The Test

by Deborah Rudacille

The Maryland State Police Forensics Laboratory in Pikesville is oddly quiet on a Wednesday afternoon in February. A single researcher in scrubs and a facemask pads around one of the labs where DNA is extracted, purified, and analyzed. Otherwise the rooms full of gleaming lab benches and new equipment are empty of both scientists and dog-eared photocopies of *Far Side* cartoons—a usually reliable indicator of intense scientific activity. Forensic biology manager Daniel Katz directs a staff of twenty-one, but on the day I visit, the two-year-old lab has the look of a model home or a stage set—beautiful but empty.

The lab may be jolted out of its torpor soon, if state legislators pass one of two proposed bills authorizing police to create genetic profiles of people arrested for felonies, burglaries, and some breaking-and-entering crimes. Right now, Maryland—like forty-four other states—takes DNA "fingerprints" of those convicted of violent felonies and links them to a national database, but mass DNA sampling of those arrested on suspicion of committing a wide range of crimes, from misdemeanors to murder, is a national trend. Since Virginia passed the first arrestee-sampling law in 2003, ten other states have followed suit.

Advocates of such expansion, including Maryland governor Martin O'Malley, hail it as a powerful tool to fight crime. In testimony submitted to support the bills debated in Annapolis in February, O'Malley cited the case of a career criminal arrested sixteen times since 1976 for crimes ranging from attempted murder to robbery. "Had we been able to take a DNA fingerprint at the time of those arrests," O'Malley said, "we would have been able to charge him with murder and rape years earlier—and at least one of our neighbors would have never become a victim." (At press time, the bills had not been scheduled for a vote.)

Civil liberties advocates have a host of concerns about the coming expansion of DNA profiling. Some are purely practical: The sharp increase in the volume of arrestee profiles will overwhelm an already sluggish system struggling with backlogs in the processing of crime-scene DNA, which is arguably more useful in solving crimes. But others revolve around concerns that arrestee-sampling laws can deepen racial bias in law enforcement.

Given the demographics of the state's criminal justice system, the great majority of arrestee DNA samples will come from African American men living in urban areas, a group with a lifetime risk of arrest of more than 50 percent. Even if never charged nor convicted of a crime, once an arrestee's DNA profile is archived in the FBI's database, that individual becomes—in the genetic sense—a perpetual suspect. It's the equivalent, says Maryland ACLU legislative director Cindy Boersma, of "putting the African American community under genetic surveillance."

The only way to avoid that problem? Even the playing field by sampling everyone, creating a universal DNA database.

In 1990, the FBI launched the Combined DNA Indexing System (CODIS), a national database of identifying genetic information. Fourteen states agreed to share DNA collected from convicted felons and at crime scenes. The goal of the program was twofold: to get violent offenders off the streets and to solve cold cases. Four years later, Congress passed the DNA Identification Act, which formalized the FBI's authority to expand CODIS to include to all national, state, and local databases. Since then, more than fifty thousand suspects have been identified through

matches between offender profiles and crime-scene evidence.

Improvements in technology have made the process of obtaining genetic fingerprints from subjects far easier in recent years. “All we’re dealing with is a swab—a big spongy swab sort of like a lollipop,” says Katz. Technicians scrape the swab against the inner cheek of the subject, the cheek cells are transferred to a special type of filter paper, then the sample is sent to a lab. Technicians extract DNA from the sample, purify and amplify (or copy) it, and tag fragments of genes at thirteen locations along the strand of DNA with an array of fluorescent dyes.

The sample is then run through an electrical field where a laser beam picks up the wavelengths of light emitted by the DNA fragments—called short tandem repeats (STRs)—as they migrate through a polymer. Shorter fragments move faster than longer ones. Computer software quantifies the data, and the end result is a pattern of glowing bands of varying size and number that represent data peaks. This is the DNA “fingerprint,” which is uploaded into CODIS, where it is compared to DNA collected at crime scenes.

In Maryland, as in most other states, DNA samples are not processed in government labs like the gleaming new state police forensics facility in Pikesville. Instead, states bid out the work to commercial testing outfits like Princeton, New Jersey’s Orchid Cellmark, which have the kind of automated “high-throughput” equipment that allow them to process a huge volume of biological material. “You need scalability to do this work cost-effectively and efficiently,” says Orchid Cellmark CEO Tom Bologna. He says that the number of DNA samples processed in Cellmark’s four U.S. labs last year was “well into the six figures.” Worldwide, the company’s sales topped $60 million. “It’s like a mass production line,” he says.

