causing all the wrong-answer strands to fold over and form hairpins. The researchers then either cut all the hairpins with a single dose of enzyme, or used a standard technique for copying DNA to reproduce just the remaining unfolded strands, which represented the right answer.

The new method obviates several laboratory procedures by exploiting DNA's knack for forming complicated structures, says team member Masami Hagiya, a computer scientist from the University of Tokyo. But the researchers pay a price to avoid the extra chemistry, Smith says. The logic problem reduces to finding one correct solution out of the 64 possible combinations of six statements and their opposites. In restating the problem so that wrong answer strings all have contradictory literals, however, the researchers make it much larger. As a consequence they wade through thousands of redundant wrong answers. The new technique also lets through many more wrong solutions, notes Laura Landweber, a biologist at Princeton University, in Princeton, New Jersey. "I remain intrigued but skeptical," she says, "until they can reduce the large proportion of errors."

–ADRIAN CHO

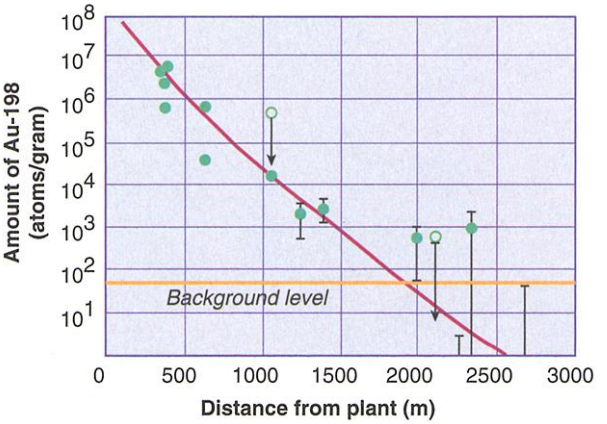
JAPAN

Exposure Levels Tracked Around Nuclear Accident

TOKYO—When workers at a nuclear fuel processing plant inadvertently set off a nuclear chain reaction last fall, more than 6 hours passed before the Japanese government set up radiation monitoring equipment at the scene. The time lag left a critical gap in the record of the amounts and types of radiation released in the accident 110 kilometers northeast of the capital (*Science*, 8 October 1999, p. 207).

That gap has now been filled by a group of Japanese university researchers, whose results appear this week in a special issue of the *Journal of Environmental Radioactivity* (vol. 50, no. 1-2, May 2000). In 21 reports, the team has reconstructed the aftermath of the accident by collecting over 400 samples of irradiated table salt, sugar, stainless steel cutlery, coins, and gold and silver jewelry. This approach, although not new, builds on the cooperation of company officials to offer the most detailed picture ever of the spread of radiation from a nuclear accident.

Ohtsura Niwa, director of Kyoto University's Radiation Biology Center, says the results are particularly important given ongoing controversies over the effects of neutron radiation, the primary type of radiation in the Tokaimura accident. Previous studies have yielded inconsistent results on the relation between distance from the source and radiation dose, and the possible health effects of exposure to neutron radiation. These questions make "this kind of study very necessary," he says.



Golden records. Gold isotopes in household jewelry help scientists measure radiation exposure around the accident site.

The 30 September incident at a nuclear fuel processing facility in Tokaimura was Japan's worst-ever nuclear-related accident. Dozens of residents close to the plant were evacuated, and hundreds of people in the surrounding area were warned to stay indoors for 18 hours after the event. Two employees of the Tokyo-based JCO Company Ltd., the plant operator, eventually died from complications arising from high radiation doses. Kazuhisa Komura, who heads the university group and is director of the Low Level Radioactivity Laboratory at Kanazawa University, says the study provides an independent check of the official governmental investigation and extends its scope.

The researchers use the fact that neutron radiation makes many substances, particularly metals, radioactive. Gold, for example, captures neutrons to produce the isotope Au-198, in proportion to the amount of radiation (see graph). After examining household items loaned by area residents, the group concludes that the level of accumulated radiation at the edge of the JCO property was about 100 millisieverts. A sievert is a measure of the total radioactive dose, factoring in each type of radiation and its energy. Normal background radiation results in an annual dose of about 1 millisievert, and doses of more than 5 sieverts have typically been fatal. The stricken workers suffered dosages of 17 and 10 sieverts, and 50 other people received up to 100 millisieverts.

Dose levels outside the plant were much lower, and the health implications for the general public are likely to be negligible, Komura says. Another group studying the biological effects of low-level neutron radiation has yet to publish its results.

The journal reports are consistent with previously released government studies, which stopped at the site boundaries. However, the university researchers also plan to study the level of radiation to buildings and other objects beyond the accident site in hope of understanding the shielding effect of various materials, natural and human-made. The results, says Murdoch Baxter, editor for the special edition of the journal and a former official with the International Atomic Energy Agency in Vienna, could even help scientists looking back at the atomic bombings of Hiroshima and Nagasaki.

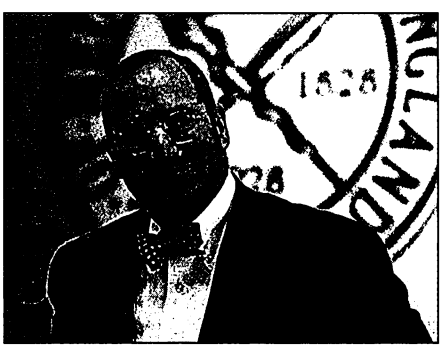
–DENNIS NORMILE

JOURNAL PUBLISHING

Harvard Researcher Named *NEJM* Editor

The New England Journal of Medicine (NEJM) has a new editor, its third in less than a year. Jeffrey Drazen, 53, a Harvard asthma researcher and associate chief for research in the Pulmonary Division at Boston's Children's Hospital, takes on the challenge of trying to set the 188-year-old journal on a smooth course following a year of controversy about both its internal policies and its outside activities.

Last summer, conflict over the journal's commercial activities led to the sacking of Editor-in-Chief Jerome Kassirer (*Science*, 30 July 1999, p. 648). Then early this year, *NEJM* confessed to violating its own conflict-of-interest policies (*Science*, 3 March, p. 1573). In its 24 February issue, the journal listed 19 papers in which one or more authors had accepted money from drug companies. Drazen was one of them: He co-



Hot spot. Pulmonary scientist Jeffrey Drazen becomes the third *NEJM* editor in 10 months.

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