SCIENTIFIC MISCONDUCT

Lead Researcher Confronts Accusers in Public Hearing

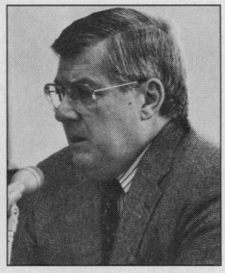
PITTSBURGH—Some prominent critics of the way the federal government investigates scientific misconduct, including National Institutes of Health director Bernadine Healy, have argued that researchers accused of misconduct should have a chance to confront their accusers in an open forum. Last week, a hearing at the University of Pittsburgh provided a taste of what such proceedings might be like. At a 2-day public session, psychiatrist Herbert Needleman engaged in a face-to-face showdown with two psychologists who had attacked an influential paper he published in 1979 on the effect of low-level lead exposure on child development.

By the end of the hearing, few of the participants seemed to be happy with the process, however. Although an open proceeding may solve some of the problems that have arisen in misconduct investigations—the propensity for leaks, the inability of the public to assess the probity of investigations conducted in secret—Pitt's effort apparently was no panacea. Needleman himself complained that the hearing rules made it impossible to cross-examine his accusers effectively. And his accusers, Sandra Scarr from the University of Virginia and Claire Ernhart of Case Western Reserve University, charged that the hearing was merely an opportunity for Needleman to trot out testimonials from his friends and make personal attacks against them, rather than answer their charges.

Preview. Whatever the drawbacks, last week's events may become more commonplace. A proposal now before Health and Human Services Secretary Louis Sullivan, which was put together by top federal health officials including Healy, would permit accused researchers to request a hearing once an investigation is essentially complete (*Science*, 13 March 1992, p. 1344). Although the Needleman hearing came at a much earlier stage of an investigation than the process now being considered by Sullivan, it might hold some lessons for the way such hearings should—or should not—be conducted.

Last week's face-off was the latest battle in a war of attrition that has been going on for more than a decade (*Science*, 25 November 1983, p. 906). It began shortly after Needleman published a paper in the *New England Journal of Medicine* (vol. 300, p. 690) linking chronic exposure to low levels of lead with lowered IQs in young children. Critics, led by Ernhart, quickly attacked the study as being methodologically flawed, and the dispute soon became heated, with Needleman accusing Ernhart of being in the pocket of the lead industry. The combatants have continued to skirmish ever since.

Their battle took a new turn in 1990, when Scarr and Ernhart were scheduled to appear as expert witnesses for the owners of a lead smelter in a Superfund case brought by the federal government. To prepare their case, they sought access to Needleman's data. In a day-and-a-half visit to Needleman's lab, cut short by legal wrangling over the terms of the visit, the pair



Face to face. Claire Ernhart looks to her lawyer, David Geneson, for advice as Herbert Needleman *(right)* questions his questioners.

saw what they considered evidence of misconduct in three aspects of Needleman's work: That he apparently had excluded some subjects whose IQ scores failed to fit his hypothesis, that he tested so many behavioral, social, and economic variables that some were bound to show statistically significant differences simply by chance, and that he had failed adequately to control for factors such as children's ages and their families' socioeconomic status, which they said would have rendered his results statistically nonsignificant. The pair forwarded their suspicions to NIH's Office of Scientific Integrity (OSI) in May 1991, and OSI subsequently asked Pitt to determine whether a formal investigation was warranted (*Science*, 23 August 1991, p. 842).

Pitt put together a panel, chaired by biostatistician Gary Marsh, that looked not only at the 1979 study but also at a follow-up study showing the longer-term negative effects of early lead exposure date (*New England Journal of Medicine*, vol. 322, p. 83). According to the panel's confidential report, a copy of which was obtained by *Science*, the panel found "no evidence of fabrication, falsification, or plagiarism," but was "not convinced that the 1979 and 1990 reports are full, fair, and accurate descriptions of the study's methods and analyses, and is not able to exclude the possibility of research misconduct in terms of misrepresentation." The panel, whose report was delivered to George Bernier, dean of the School of Medicine on 18 December, recommended a full investigation, and Bernier, after checking with OSI, agreed. Under normal circumstances, the investigation would have been conducted in secret, but Needleman asked for a public hearing, a request that was endorsed by the Pitt faculty senate and ultimately agreed to by the Pitt administration. Thus the stage was set for last week's drama.

