Letters

Science in the Persian Gulf

Daniel E. Koshland, Jr., is tragically wrong in his editorial "Science and peace" (12 Apr., p. 189). Deaths were most certainly not "miraculously few" in the Persian Gulf war. Tens of thousands of Iraqi troops and civilians died either directly by our hands or as a consequence of the physical destruction of the country. And it is not over. The killing and dying continues today. If the application of the scientific method is going to help us understand the causes and consequences of the war, it is imperative that our observations be as accurate as possible.

Moreover, if there was anything like an "experiment" in the history of this war, it was the unprecedented attempt by the world community to assert its will on the government and commanders of Iraq without bringing about war. That attempt failed because our government did not want to wait for it to work.

The only "experimental conclusions" to emerge from this tragedy are (i) whoever has weapons of any kind will at some point use them instead of honestly seeking peaceful resolution, (ii) the human species remains shortsighted and vicious, and (iii) wars will arise in the future from these failings of human behavior regardless of the technology of killing involved.

THOMAS M. BOYCE
Department of Genetics, University of Georgia, Athens, GA 30602

Math Problems

I noticed that three of the five printed answers in the EMPT sampler math quiz in the 8 March issue (News & Comment, p. 1173) were in error. Assuming that the quiz was designed to test math confidence, rather than ability per se, I gave the quiz to my wife and my daughter. My wife, who was educated in England, said, "That's funny, I didn't realize that I had forgotten so much high school math." My daughter, who has been educated in California, said, "I recognize those problems. I could do them if I wanted to." I conclude that more recent educational techniques are indeed increasing math confidence. The data do not allow any conclusions about ability.

TERENCE M. MURPHY
Department of Botany, University of California, Davis, CA 95616

My gratitude for the sampler from the EMPT test of math proficiency. Imagine my surprise at scoring only 40% on a high school test. Would that I had been diagnosed before spending 20 years in math modeling. On the other hand, perhaps it was a deliberate plant by the psychology section. Your mailbag will tell how many of us are so insecure that we submit to self-tests of our very bread and butter!

MICHAEL W. LEVINE
Department of Psychology, and Committee on Neuroscience, University of Illinois, Box 4348, Chicago, IL 60680

I was about to defend my doctoral thesis, but after missing three out of five on your high school math test I am rethinking my qualifications for higher education.

ROBIN D. HANSON
Division of Biology and Biomedical Sciences, Washington University Medical Center, St. Louis, MO 63110

Concerning the answers presented for questions 1, 3, and 4 in the five-question sampler of a test designed to assess high school students' math skills, could it be that we have identified the cause of low scores by high school students on such tests?

CRAIG BOND HATFIELD
Department of Geology, University of Toledo, Toledo, OH 43606

Response: The disarrangement of problems and answers (see the issue of 15 March, p. 1305) was not a test to see whether our readers were paying attention, nor one to measure "math confidence." We were, however, delighted to discover so many readers who communicate cleverly and who keep us on our toes.

—DANIEL E. KOSHLAND, JR.

Energy Savings

I'm sorry to disappoint my fellow correspondents (Letters, 15 Mar., p. 1296). Arne P. Olson's lighting–space-conditioning interactions *are* fully included in our analyses (*1*); and Jeremy Cherfas' paraphrase—"Lovins is willing to concede half of his savings" (News & Comment, 11 Jan., p. 154)—isn't, as A. David Rossin assumes, an admission of exaggeration (on the contrary, our estimates now look conservative), but rather a sporting handicap: as Cherfas' next sentence quotes Graeme Pearman, as agreeing that about half the potential savings would be enough.

Even if Olson's and Rossin's premises were correct, their inferences wouldn't be. Net space-conditioning effects *increase* the total energy savings of efficient lighting by one-fourth (*2*), to a U.S. potential of ~120 gigawatts (a quarter of all electricity); and however costly and slow energy savings may seem, the power plants Rossin prefers are an order of magnitude worse (*3*). Minimizing cost, delay, risk, and regret are precisely why the nation's largest investor-owned utility now plans to get at least 2.5 gigawatts, or three-fourths of its 1990s resource needs, from energy efficiency, and the rest from relatively small, fast, cheap, modular, renewable sources (*4*).

AMORY B. LOVINS
Rocky Mountain Institute, 1739 Snowmass Creek Road, Snowmass, CO 81654-9199

REFERENCES AND NOTES

1. A. B. Lovins and R. Sardinsky, *The State of the Art: Lighting* (COMPETITEK Service, Rocky Mountain Institute, Snowmass, CO, 1988); pp. 16–19.
2. For typical U.S. buildings and climates, each unit of directly saved lighting energy saves net space-conditioning energy of roughly >0.35 units in commercial, 0.04 in industrial, and −0.055 in residential buildings (*1*). Actual interactions are building-specific, but even in unfavorable cases (all-electric houses in cold climates), incandescent lamps, being both electric and short-lived, are a costly way to heat, especially compared with insulation and superwindows.
3. Presuming that efficiency is at first premature and then too late, with nothing in between, Rossin's prescription—urgently building power plants—would both divert resources from efficiency and create a strong idle-asset incentive not to achieve it. The Electric Power Research Institute's *Impact of Demand-Side Management on Future Customer Electricity Demand* (EM-4815-SR, Palo Alto, CA, 1986) estimated that overbuilt utilities' mid-1980s efforts to recover their costs by ordering their efficiency staffs to market more electricity instead would create about 35 gigawatts of new *on*peak load by 2000, wiping out about five-eighths of utilities' efficiency efforts.
4. *1990 Annual Report* (Pacific Gas and Electric Company, San Francisco, CA, March 1991).

Olson notes that light bulbs emit significant amounts of waste heat and suggests that, since compact fluorescents emit less heat than incandescents, energy savings from substituting fluorescents for incandescents won't be as large as expected. He states that "large, modern office buildings receive a significant contribution to their heating plant from the waste heat from lighting systems." However, large modern office buildings are *not* lighted by incandescent lights. Their waste heat from lighting comes from fluorescent lights, so no one will be substituting compact fluorescents for incandescent bulbs in such buildings. Even though the waste heat tradeoff might de-