern the real issues at stake. But there is general agreement on—or reluctant acceptance of—one point: Like it or not, competition is already coming to the industry.

Small, entrepreneurial companies have found tiny cracks in the regulations where they can innovate and compete. Plug Power, for instance, is developing a fuel cell technology that could allow homes and small businesses to produce their own energy. Trigen Energy has found ways to dramatically improve efficiency in power production—and claims a competitive industry would have every incentive to follow its lead. Such enterprises represent the possibilities of a dynamic, less regulated marketplace. It's unclear, though, whether there is room in Washington for a bill that would unleash all the creativity of companies like Trigen and Plug.

It's not as though the electricity market has never been competitive before. For a long time, policy makers assumed that it was a natural monopoly—that only one firm could operate profitably in each market. But over the last two decades, Burton Behling, Harold Demsetz, and other economists have discovered that the early industry was remarkably competitive. In the first 10 years of the century, in cities across America, consumers could choose from more than one electric company. In that environment, production quadrupled and prices fell 26 percent.

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In 1907, with competition eating into their profits, the oldest firms began lobbying to consolidate the industry. States passed laws guaranteeing exclusive franchises to those utilities and propping up their prices. Unnaturally large holding companies began to develop, channeling their monopoly profits (as high as 2,000 and 3,000 percent in exceptional cases) into other industries and spreading into other states (thus partially shielding themselves from state takeovers).

The federal government responded by passing interstate legislation. In 1935, the Public Utility Holding Company Act prevented utilities from entering other energy-related businesses and severely restricted their capacity for growth. (A 1995 study by Paul Carpenter and Frank Groves of the Central and South West Corporation estimated that this law costs the industry $3 billion to $12 billion each year.) Also in 1935, Congress established the Federal Power Commission, later reorganized as the Federal Energy Regulatory Commission; to this day, its complex rate and merger regulations delay and contort changes within the industry. Finally, the feds instructed the Army Corps of Engineers and the Bureau of Reclamation to erect the Tennessee Valley Authority and five Power Marketing Administrations, offering tax-subsidized and regulation-exempt power to different parts of the country. That, combined with even more stringent regulations on the state level, is how the industry was regulated until the 1970s, when a new law inadvertently opened the door to change.

In the late 1970s, the new Department of Energy was eager to develop environmentally sound, renewable resources. To that end, in 1978 Congress passed the Public Utility Regulatory Policies Act (PURPA), which required utilities to purchase a portion of their electricity from environmentally friendly producers.

At that time, the industry was dominated by huge, vertically integrated firms. These companies owned electric generation plants, vast networks of electric lines (known in the industry as the transmission grid), and local distribution facilities; they produced, moved, and distributed electricity in one bundle to consumers. PURPA forced those utilities to let small, independent nonutility generators sell energy to other producers over the transmission grid. Suddenly, hundreds of companies could produce and sell their electricity in the wholesale market.

PURPA caused a number of problems: It gave states the power to set prices, for