letters

should be to acquire not only scientific and technical knowledge but also to enhance and deepen the understanding of Islam and its emergence as a religion of the modern world.

At this time, there are five science-oriented universities in Saudi Arabia—King Abdulaziz University at Jeddah, King Faisal University at Dammam, The University of Riyadh at Riyadh, The University of Petroleum and Minerals at Dhahran and Dammam University for girls at Dammam. Two other universities, located in the holy cities of Mecca and Medina, emphasize Islamic studies. With a total enrollment of about 25 000 students, these universities are training young Saudis in the fields of science, agriculture, engineering and medicine, in the hope of having Saudi Arabians become self-sufficient in providing a high quality of modern life. In long-range planning, Saudis are considering nuclear reactors for power generation and water desalination, and the discovery of uranium reserves in Arabia has given emphasis to training programs in nuclear technology. The hospitals in Saudi Arabia are using radioisotopes for diagnostic purposes. Use of radioisotopes in medicine and industry is increasing rapidly. Low-energy cyclotrons and cobalt-60 sources have been placed in some hospitals for radiation treatment of tumors.

King Abdulaziz University is planning a nuclear-energy center based on nuclear fusion technology. Saudis have a strong need for trained nuclear physicists and engineers and technicians; through our experience we can say that the salaries, benefits and working conditions in most Saudi universities are becoming increasingly attractive.

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11/81

Federal funding

December contains an editorial, a news article, and an article on physics funding to which I would like to respond with thoughts I have had for several years.

Emanuel Piore (page 38) has performed a valuable service in outlining the evolving federal role in physics funding. As he points out, the initial impulse for federal funding of physics research resulted from the experience of World War II (page 40). The scale of scientific technologies developed during the war had increased beyond the ability of pre-war funding sources to support. "The war effort had clearly demonstrated in Washington the creative ability and usefulness of scientific laboratories and research groups. The future well-being of the national economy and defense required that such resources be preserved." As a result, the output of scientific research in the US between 1945 and the present proceeded at an unprecedented rate and on a vast scale with federal funds.

But is it socially wise to continue scientific research at this rate and on this scale? I think that it is not for four reasons:

▶ The rate and scale of scientific research, together with the coordinated technology, have outpaced the ability of society to comprehend and to evaluate (ethically, in particular) the results and implications of the research and technology. We are beginning to suffer what Alvin Toffler has called *Future Shock*.

▶ Research areas, to some extent, and proposal rationales, to a large extent, have been determined by what researchers perceive that the funding agencies desire, and not necessarily by what researchers perceive to be fundamental questions to be asked of nature. Thus, research has been guided away from its true course, to some extent.

▶ The rate and scale of scientific research has distorted considerably the relative merits of teaching and research in the academic community. Teaching and research are separate

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arts in themselves, and it is rare that excellence in both arts is found in a single individual. Excellence in science teaching at the undergraduate level is essential for the intellectual growth of science majors and non-science majors alike. But what percentage of openings in the Information Exchange section of this publication and in the AIP Summary of Academic Openings calls for applicants who are excellent teachers and are not researchers? On the other hand, every issue of these publications carries academic positions which involve research and no teaching. What percentage of academic institutions promote and reward those individuals who are excellent teachers, but who are not researchers? On the other hand, a large percentage of academic institutions routinely promote and reward those individuals who are devoted solely to research.

▶ Large-scale federal funding of research for "defense" has helped to perpetuate a life-destructive concept of defense and has helped to inhibit the growth of a life-protective concept: the development of strategies and technologies to render ineffective weapons of destruction used by potential adversaries.

To alleviate these four problem areas, I support the steady reduction of federal funding of scientific research over a period of five years until the only federal support remaining is for life-protective defense. In the process of this reduction there would a phasing out of NSF, NASA, DOE, and some of the national laboratories. In my opinion, the correct rate and scale of scientific research not related to life-protective defense are those which can be funded by private individuals, private foundations, and industry. In this way society can retain its ability to comprehend and evaluate the results and implications of scientific research and its coordinated technology, the course of scientific research can have less deviation, the relative merits of teaching and research can be placed in proper perspective, and the world can be made safer for humanity.

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1/82

S. B. Preuss: a short life

Among the many notable achievements during the celebrations of Einstein's one hundredth birthday, the discovery of his coworker in Berlin, S. B. Preuss, was one of those receiving rather little publicity. This may be due to the fact that the discovery was made accidentally. In a section entitled "Historical Comments" of their review article about cosmology,[1] the authors state: "The discovery [. . . of Hubble's law . . .] also led Einstein to immediately reject the notorious cosmological term (*Einstein and Preuss, 1931*)".

The curious reader who has followed Einstein's life story and knows of his collaboration with M. Grossman, J. Grommer and W. Mayer (to name a few) but never heard of S. B. Preuss eagerly turns to the reference given. It is: A. Einstein and Preuss, S. B. (1931), Akad. Wiss. 235. Surely the Akad. Wiss. must be the Berlin academy. Handily enough for those without access to the originals, Einstein's reports to the Berlin academy have been reproduced on the occasion of the 1979 celebrations[2] and can be bought with little cost. A glance at page 235 of the 1931 volume of the Sitzungsberichte der Preussischen Akademie der Wissenschaften, Phys.- Math. Klasse (Reports of the meetings of the Prussian Academy of Science) reveals the working of a creative mind. Not inclined to check the primary sources, he nevertheless is able to compensate for a considerable loss of information. Let us look at the following sequence of references to the author and journal in question:

Einstein, A. (1931). Sitzungsber. Preuss. Akad. Wiss. . . .[3]
A. Einstein, 1931, Sitzgsber. Preuss. Akad. Wiss. . . .[4]
A. Einstein, Sitzber. Preuss. Akad. Wiss. . . (1931)[5]
A. Einstein (1931). Sber. preuss. Akad. Wiss. . . .[6]
Einstein, A., 1931, Sb. Preuss. Akad. Wiss., . . .[7]
A. Einstein, S.-B. Preuss, Akad. Wiss., . . .,1931.[8]
A. Einstein, S. B. Preuss. Akad. Wiss. (1931), . . .[9]
A. Einstein and Preuss, S. B., (1931). Akad. Wiss. . . .[1]

Thus it turns out that the birth and death of S. B. Preuss occurred within such a very short time span that his scientific endeavors could come to nothing. Hopefully this is noticed by the public, including the people producing the citation index. Otherwise I fear, lest, in a generation or two, a young historian of science might apply for a grant to uncover more details from the brief but not entirely joyless life of S. B. Preuss.

References

1. E. P. T. Liang and R. K. Sachs, "Cosmology," in: *General Relativity and Gravitation (One hundred years after the birth of Einstein)*, E. Held, ed., New York, 1980, Vol. 2, pp. 329–357.
2. Albert Einstein, Akademie-Vorträge, Akademie-Verlag, Berlin 1979.

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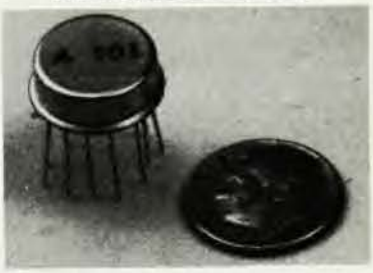

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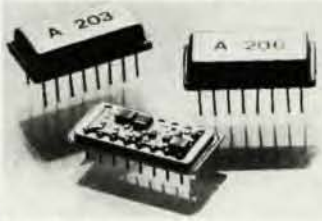

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