Education professor William Cooley, chairman of the investigation panel, kicked off the proceedings by pointing out that "[t]his is not a judicial proceeding, and technical rules of procedure and evidence in a court of law will not be governing." But Needleman and his lawyer James Lieber of Lieber & Hammer weren't buying that. After Scarr and Ernhart made opening remarks detailing their concerns about his work, Needleman took the offensive, challenging the credibility of his accusers' work and suggesting that their motivation for questioning his study was based on their sympathies with the lead industry or some longstanding personal bias against him. Clearly flustered, Ernhart declined to answer Needleman's accusation that she had excluded confounding factors from the analysis of one of her studies, and she refused to explain why she had defended a landlord who was sued after a young girl developed severe brain damage as a result of ingesting lead paint. Cooley tried to keep Needleman focused on the technical aspects of his own work, but after whispered conversations with University of Pittsburgh Medical Center's assistant legal counsel Alexander Ciocca, Cooley let Needleman proceed with his questions, although he advised Scarr and Ernhart that they did not have to answer them.

"I have been appalled by the way this day has gone forward," Ernhart told the panel at the end of her testimony. "It has brought forth many issues unrelated to the charges...we have been harangued and lectured." Needleman, interviewed during a break in the hearing, took the opposite tack: He criticized Cooley for not following legal procedures by not requiring Scarr and Ernhart to answer his questions.

Needleman's accusers were followed by a parade of witnesses testifying to the validity, accuracy, and importance of his work. Joel Schwartz, a senior scientist at the Environmental Protection Agency (EPA), reanalyzed Needleman's 1979 data and showed that even if all confounding variables and all excluded subjects were included in the analysis, the

results would be essentially identical to those Needleman published in 1979—namely, that for every 10 parts per million increase of lead in a child's tooth there was a two point drop in IQ. Paul Mushak, a consultant in health and chemical sciences in Durham, North Carolina, sharply disputed Ernhart's contention that Needleman had not fully cooperated with a 1983 investigation of his work conducted by a panel of the EPA. Finally, Joel Greenhouse, a statistician from Carnegie-Mellon University, criticized the statistical methods used by Marsh's panel to conclude that something might be amiss with Needleman's research.

Since his work was first challenged, Needleman has insisted that any questionable analyses or data reporting that appeared in the 1979 paper would fall under the heading of scientific difference of opinion, not misconduct. And he says he asked for an open hearing to make that point clear. "I shudder to think what would have happened if it had been closed," he told *Science*.

He is also trying to fend off the charges more directly: He has asked the courts to toss out the whole investigation. Last month, he filed a class-action suit in federal district court against NIH, OSI, and Pitt claiming that the definition of misconduct as "practices that seriously deviate from those that are commonly accepted within the scientific community for proposing, conducting, or reporting research" is too vague, and virtually impossible to defend against. The suit also argues that it is unfair to investigate him for events that occurred before the current misconduct rules came into effect. And Needleman claims that since he was not allowed to be formally represented by Lieber during last week's hearing (although Lieber sat at his elbow throughout the day) or subpoena witnesses—he wanted NIH fraud-buster Walter Stewart to testify—his constitutional right to a fair trial was violated.

The Cooley panel hopes to wrap up its work by the end of this month, and Needleman will have a chance to comment on their findings. But Needleman's lawyer worries that even an open forum will not protect scientists from attacks from those seeking to discredit their work, as he claims Scarr and Ernhart have done. "They've taken a research debate and turned it into a blood sport," he says.

Still, there may be more open forums like this if Needleman's strategy appears to work to his advantage. "As a rule, it is the accused who has the most to lose [in a misconduct case]," says Paul Friedman, dean for academic affairs at the University of California at San Diego medical school, so if he or she asked for an open hearing, "it would be very difficult to deny the request." If he's right, misconduct hearings could become even more of a spectator sport in the 1990s.

