issue until after heating the results from the Forum Symposiums on this question. One of the Forum speakers, Hans Bethe, gave a talk that showed beyond a reasonable doubt that the US was the aggressor in the nuclear arms race and that the Russians have been desperately trying to catch up! At the final Forum meeting I called for a vote on the question of a nuclear freeze, and there was almost a 100% show of hands!

At the 1983 Spring meeting, George A. Keyworth II, President Reagan's science adviser and the director of the Office of Science and Technology Policy, gave a talk in which he asked for help from the physics community to develop the technology for future antiballistic missile systems. I was the first to comment on his talk, and I argued that development of these types of weapons would expand the arms race and bankrupt the economy! The loud applause in support of my argument left little question that a large majority of the physicists have had enough of the arms race and would not support the development of Reagan's "Star Wars" weapons.

BRYAN G. WALLACE
St. Petersburg, Florida
5/83

More on Bronx Science

The fact that I am a graduate of the Bronx High School of Science heightened my interest when I read the article about the Science class of 1950 "One high school yields 8 PhDs and 2 Nobel laureates in physics" in February (page 53).

The two Nobel Prize winners notwithstanding, this yield of 8 PhDs was not unusual even after the three-or four-year period mentioned in the article. My graduating class (Science '57) produced 10 PhDs in physics and one in astronomy. Besides Leonard Susskind and Lillian Hartman, who were mentioned in the article, the people who went on to get PhDs in physics are: Leonard Feldman (Bell Labs), Lance Heiko (self-employed), Steven Holt (NASA), Ivan Kramer (University of Maryland), Leslie Levine (Federal Government), Michael Moldover (NBS), Ken Pickar (self-employed), and myself. Eugene Milone (Rothner Astrophysical Lab, Canada) received a PhD in astrophysics.

SAMUEL MARATECK
New York University
New York, New York
3/83

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I would like to add my name to the list of Bronx Science graduates (class of 1960) who later went on to receive a PhD degree in physics. The research for my doctorate, received in October 1971, was an experimental study of vortices in helium-2.

MARVIN STEINGART
Hughes Aircraft Company
Fullerton, California
3/83

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In the excellent news story by Gloria Lubkin about the Bronx High School of Science, a list is presented of graduates of the school between 1940 and 1960 who became physicists. Since I am identified as the compiler of the list, I wish to assure my fellow alumni that it was not meant to be complete as published, both because there were many more that I knew of than could conveniently be listed, and because I do not believe that I have identified all physicist alumni of Bronx Science. Since the article was published, a number of physicists who were not listed have written to me, identifying themselves and sometimes other graduates who became scientists. I very much appreciate this, and I would be happy to hear from other graduate of Bronx Science, physicists or otherwise, who would like to tell me something about their experiences at the school.

GERALD FEINBERG
Columbia University
New York, New York
5/83

Secular correction

Regarding "New inflationary universe: an alternative to the Big Bang" (May, page 17), I would have expected the "three-week worship" to have been held at Canterbury rather than Cambridge.

JOHN S. MCINTOSH
Wesleyan University
Middleton, Connecticut
5/83

We did not mean to imply a religious gathering; the correct word, of course, is "workshop"—Editor.

Nuclear arms education

Congratulations on the fine special issue in March on nuclear arms education. The authors were obviously well selected, the topics most appropriate, and the emphasis on the normative role physicists have (as emphasized especially by Hans Bethe) makes it one of the most important issues ever published.

Many of us are teaching about the arms race. I teach a course on the topic in the College of Liberal Arts of the Rochester Institute of Technology. Normal enrollment in my course is 45 and I teach five sections per year—thus reaching 225 students directly. One of the outcomes of the classroom teaching has been frequent contact with stu-

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dents outside the classroom, so even more students are reached.

Dietrich Schroeer is especially to be commended for his hard work in developing course material and for his willingness to share it with his colleagues. My own course had its beginnings with material he graciously supplied me.

Each of us physicists has something unique to bring to the question of the nuclear arms race. I hope that the visibility and undergirding that efforts in teaching about the arms race has gained from this issue will be the catalyst for even more opportunities for informed and professional discussions of the issues involved.

FRED WILSON
Rochester Institute of Technology
3/83 *Rochester, New York*

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The dramatic Japanese painting of the firestorm at Hiroshima as well as the child's drawing of the mushroom cloud (page 23) form an appropriately penetrating and emotionally charged introduction to the nuclear education theme of the March issue. You are to be commended for your courage in entering the public arena not only with words and hard scientific facts but with visual image and color. Distinguished scientists illuminate the technological facts in ways the layman can comprehend, while child and surviving victim call us to the dark side of that which we are creating.