By contrast, the state police lab in the Pikesville facility “performs strict quality assurance,” according to Katz, running controls and reviewing data produced by the commercial labs. In his 2009 budget, O’Malley allocated $1.3 million for additional forensic science equipment and staff. Katz hopes that those funds will help his lab take over much of the work that is currently contracted out. “This is a premier facility,” he says. “There’s no reason we can’t get a high-throughput system going here.”

Katz explains the molecular biology behind the DNA fingerprint in the simplest terms. “Each DNA molecule is made up of repeating subunits of four nucleotide bases—A, C, T, and G. And what you see at each location on the DNA molecule is a sequence composed of those four bases repeated over and over again. Within individuals, the number of times that sequence gets repeated at each loci differs.”

The reason the sequence differs is because each person gets half of their genes from their mother and half from their father; therefore, the combination of alleles—alternative forms of a gene at a specific location—is unique to the individual (save for identical twins, who share exactly the same genetic code).

Within families certain sequences are shared, which explains why DNA testing is used to establish paternity—and why some law enforcement agencies have used “familial” DNA searches to try to track down criminals. Forensic scientists can generate a list of possible relatives of suspects by looking for partial matches between crime-scene evidence and offender profiles, or by searching the database for rare alleles identified in DNA recovered from crime scenes. Close relatives of the individuals so identified are then asked to provide a DNA sample, which is compared to the forensic evidence.

Certain repeating sequences are shared not only within families, but also within populations, where thousands of years of interbreeding create a characteristic DNA profile shared by the members of that group. This explains why

a swab of your cheek can reveal where your ancestors came from—the DNA inside your cells contains nucleotide sequences resembling those of other people who share a similar genetic history.

The more locations on the genome are tested, the more unlikely it becomes that any two individuals—even those from the same background—will share all of those sequences. And the chances of a coincidental match shrink with each additional loci tested. “Basically, there is a chance that two people might match at two or three or even four locations,” says Katz. “But when you get the number of tests up higher—and we do thirteen loci, which is overkill—it’s virtually impossible.”

Still, bioethicists point out that “match probability” requires determining how commonly various alleles occur at the analyzed loci. Ideally, this probability would be determined by analyzing the DNA of the entire population who could conceivably have left DNA at a crime scene. Because such a blanket analysis is impossible, forensic geneticists typically use reference databases categorized by race and ethnicity to calculate probabilities—leading to a kind of genetic racial profiling.

Neither bioethicists nor scientists foresaw this unintended consequence of what seemed at first a grand slam for public safety. Not long after University of Leicester genetics professor Alec Jeffreys created the first DNA fingerprint in September 1984, police asked his lab to perform a DNA dragnet to help solve a local murder. The first DNA-based criminal databases quickly followed. Initially, few expressed much concern about the privacy rights of murderers, rapists, and other evildoers. But over the past fifteen years, state and local police departments have started sampling people convicted of a wide range of misdemeanors, and a growing number of states—twenty-eight at last count—now sample juvenile offenders.

Twenty-five states proposed arrestee-sampling legislation similar to Virginia’s in 2007, with four passing laws. Most target individuals arrested on suspicion of committing felonies, but some cast a wider net. The Arizona bill, for example, authorized sampling of anyone arrested after January 1, 2008. “It’s a small step from a universal DNA database,” says Gary Sweeten, assistant professor of criminology at Arizona State University, “given that the lifetime risk of arrest for a non-traffic offense in the United States is now around 30 percent, with males as high as 50 to 60 percent.”

In 2006, former British Prime Minister Tony Blair proposed just such a universal database, sparking a storm of protest in the U.K. The *Daily Telegraph* warned of the “sinister plan to make every Briton a suspect.” The British have long been world leaders in DNA databanking: Every individual taken into police custody has his or her DNA profile entered into the U.K. National DNA Database, which now holds more than four million profiles. Five-hundred thousand arrestees who were never convicted remain in the system, including one-hundred thousand under the age of 18.

Proponents of mass sampling argue that individuals who haven’t done anything wrong have little to fear from having their genetic profile databanked. After all, the system scores a “hit” only when an individual profile matches DNA found at a crime scene. “Victim’s rights advocates and others in society may view these laws as powerful ways for government to solve crime,” says James G. Hodge Jr., associate professor of Health and Public Policy at the Johns Hopkins Bloomberg School of Public Health. “The ethics question is at what cost—the most significant being potential privacy abuses and racial disparities. That is, until the databases eventually include everyone, which is not something that anyone is proposing, at least not in this country.”

