

Genes and The Law

"The Dark Side of DNA Profiling: Unreliable Scientific Evidence Meets the Criminal Defendant" by Janet C. Hoeffel, in *Stanford Law Review* (Jan. 1990), Stanford, Calif. 94305.

Police and prosecutors rejoiced in 1987 when DNA "fingerprinting" was introduced in the nation's courts. "If you're a criminal," one DNA analyst boasted, "it's like leaving your name, address, and social security number at the scene of the crime. It's that precise."

Far from it, retorts Hoeffel, a Stanford law student. DNA fingerprinting is dangerously inexact.

Unfortunately, nothing so straightforward as simply matching fingerprints is involved. Rather, in the complex eight-stage technique usually employed, the DNA is chemically chopped up, certain fragments are isolated for analysis, and images are made on x-ray film. The analyst looks at the pattern of bands (alleles) in the images; if he sees a match, he calculates the odds that it could occur at random. Then he goes to court.

The technique's shortcomings were dramatized during the 1989 trial of Joseph Castro, a Bronx, New York, building su-

perintendent who was accused of murdering his tenant, Vilma Ponce, and her two-year-old daughter. Police found some dried blood on Castro's watch, and a DNA analysis firm called Lifecodes declared that it matched Ponce's. In most cases, Hoeffel says, Castro would have pleaded guilty. But his attorneys fought on, revealing many flaws in the new technique.

For example, part of the eight-stage analysis involves the use of radioactive DNA (called "probes") to isolate bits of the sample DNA. But the sample can easily be contaminated by the probes—or by another sample, or by bacteria. In the Castro case, two extra bands showed up in the blood taken from the watch; Lifecodes scientists simply assumed they were the result of bacterial contamination.

That highlights some other problems. For example, test reliability decreases the smaller and older the samples are. And the scientific community does not even agree on the criteria for declaring a match be-

A Computer Crime Wave?

Computer crime already costs the nation an estimated \$3-\$5 billion annually. Writing in *Technology Review* (Feb.-March 1990), Kenneth Rosenblatt, an assistant district attorney in Santa Clara County, California, predicts that the worst is yet to come.

Our society is about to feel the impact of the first generation of children who have grown up using computers. The increasing sophistication of hackers suggests that computer crime will soar, as members of this new generation are tempted to commit more serious offenses. Besides raising prices, computer crime endangers our country's telecommunications systems, since phone-company switching computers are vulnerable to sabotage. The spread of scientific knowledge is also at risk; to prevent "viral" infections, research institutions may have to tighten access to their computer networks . . .

New [deterrent] strategies are urgently

needed. The first step is to abandon the idea that local police departments can fight computer crime effectively. Instead, high-technology regions need special task forces whose sole purpose is to apprehend computer criminals. The second step is to fit the punishment to the crime . . .

Many offenders depend psychologically and economically upon computers. They spend all their time with computers, and they work, or expect to work, in the computer industry. Thus, punishments that impinge upon this obsession will do more to curb abuses than fines or community service ever could. I suggest three such sanctions: confiscating equipment used to commit a computer crime, limiting the offender's use of computers, and restricting the offender's freedom to accept jobs involving computers. These penalties would be supplemented by a few days or weeks in a county jail—longer in serious cases.

tween two samples—just how much alike do the various bands have to be? And what does it mean if they do seem to match? When Lifecodes (incorrectly) concluded that the blood on Castro's watch matched Vilma Ponce's, it declared that there was only one chance in 100 million that it could also match somebody else's. But two defense experts put the odds at one in 78 and one in 24, respectively.

How do the courts deal with such complex issues? Many state courts rely on the so-called *Frye* rule. It dates from a 1923 case in which the U.S. Supreme Court, asked to rule on the validity of an early form of lie-detector test, said that prevailing opinion among scientists was the best

guide. But which scientists? DNA fingerprinting cuts across disciplines. All too often, the scientists who work for private fingerprinting companies are the ones whose expert opinion is solicited. And many courts are switching to a newer standard—based on a 1978 U.S. Court of Appeals decision allowing the use of spectrographic voice analysis—which allows juries to decide what is admissible.

Hoeffel doubts that the courts are competent to judge such new technologies. DNA fingerprinting, she concludes, ought to be judged by a panel of experts vested with the authority to establish uniform testing standards—if they find the technique to be valid.

Morphine's Merits

"The Tragedy of Needless Pain" by Ronald Melzack, in *Scientific American* (Feb. 1990), 415 Madison Ave., New York, N.Y. 10017.

The young soldier who becomes addicted to drugs because he received morphine for war wounds is a stock character in popular mythology. But his like is seldom found in real life, says Melzack, a psychologist at McGill University.

For reasons that are not very well understood, people who are given morphine solely to control pain rarely become addicts—even if they take the drug for months at a time. Two researchers at Boston University studied 11,882 patients who were given narcotics to relieve pain and found that only four of them later became drug abusers. Another study found that of more than 10,000 burn victims treated with narcotics, only 22 subsequently had drug problems, and all of them had prior histories of drug abuse.

Unfortunately, says Melzack, most physicians are as ignorant of these facts as the general public is. In the United States and Britain, physicians who are fearful of turning their patients into addicts either avoid morphine altogether or mete it out too sparingly. (In much of Europe, even medical uses of morphine are outlawed.) As a result, he says, cancer, burn, and other patients are forced to suffer needless agony.

In his own research, Melzack has discov-

ered that morphine has an effect on "two distinct pain-signalling systems in the central nervous system. One of these—which gives rise to the kind of pain typically treated with morphine—does not develop much tolerance to the drug [i.e. need for increasing doses]."

That system is the medial system, which is responsible for persistent pain. Evolution seems to have sculpted it into a network suited to producing unpleasant physical and emotional sensations long after an injury has occurred, feelings which "would help ensure that, having survived an immediate threat, a wounded individual would feel miserable and so remain inactive long enough to heal." The lateral system, on the other hand, is a quick response mechanism for pain. For evolutionary reasons, it is subject to rapid inhibition: In nature, injured animals must be able to run or fight for survival.

Melzack and other researchers believe that this may explain why the lateral system develops a high tolerance for morphine. They have also discovered that morphine's effects vary a great deal from person to person and from group to group, which suggests that drug addiction may have a genetic component.