

University as a result, while Imanishi-Kari, now at Tufts University, had her reputation besmirched and a federal research grant terminated. Recently, their ordeal came to an end when a federal appeals panel cleared her of the fraud charges. In the future, argues Kevles, director of the Program in Science, Ethics, and Public Policy at the California Institute of Technology, scientific misconduct cases should be handled very differently.

To begin with, he says, it should be recognized that scientific misconduct in its most serious form appears to be quite rare. Of 26 investigations closed in 1994 by the Office of Research Integrity (ORI) in the National Institutes of Health (NIH), only six concluded that research data had been fabricated or falsified—"a minuscule incidence, given all of the biomedical research sponsored by the NIH." In light of this, Kevles questions whether a special investigative office such as ORI is even necessary.

Whatever the governmental machinery employed to handle misconduct cases, he says, those conducting the investigations "should have the courage to insulate the proceedings from political pressure." Repre-

sentative John Dingell (D.-Mich.), then chairman of the House Energy and Commerce committee, with jurisdiction over the NIH budget, and a relentless watchdog, cast an "overbearing shadow" over the Imanishi-Kari case, Kevles contends, with unfortunate results. In addition, he says, the investigators should not serve as prosecutor, judge, and jury, as the ORI did.

"The procedures should guarantee the accused the rights of due process from the beginning," Kevles writes, "and, while giving due attention to whistle blowers, should keep those making the charges" at arm's length. Until the appeals board took up her case, Imanishi-Kari was not permitted to see the evidence against her, cross-examine witnesses, or call any of her own.

Finally, Kevles concludes, scientific misconduct should be narrowly defined—limited to falsification, fabrication, and theft of intellectual property. "Pursuing vague notions, such as the deviation of a scientist's practices from 'commonly accepted' ones, will invite still other houndings of hapless researchers and very likely have a chilling effect on the practice of science itself."

## *The Sacred Language of Genes*

"Genetics, God, and Sacred DNA" by Dorothy Nelkin, in *Society* (May-June 1996), Rutgers—The State University of New Jersey, New Brunswick, N.J. 08903.

Religious critics of genetic engineering hold that it is wrong to tinker with, as one evangelical writer put it, "our essential humanity." In 1983, 21 Catholic bishops joined other religious leaders in calling for a ban on genetic engineering, declaring that humans have no right to "play God." Nelkin, a sociologist at New York University, asserts that geneticists play into the hands of such critics by using religious language themselves to describe their subject.

Scientists, she says, "seem to endow the biological structure called DNA with a nearly spiritual importance as a powerful and sacred object—an essential entity through which human life and human fate can be explained and understood." Frequently, they refer to the human genome as the "Bible," the "Book of Man," and the "Holy Grail."

"Our fate is in our genes," claims Nobel laureate James Watson, codiscoverer of the double helix and the first director of the Human Genome Project. Another Nobel laureate, molecular biologist Kary Mullis, even offers, via a company he founded, the equivalent of early Christian relics, Nelkin writes: cards and jewelry that purportedly contain DNA cloned from rock stars, athletes, and other "secular saints."

Scientists are using religious metaphors "as part of their effort to convince the public of the centrality and power of the genes—and of the importance of supporting their research," Nelkin says. Their language also reflects their nearly religious belief "that there is underlying order in nature." But the scientists' words, Nelkin says, are easily turned into weapons by their critics and used in the campaign against genetic science.