It is time we dare to reach across the boundaries of our academic disciplines not only to share what we know but to allow ourselves to be touched by what is as yet unknown. It is with this intent that I write.

By way of background I will mention that I am a clinical psychologist in the practice of individual psychotherapy and group dreamwork. For thirty-five years I have been married to John Jungerman, now a professor of physics at the University of California, Davis. Three years before I met him, while he was a graduate student working on the Manhattan Project, my husband witnessed the first nuclear explosion on the Alamagordo desert. Many times he has told me the story of how witnessing that event altered his consciousness. There in the early dawn of that morning in 1945, with the blinding vision of the now familiar mushroom cloud before him, he knew the world would never be the same.

In the past year, my husband and a colleague have presented an upper-division physics course at our university campus called "The Science and Technology of Nuclear Weapons and Nuclear Arms Control." Response to the course offering was gratifying, for even with class space for one hundred and eighty, students had to be turned away.

I followed my husband's participation in this course which was challenging, exciting, and at times anxiety-producing for him beyond anything he had taught before. About halfway through the quarter there were rumors that students were feeling depressed and hopeless. We talked of his bringing in someone who could encourage the acknowledgment and expression of the emotional impact of the material of the course. A female psychologist from the Counseling Center staff who was brought in as a guest lecturer was able to lay the groundwork for students to express themselves. Enough students spoke out in the large class to break the ice and give voice to the fact that immobilized them. Some offered personal reflections and a few told of dreams they were having of nuclear war. (It was later learned through a questionnaire devised by a student as a class project, that dreams of nuclear war were twice as frequent after the course as before.) That a turning point had been made in the class was evident not only from positive comments but from the heightened emotionality and resolve toward action expressed by students. Thus the students finished the class not only better informed technically but also having confronted the emotional denial that prevented them from challenging their fear.

I do not look upon the dreams of nuclear war or the fears they represent in a negative way. It is not the fear but the avoidance or denial of fear that is most destructive. Here I draw directly from my dreamwork and my experience with people in crisis. Turning points are heralded by crisis and carry with them paradoxical overtones of both tragedy and opportunity. Nightmares and other vivid dreams are most likely to present themselves to us in times of crisis. We often forget that they carry within them the seeds of transformation. As I see it, we have a choice: We can shrink from the nightmare as a harbinger of tragedy or we can learn to accept fear and excitement as opportunities for creative change and cultural transformation.

For several weeks my husband and I together have been offering our complementary perspectives on the nuclear arms dilemma to public groups. Audience response suggests that the two perspectives form a balance that mitigates against avoidance and emotional denial. I hope this recognition will be as encouraging to your readers as it is to us.

NANCY K. JUNGERMAN
5/83 *Davis, California*

Unexplained glass flow

I have followed with interest the article on the physics of glass in February 1982 (page 27), by James Phillips of Bell Telephone Laboratories, and the subsequent discussions in the letters to the editor. The latest comment I saw was by Jay Pasachoff, who quoted expert opinion that there was no possibility of flow in glass once it had dropped below 400 °C. (February 1983, page 95).

I would like to relate a surprising example of glass flow which I found accidentally in 1967, for which no physicist has yet given me an explanation. Most of them refuse to comment, probably suspecting a hoax. On that occasion I had borrowed a box of wine glasses for a party, and afterwards they were washed and re-packed loose, with no padding, in a cardboard box ready for their return.

The box was placed for a while on a low window sill, about 2 feet above a wooden floor. Unfortunately, the width of the sill was barely adequate to balance the box, which, on being accidentally touched, tipped over onto the floor. The majority of the glasses survived this experiment, one breaking in a normal manner and one in a very abnormal manner. The second glass had a shattered bowl, the foot remaining intact, but the stem was bent sharply through about 90° (see photograph). I still have the object in my possession.

I cannot think of any way in which glass could be made to flow at this rate at room temperature. The bending must have occurred in a period of milliseconds, and the force required would also be very large, although the conditions of the accident seem to preclude this.

I would be interested to hear from any experts on the structure of glass or strength of materials whether this behavior can be considered normal or whether we are dealing with an abnormal phenomenon.

Not surprisingly, I have tried experi-