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Information for Contributors appears on pages 93–94 of the 5 January 1996 issue. Editorial correspondence, including requests for permission to reprint and reprint orders, should be sent to 1333 H Street, NW, Washington, DC 20005.

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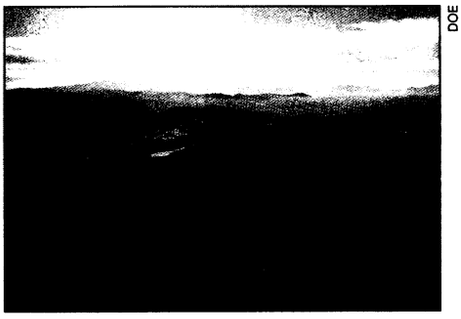
LETTERS

Heat and light

A comparison of models of heat flow and relative humidity in a proposed "hot, dry repository" for the storage of nuclear waste at Yucca Mountain, Nevada (right); responses to a statement about genetics, race, and IQ; a recollection of a shootout in Tombstone, Arizona, in 1881; and a dissenting opinion about greenhouse warming are among the items in this week's letters.



Keeping Radioactive Waste Dry?

At the heart of geophysicist Thomas Buscheck and colleagues' "new twists" to answer the question "Can nuclear waste keep Yucca Mountain dry—and safe?" (Research News, 15 Dec., p. 1761) is their use of "customized computer models, based on known properties of water and heat flow in porous, fractured media such as the Yucca Mountain rock. . . ." The idea, as reported by news writer Wade Roush, is to use heat from the radioactive waste "to boil corrosive moisture out of the surrounding rock."

The validity of the water and heat flow models will continue to plague the credibility of the "hot, dry repository" approach as a means to defer waste package corrosion and failure. The U.S. Department of Energy's prime contractor for the Yucca Mountain Project is undoubtedly aware of the sensitivity of the models to differing assumptions. Their recent performance assessment for Yucca Mountain (*1*) points out that their and Thomas Buscheck *et al.*'s (*2*) thermal-hydrologic models predict very different waste emplacement drift environments in terms of temperature and relative humidity (*1*, pp. 4–12).

According to the contractor model, the calculated time for return to high-humidity conditions conducive to waste package corrosion is up to a few thousand years, while Buscheck's model predicts tens of thousands of years. This significant discrepancy will not be resolved by the planned in situ heater tests alone, as it is in large part due to uncertainties in modeling unsaturated zone flow at full Yucca Mountain site scale.

As the U.S. Nuclear Regulatory Commission's Advisory Committee on Nuclear Waste recently noted (*3*)

> There is little experience or understanding of governing processes and the behavior of fluids in fractures and faults [in the unsaturated zone at Yucca Mountain], and few field demonstrations or standardized methodologies for obtaining parameter values necessary for modeling.

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1. R. A. Andrews *et al.*, in "Total System Performance Assessment—1995: An Evaluation of the Potential Yucca Mountain Repository" (B00000000-01717-2200-00136, Civilian Radioactive Waste Management System Management and Operating Contractor, Las Vegas, NV, 1995).
2. T. A. Buscheck, J. J. Nitao, L. D. Ramspott, "Localized dryout: An approach for managing the thermal-hydrological effects of decay heat at Yucca Mountain" (UCRL-JC-121232, preprint, Lawrence Livermore National Laboratory, Livermore, CA, 1995) (available by e-mail from buscheck1@llnl.gov).
3. Letter to Shirley Ann Jackson, Chairman, U.S. Nuclear Regulatory Commission, from Paul W. Pomeroy, Chairman, U.S. Nuclear Regulatory Commission Advisory Committee on Nuclear Waste, November 6, 1995.

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Genetics and Race

"The Bell Curve: A Statement" (Letters, 5 Jan., p. 13) did not mention that *The Bell Curve* (*1*) reported the results of a 12-year longitudinal study of 11,878 youths (3022 of whom were African American), in which most 17-year-olds with high scores on the Armed Forces Qualification Test (black as well as white) went on to occupational success, whereas many of those with low scores went on to crime and welfare dependency.

Whatever the causes of poverty and black underachievement (the flashpoint of discussion), they go well beyond U.S. particulars. Evolutionary (and hence genetic)

models are needed to explain the multifarious sets of disparate data. Exclusively sociocultural and economic models will not do the job.

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References

1. R. J. Herrnstein and C. Murray, *The Bell Curve: Intelligence and Class Structure in American Life* (Free Press, New York, 1994).

The advisory group statement comes dangerously close to criticizing free inquiry itself. Scientists often find that the search for truth leads in directions that threaten social consensus. Those who would defend that consensus only betray the weakness of their position when they ignore new discoveries and attack, instead, men and their motives. If Charles Murray and Richard Herrnstein are wrong, let us prove them so. Simply to dismiss them without examining their ideas is the most graceless way of admitting that they may very well be right.

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Publicizing the Value of Basic Research

Bravo, Arthur Kornberg (Editorial, 29 Sept., p. 1799) for telling it like it is! The current fad of supporting "strategic basic research" and "targeted basic research," accompanied by severe cuts in research, affects not only the biological, but all sciences across the board.

As scientists, we owe it to ourselves, and even more to the future generations of scientists (our scientific children and grandchildren), to keep the flame of science burning as brightly as we can, but there is one element of the story that should not be neglected. Past experience lets us predict with some confidence that a breakthrough in some field will be made in the next few years in some country that is "prepared" for it. Imagine the public outcry if another country were to secure the basic rights to a new discovery that revolutionizes communication technology, or biotechnology (cure for AIDS or cancer), because they have kept active basic research programs, while we have not.

The AAAS, as the umbrella scientific society in the United States, should take an increasingly active role in publicizing to the American public the future dangers in the long term from cutting our national investment in basic research. With enough (and continued) publicity, the downward trend might be stopped.

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Bullets and Silk in the Old West

The Perspective "Putting a new spin on spider silk" by David A. Tirrell (5 Jan., p. 39) concerning the structure of spider dragline silk points out that the properties of spider silk have been known for nearly a century. Considerable interest in the material has been generated by the demonstration that spider dragline silk is one of the strongest fibers known. However, the similarly remarkable properties of silkworm silk, in particular its resistance to rupture by bullets, have been known for more than a century in the United States. An early pub-