The Fourth Amendment to the U.S. Constitution, which safeguards "the right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures," is one of the hallowed principles of American civil liberties. It is also the legal crux of the argument against DNA sampling of arrestees, according to those opposed to giving the state the authority to conduct "searches" of a person's DNA without probable cause.

Law enforcement agencies already have the power to collect DNA from people who are arrested on suspicion of committing a specific crime. "We have no problem with that," says Tania Simoncelli, research fellow at the ACLU's Technology and Liberty Project. What she calls "intolerable violation[s] of our civil liberties" are DNA dragnets and random database searches for hits between crime-scene evidence and the DNA profiles of people arrested on the mere suspicion of having committed some crime, somewhere, sometime.

Such DNA dragnets are increasingly common. In February, for example, police in Daytona Beach, Florida, pulled over "persons of interest" during traffic stops, using portable DNA kits to swab passing motorists in an attempt to locate the serial killer who had murdered four women in the area.

Former Baltimore Circuit Court Judge Kenneth L. Johnson, who practiced constitutional law before serving on the bench from 1982 to 2001, says that he is personally opposed to arrestee sampling. "It violates the presumption of innocence," he says. "DNA samples should be taken only after a person is convicted, unless that person has been arrested for a crime like murder, rape, or child molestation, and has a prior conviction for a similar offense."

Convicted felons, he points out, have already forfeited some of the protections guaranteed by the Constitution, and though testing their DNA is in some measure a violation of their privacy, the need to catch serial rapists or murderers justifies the intrusion. But for individuals who have been arrested but never tried nor convicted—especially in jurisdictions prone to mass arrests for often negligible crimes—he says, DNA sampling is a clear infringement of constitutional rights.

As an African American growing up in Jim Crow-era Mississippi, Johnson has a personal perspective on the issue. "I witnessed the wholesale violation of civil liberties, with no presumption of innocence," he says, recalling how black Mississippians were treated by law enforcement. "That was mirrored when I came to Baltimore, though on a lesser scale." History, he says, makes him especially sensitive to ongoing racial bias in the criminal justice system, and to policies and practices that appear to disproportionately target African American men.

Department of Justice statistics cited by the ACLU show that non-whites are arrested at three times the rate of whites for crimes of violence. The racial disparity in arrest rates extends to misdemeanors: In Maryland, African Americans are arrested for possession of marijuana at up to five times the rate of whites, even though studies have shown that marijuana use tends to be higher among whites. Higher arrest rates for both felonies and misdemeanors have contributed to the lopsided composition of the state's prison census, which is 72.3 percent black, though African Americans comprise just 27.9 percent of the state's population.

These racial disparities in arrest rates add a critical social justice component to the debate about broadening DNA sampling to arrestees, says bioethicist Hodge, who studies the convergence of public health law, ethics, and human rights. "Basically what we are doing is gathering more incriminating evidence from people of a specific racial class," he says. "Yes, we may be able to solve more crimes in the future, but it will only be crimes committed by certain groups because that's all the data we have. It's not to the advantage of society, many would say, to

simply gather more and greater potential evidence from one racial group."

Nonetheless, laws mandating DNA sampling of arrestees have survived constitutional challenges in Virginia and other states, he points out, though the Minnesota Court of Appeals recently overturned that state's law and the conservative governor of South Carolina recently vetoed broad arrestee sampling on privacy grounds.

Some civil liberties advocates have also charged that the genetic information stored in CODIS ultimately could be used for other types of research likely to target minority populations—seeking a genetic basis for a predisposition to crime, for example. The ACLU's Simoncelli argued in a paper prepared for the American Constitution Society that "an association found between a genetic mutation and violence—whether real or perceived—could be used as a means for attempting to screen out violent offenders before they strike."

It might sound like something out of a science fiction novel, but there's an ugly history of scientific research performed on people incarcerated in U.S. prisons and mental institutions. The long shadow cast by the 1932 Tuskegee Syphilis Study, in which 399 black men were denied treatment for forty years so researchers could chart the natural history of the disease, continues to serve as a potent reminder of scientific malfeasance.