–Joseph Palca

COLD FUSION

A Japanese Claim Generates New Heat

They're back—claims of cold fusion, that is. Actually, they never really went away. The original experiments by chemists Stanley Pons and Martin Fleischmann may have been discredited in the eyes of many observers soon after they were hailed in 1989, but die-hards around the world have continued churning out reports of excess heat when an electric current is run through chunks of palladium immersed in heavy water. Last week, Akito Takahashi added his claims to the pile. And even in a field where eyebrows have become permanently raised, Takahashi has managed to cause a bit of a stir.

Takahashi, a professor of nuclear engineering at Osaka University in Japan and a respected specialist in the physics of conventional hot fusion reactors, has issued one of the most startling claims since Pons and Fleischmann themselves. He says his cold-fusion cell produced excess heat at an average rate of 100 watts for months at a time. That's up to 40 times more power than he was putting into the cell, and more power per unit volume (of palladium) than is generated by a fuel rod in a nuclear reactor.

Takahashi, who had previously announced his results in Japan, made his first U.S. presentation at—of all places—the Massachusetts Institute of Technology (MIT), home of some of cold fusion's loudest and most derisive critics. "I was worried," said Takahashi afterward. "I thought everyone would attack me." As it happened, many of the attendees praised Takahashi's experimental innovations...but then again, most of the skeptics had stayed home.

Among the innovations that caught the fancy of attendees: Instead of the usual palladium rods, Takahashi used small sheets, which he guessed might make it easier for deuterium atoms from the heavy water to snuggle into the crystal lattice of the metal and—he hoped—undergo fusion. He also kept varying the current in the cell, guessing from the bursts of heat seen in earlier experiments that the process might thrive under transient conditions. His reward, he told the MIT audience, was so much heat that he had to lower the average current repeatedly and install a cooling coil to keep the water in the cell from boiling. Even then the temperature continued to rise week after week. Finally, he said, "we were very much afraid of an accident, and had to stop." As well he might have been, considering the January explosion of a cold-fusion experiment at SRI International in Menlo Park, California, (*Science*, 10 January, p. 153) that killed a researcher.

Missing neutrons. Among the largely sympathetic audience, a few doubters asked pointed questions about the calibration of the calorimetry—the measurement of heat output—and other possible sources of false readings. Nor has Takahashi shaken the biggest doubt plaguing claims of cold fusion: the lack of the plentiful neutrons any nuclear process should produce, according to current physics. Indeed, Takahashi's neutron readings were not only low; they were inversely correlated with heat production.

For many physicists, that closes the door on any claims of fusion. "If it's a nuclear process, known or unknown, it has to be producing on the order of billions of times as many particles as are being observed here," says Richard Petrasso, one of a small group of physicists at the MIT Plasma Fusion Laboratory who have made a virtual pastime out of shooting down cold-fusion claims. "Where are the particles? It's a lot easier to believe the calorimetry is at fault than all of nuclear physics."

Cold fusion supporters would rather look beyond standard theory. MIT electrical engineer Louis Smullin echoed the views of several supporters at the Takahashi presentation when he told *Science*: "You might be able to argue that with better calibration you'd only get 50 watts instead of 100 watts, but 50 watts is still a big number. I'm not concerned about the lack of the neutrons you would expect from a [conventional] fusion reaction. This is a different ballgame, and it could be a different reaction."

Indeed, cold-fusion aficionados are already positing exotic processes that could account for the Japanese observations. Takahashi himself speaks of a four-body nuclear reaction that yields no neutrons at all. And Peter Hagelstein, an MIT x-ray laser researcher who has been focusing on cold fusion for the past 3 years, asserts in a paper to be published in the *Journal of Fusion Technology* that neutrons are emitted in cold-fusion reactions—but are promptly absorbed by the palladium lattice.

But those proposals aren't making cold-fusion claims any more palatable to the physics community as a whole. For now, Takahashi and hundreds of other researchers keep laboring over their (gently, they hope) bubbling cells, recording their provocative output and trying to ignore the chorus of voices saying they are wasting their time.

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