

letters

Clearly more relevant data are needed before any prediction of nuclear winter rests on a sound foundation. We hoped our article would help highlight those parameters that are key determinants of the climatic effects so that research efforts might be directed to narrowing the most critical uncertainties.

BARBARA G. LEVI
Princeton University
Princeton, New Jersey

6/86

I wish to compliment Barbara G. Levi and Tony Rothman on avoiding, for the most part, the following perversion of the discussion on nuclear winter in their article. It has been all too common in the recent spate of press treatments of the possible final-solution consequences of nuclear war to stand the discussion on its head. One reads that the conclusions are (not surprisingly) not certain. One is invited to take some comfort in this. Surely in a sane world the burden of proof is on the proponents of bearable nuclear war to prove that the cataclysmic nuclear winter will *not* occur, rather than the other way around.

W. C. MEECHAM
University of California
Los Angeles

10/85

'Von Kármániana'

William Sears's article about Theodore von Kármán (January, page 34) will certainly interest many of his old friends—but I am sorry to see that Frank J. Malina's name was spelled incorrectly in the illustration on page 38. Historians of engineering—and in particular of the Jet Propulsion Laboratory—may like to know that Marjorie Malina has now donated her late husband's library to the Arthur Clarke Centre for Modern Technologies at the University of Moratuwa, Sri Lanka, and it is now in the process of being cataloged.

May I add my own two favorite bits of von Kármániana to the record? Both occurred at IAF congresses. At Zurich in 1953, von Kármán was lecturing fluently in English, German and French when his attention was distracted by a handsome lady in the front row. The lecture went on and on and the audience was getting restive when the object of his concern, who happened to be my wife, whispered to me, "Do you think if I leave now he will stop talking?"

At another IAF lecture, a hapless American engineer, straining for superlatives, stated that "not only is the

curve exponential—but the rate of increase is *also* exponential!" At this point von Kármán interjected mildly, "I always thought that was the definition of an exponential function."

ARTHUR C. CLARKE
University of Moratuwa
Sri Lanka

1/86

Memories of Pauli

The recent article by Victor Weisskopf about Wolfgang Pauli (December, page 36) reminded me of a story that a certain Northwestern University professor (who will remain nameless, but who was a graduate student at Princeton while Pauli was there) used to tell in his physical-chemistry classes.

As Weisskopf noted in his article, Pauli had a young wife. She liked to dance. After a party that ended with the then graduate student dancing with Pauli's wife, she told him, "Wolfgang will drive you home." Upon reaching the car it was discovered that Mrs. Pauli had forgotten her boots, and Pauli asked the student to retrieve them. After returning with the boots he found the Paulis in the car and ready to go. When he attempted to enter the car on Mrs. Pauli's side, Pauli said, "No, over here please." When he reached the other side of the car, Pauli opened the door and took the boots. He then drove off without the student.

The point of this story is to help us remember the Pauli exclusion principle.

W. B. GLEASON
Chaska, Minnesota

1/86

High-school physics

The description of the high-school physics teacher's world in "The physics classroom revisited: Have we learned our lesson?" (November, page 46) is absolutely correct.

As one with 15 years' experience, usually as the only physics teacher in the school, I can attest to both the isolation and the diverse demands of the job. Not only are we expected to be up to date in our personal knowledge of physics content and teaching methods and materials, but we are also supposed to make physics "nonthreatening" to the general student body, increasing enrollment and providing opportunities for academic success while at the same time challenging the "super scientists" and "whiz kids" who pop up now and then.

The possibility of collaborating with physicists in higher education and industry in developing a more appropriate high-school physics program is exciting. We high-school teachers need professional-growth opportunities such

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letters

as these. And our higher-education and industrial colleagues need the large doses of reality that our daily classroom experiences bring to the realm of physics education.

BEVERLY C. STONESTREET

Maryland State Teachers Association

12/85

Baltimore, Maryland

A high-school science teacher visited my house recently. He was amazed that the copper coils around my wood-fired space heater would send hot water upstairs to a tank without a pump. After seeing the setup, he mumbled about density differences for quite a while.

This reminded me of the article "The physics classroom revisited: Have we learned our lesson?" I read this article through and saw, to my dismay, no serious discussion of making physics interesting and understandable to children. I would think that enough people have seen that young students dislike physics to figure out why and to find a way to present the subject without getting this reaction. But apparently solutions in this direction have not yet been seriously attempted.

Then I remembered my visits with Sears and Zemansky, and the backward (standard historical) way in which the book presented the subject, and how calculus starts with limits, which are promptly forgotten. All this leads me to plead, for the sake of educating the young in science, that textbook writers stop the pomp and circumstance and prepare to teach physics that children want to learn. Once you have the attention of the few capable ones, you can present more esoteric material.

An example: A student wanted to do better video editing (VHS, without a frame editor). I wanted to teach him about raster scans, chroma signals and color vectors. The more I covered this basic material, the less he wanted to be there. When I covered editing topics, such as allowing an appropriate lead out of scene 1 to allow overlap of scene 2 for matching synch, he grew increasingly interested. That was what he wanted. When he needs to solve problems with split screen and gen-lock, he will be ready to learn about rasters.

When I teach electricity, I don't mention Ampère's law or static electricity at first. That is not what is wanted or needed. It is yawn material. What is needed is: There are x number of electrons in a coulomb (and that is not too important), an amp is 1 coulomb of electrons through a surface per second and a volt is the force needed to push those electrons through a restriction called an ohm.

So what type of physics do children want to learn? Why are there colors in an oil slick or a soap bubble? A simple explanation, please. White light, and almost all light seen, is made up of many colors added together. A picture of two prisms would help here: white to colors to white. Turn off the technical stuff—such as what makes each color—when the eyelids droop. Ask the students what kind of physics things they would like to figure out.

What about other things close to life? A biceps puts forces on a forearm to make it work like a lever. The muscle has to lift much more than just the arm. Look for other lever examples, such as window cranks and doorknobs. Look at a ball on a string; compare it to the Earth going around the Sun and the "invisible string." Where are the strings holding us on Earth?

Haven't scientists and text writers even tried to understand what turns kids off about physics? It is the irrelevant stuff that makes no sense and is too hard, with all its new kinds of stuff to think about.

PETER GRANT

Bristol, Vermont

1/86

Sabine and acoustics

I am as much of an admirer of Wallace Clement Sabine and his contribution to architectural acoustics as Leo L. Beranek is, but I find it difficult to agree with his opening remark that "Wallace Clement Sabine was the world's first and most celebrated acoustical scientist," which appeared in his article on Sabine (February 1985, page 44). The honor of being the world's first and most celebrated acoustical scientist goes, in my view, to Lord Rayleigh, who had already published his *Theory of Sound*, Volume I in 1877 and Volume II in 1896, and had thereby laid the foundations for the science of acoustics.

B. S. RAMAKRISHNA

University of Hyderabad

10/85

Hyderabad, India

BERANEK REPLIES: I wish to thank B. S. Ramakrishna for properly giving Lord Rayleigh credit as the person most deserving the title of "most celebrated acoustical scientist," using the broad meaning of the word "acoustical," that is, "of or relating to sound or sound waves." In the context of my article, "acoustical" meant "the aggregate of qualities of an enclosure (as an auditorium) that affects production, control, transmission, reception and perception of sound" (*Webster's Third New International Dictionary, Unabridged*). Lord Rayleigh seldom used the word "acoustic," preferring "sound."

LEO L. BERANEK

Cambridge, Massachusetts

7/86

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