Both Katz and Hodge say that some concerns about genetic research using the CODIS databank are based on a misunderstanding of the technology. A DNA fingerprint is basically a snapshot of thirteen locations on an individual's genome, not a complete genetic portrait of that person. And the portions of the genome analyzed are non-coding—or "junk DNA"—which do not express proteins and thus are not associated with any particular trait or disease.

"The type of DNA profile acquired in these CODIS systems doesn't describe one's health status," Hodge says. "All it tells us is that this DNA profile is a match for somebody previously convicted, or—if Maryland's bill passes—somebody previously arrested. It's a limited amount of data and not equivalent to a full genetic sample or a full genetic test run on that sample."

It's worth pointing out, however, that most states, including Maryland, save the original DNA samples after the DNA fingerprint is created. Just because full genetic analysis of those samples is not carried out now doesn't mean that it won't be someday, if someone decides the data is worth further study. Some states already permit such uses: Alabama permits its DNA database to be used in educational and medical research; Massachusetts allows the disclosure of DNA records for "advancing other humanitarian purposes."

The standards of informed consent applied in all other types of genetic research—in which study subjects must explicitly approve specific uses of their DNA and can withdraw from a study at any time—are entirely absent in forensics. Only one state, Wisconsin, mandates the destruction of original samples. In other states, people have had to sue to retrieve their tissue samples. The bills proposed in Maryland this winter would permit an individual to petition the court to request expungement of their DNA samples and CODIS profiles, "if the conviction that resulted in the record or profile's inclusion in the database meets specified expungement criteria."

Katz says that the original tissue samples used to create DNA fingerprints are saved purely to ensure accuracy. "Whenever there's a hit, we need to go back to the original sample to make sure that the analysis was correct." The Pikesville lab does a "100 percent review" of all the analysis that is done off-site, he says—both DNA fingerprints and biological samples collected at crime scenes. Advances in technology over the past decade have made it easier to test smaller and smaller traces of crime-scene DNA. "As the technology advances, so does the

quality assurance associated with it," he says. "You've got to be fully aware of all the possibilities when you are dealing with smaller amounts."

It's critical that all DNA samples, whether from individuals or crime scenes, be handled and processed with the most exquisite care to prevent contamination. DNA is easily transferred from person to person or from person to object, and because of the sensitivity of DNA testing, even a single copy of stray DNA from someone else could muddy the integrity of a sample.

One of the major weaknesses in the State of California's case in the O.J. Simpson murder trial, for example, was the mistake made by a laboratory worker who spilled some of Simpson's blood on his latex glove before performing tests on evidence taken from the crime scene. He threw away the glove but, because he failed to wipe down the area where the spill occurred, the defense was able to cast doubt on the DNA results that showed Simpson's blood was present at the crime scene.

Forensics labs in Texas, Oklahoma, and Virginia have also been charged with mishandling DNA evidence. A teenager named Josiah Sutton was convicted and jailed for four years on a rape charge after the Houston Police Department matched his DNA with crime scene evidence. When a local television station ran a report on sloppy evidence handling in the lab, Sutton's mother contacted reporters, who in turn forwarded information about his case to DNA expert William Thompson, who had been a member of Simpson's defense team. A new round of DNA analysis showed that Sutton's DNA did not, in fact, match DNA extracted from semen recovered from the victim, and Sutton was freed.

Critics say that human error in the laboratory and the potential for malicious contamination of evidence by both criminals and law enforcement point to the need for stricter standards for forensic labs, governmental and commercial. "It's an essentially unregulated science or industry," says the ACLU's Boersma. "It doesn't subject its work to any sort of peer review. The accrediting body is an organization of forensic lab directors, so it's the fox policing the henhouse."

Maryland recently became the first state in the country to enact a crime-lab oversight system. Though it has yet to be funded, "within the next five years crime labs will have to be licensed and audited by the same entity that does clinical labs," Boersma says. "That's a good thing because the people who do your cholesterol lab tests operate under much more stringent standards right now than forensic labs."

On *CSI*, it looks easy. Beautiful forensic scientists swoop down on a crime scene, pick up cigarette butts and coffee cups, scrape up specks of blood or bits of tissue, take them back to the lab, enter results into a computer, and bang, the perp is caught and put away within the hour. The Hollywood version of forensics has led "to a terrible *CSI* effect in Baltimore," says Baltimore City State's Attorney's Office spokesperson Marty Burns. "Jurors anticipate that it will be like those crime shows, but it's not."

Even when a perpetrator leaves biological evidence of his presence—blood, saliva, cells, semen—that doesn't necessarily mean that conviction is assured. "DNA evidence is not always as clear and convincing as some politicians and legislators want the public to believe," says Burns. "Just because you get a hit won't necessarily result in a successful prosecution and conviction of a violent crime." She recalls a triple-murder case in Baltimore three years ago, which ended in a hung jury even though the DNA evidence against the accused was clear and

convincing. Querying members of the jury after the trial, prosecutors discovered that “jurors were overwhelmed by the presentation of the science of DNA,” Burns says.

The second time around, prosecutors scaled back the level of scientific information, she said. “We made a determined effort to make the science easier to understand, and actually lessened the amount of science” presented to the jury. That case resulted in a conviction. State’s Attorney Patricia Jessamy has since appointed a prosecutor who specializes in DNA evidence and set up a graphics department that uses illustrations and PowerPoint presentations to illustrate the forensic evidence.

Even so, Baltimore juries are reluctant to convict on the basis of a DNA match if supporting evidence is weak. “You can have cases with a ton of DNA evidence,” Burns says, “but it’s not something our jurors will rely on alone. They want a healthy dose of witness testimony and evidence of a relationship of some kind between the victim and the accused. We’ve had cases that were well grounded in terms of the science but juries have chosen not to convict because of questions regarding testimony—several over the past year. So a little bit of DNA is not necessarily going to convince them.”

Edgar Koch, chief of the Baltimore City Police Department’s crime lab, predicts that entering Maryland arrestee profiles into CODIS will be “a great thing for police departments,” mentioning the sixty-six cold cases solved in Virginia in the first year after that state passed its arrestee-sampling law. In his February testimony for the expanded DNA sampling law, Governor O’Malley also pointed to Virginia’s success rate, noting that the proposed legislation “is supported by virtually every police chief in every town and county in our state. It is supported by virtually every prosecutor, every State’s Attorney in Maryland.”

But according to Burns, city prosecutors aren’t all convinced that sampling arrestees is going to produce more convictions. “It’s being oversold as an answer to public safety,” she says. “We’ve had less than ten murder cases over the past couple of years resulting from CODIS hits and the outcomes were nothing to write home about. The sentences in general were very modest. DNA is more important in ongoing cases, where there needs to be evidence to build a prosecution.”

What prosecutors really need, she says, is higher-volume, faster turnaround in the analysis of the DNA collected at crime scenes. “There is a tremendous backlog in terms of what prosecutors need and the capabilities of the Baltimore forensics lab,” says Burns.

Should an arrestee law pass, there will be a four- or five-fold increase in the number of DNA samples sent to labs for analysis. According to the Maryland General Assembly’s Department of Legislative Services, the approximately 15,000 DNA samples collected each year from people convicted of felonies, fourth-degree burglary, or breaking and entering a vehicle will jump to more than 100,000 per year (at a cost of $3.7 million) if the state begins sampling people arrested on suspicion of committing those same crimes. U.S. Department of Justice statistics on the number of people arrested in the state each year for violent crimes peg the number much higher. “It could be up to 300,000,” according to the ACLU’s Boersma. “We have called for years for funding to improve the volume and quality of the analysis of crime-scene evidence,” she says. “We’re not disputing the accuracy and comprehensiveness of DNA. We’re just saying test the crime-scene evidence you already have.”

Long lag times in the processing of DNA crime-scene evidence is a national problem. A report issued by the National Institute of Justice in 2003 estimated that more than 350,000 DNA samples from rape and homicide cases remained untested. In February 2007, a criminal justice commission in California reported a backlog of

approximately 160,000 untested DNA samples in the state's lab. But instead of providing more funds to speed up the analysis of crime scene evidence, the state passed an arrestee-sampling law that will come into effect in 2009, dumping an estimated 450,000 samples per year onto the pile.

Simoncelli points out that the growth in the number of offender profiles stored in CODIS has not been matched by a similar increase in the number of forensic profiles. Forensic DNA profiles—evidence collected at crime scenes—currently number less than two-hundred thousand, compared to more than five million offender profiles. "The number of crime-scene evidence profiles in CODIS is still quite low," she says, "because crime-scene DNA is much harder to collect."

Unlike the DNA extracted from cheek swabs in a controlled lab environment, crime scene DNA is often highly degraded. "It's not uncommon for us to get [crime scene] samples that are pretty tough to work with," says Orchid Cellmark's Bologna.

Pouring more resources into the analysis of DNA evidence from crime scenes would not only help put more criminals behind bars, but would also help release the ones who don't belong there. Groups such as the Innocence Project have successfully employed post-conviction analysis of DNA evidence to exonerate innocent convicts, but CODIS has not been much help, says Boersma. "Less than a handful of the more than two hundred DNA exonerations are related to DNA in a databank," she says. "Exonerations are based on comparisons with crime-scene evidence, and in most cases people have had to fight law enforcement every step of the way," to compel re-analysis of old crime-scene DNA.

She cites one celebrated local case: Marylander Kirk Bloodsworth, the first person to be freed from death row by DNA. Convicted of the rape and murder of a 9-year-old Rosedale girl in 1985, before DNA evidence was used in criminal trials, Bloodsworth was essentially liberated by advances in technology. In the same year that Bloodsworth was convicted, scientist Kary Mullis invented the polymerase chain reaction (PCR), a method for replicating strands of DNA. Starting with a miniscule number of cells, PCR "amplifies" segments of broken strands, creating more than a billion copies of any desired segment.

The discovery not only gave all of molecular biology a boost, but also handed law enforcement a way to make use of scarcely detectable trace amounts of DNA left at crime scenes. Bloodsworth's attorneys fought for years to have prosecutors release crime-scene evidence in the case so that an independent lab could carry out DNA tests on the victim's clothing. In 1993, those tests—and an FBI follow-up—showed that Bloodsworth's DNA did not match the DNA present at the crime scene, and a Baltimore County Circuit Court judge swiftly ordered Bloodsworth's release from prison.

It wasn't until 2003 that this crime-scene DNA made its way through the forensic profile backlog and was run through CODIS, revealing the actual killer: a man named Kimberly Shay Ruffner, who was already incarcerated for a rape and attempted murder in Fells Point that occurred weeks after Bloodsworth was arrested in 1985.

It's a case that reveals both the perils and the promise of DNA technology, which—if used responsibly—should condemn the guilty and free the innocent more often than not. However, the growing precision of genetic tools will surely pose new temptations. While the DNA profiles stored in the CODIS database can't reveal much about a subject, the DNA samples themselves can. A few cells are enough to help scientists construct a rough profile of a suspect's ethnicity, appearance, and health status. Both sex and race can be pinpointed fairly accurately from a small number of DNA markers; other loci can be screened to predict hair and eye color. Genes associated with

particular diseases can also be screened and matched up with suspect's medical records. Within five to ten years, it will be possible for police to construct a complete physical profile of a suspect—height, build, skin color, and general facial features—from DNA extracted and amplified from oils secreted by a suspect's fingers at a crime scene.

But no matter how advanced the science, the social issues surrounding proposed uses of DNA databanks are likely to remain ethically vexing—one reason the U.S. National Human Genome Research Institute set up a bioethics arm to address the ethical, legal, and social implications of genetic research. Too often, bioethicists say, the mere availability of data and technology, rather than ethical considerations or social needs, drives its use.

Scientific tools have a way of escaping their makers: Think of physicist Robert Oppenheimer, famously contemplating the Bhagavad Gita ("I am become death, the destroyer of worlds") as he watched the detonation of the nuclear device he had helped create. In 2004, British geneticist Jeffreys, the father of DNA profiling, was asked by the *Observer* newspaper to ruminate on recent developments in the field he invented. He told the newspaper he was "very nervous."

Jeffreys expressed some familiar concerns. "For a start, we are now putting not just criminals but suspects in our database, and that is clearly very highly discriminatory," he said. As in the United States, most of those taken into police custody in the

United Kingdom are members of minority groups—in this case, blacks and Asians. Police would soon have the ability—and certainly the desire—to construct DNA profiles with additional information on a person's ethnic origins, medical history, and appearance. Jeffreys proposed a solution that would not exactly stuff his genie back in the bottle, but would limit its power—a universal DNA database that includes every citizen's DNA fingerprint, but only that. Police would be denied access to genetic information predicting race, appearance, health, and other factors. The push by law enforcement to gain access to such information was "thoroughly dangerous," Jeffreys said. "Imagine DNA details about racial groups falling into the hands of some governments or organizations. It is not a pleasant prospect."

Such concerns are likely to be echoed in Maryland as a revolutionary technology confronts thorny realities of race and resources. "There's been a lot of hype," says Marty Burns, "but it's more complicated than the public has been led to believe."

—Deborah Rudacille wrote about the biochemistry of love in the February Urbanite.