Letters

Biotechnology Regulation

In her article "Biotechnology's regulatory tangle" (News and Comment, 17 Aug., p. 697), Marjorie Sun attributes the following statement to me: "Furthermore, the guidelines only cover experiments conducted in the laboratory, not the environment." That is not correct and is not what I said. The *NIH Guidelines for Research Involving Recombinant DNA Molecules* (*1*) do in fact cover "deliberate release into the environment" in section III-A-2. I was commenting on the licensing agreement under the Stanford University patent, from which Sun quotes the key phrase that the licensee "specifically expresses its intent to comply with the physical and biological containment standards set forth in the NIH Guidelines. . . ." I pointed out that, while the guidelines specify physical and biological containment standards for many types of experiments, for "deliberate release" experiments there are in fact no physical and biological containment standards set forth.

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References

1. *Fed. Regist.* **48**, 24556 (1 June 1983).

SURA Accelerator

I wish to comment on Eliot Marshall's article "A second look at Virginia's accelerator" (News and Comment, 17 Aug., p. 699). The article describes the recent history surrounding the funding of the Southeastern Universities Research Association (SURA) accelerator. Nowhere is there mention of the urgent scientific need for such an accelerator or of the science that would remain undone without it. A GEV electron accelerator has been seen as opening major new frontiers for nuclear physics by a series of national committees. It was first identified in 1977 in the report of a national panel on the Future of Nuclear Science chaired by Gerhart Friedlander, before the Nuclear Science Advisory Committee (NSAC) was established. The scientific need for such a facility was reiterated by the first NSAC *Long Range Plan for Nuclear Science* prepared in 1979 under the chairmanship of Herman Feshbach of MIT. Later subcommittees were active in specifying the properties of an electron accelerator, and finally the SURA facility was selected in 1983 by an NSAC panel chaired by Allen Bromley. This panel's recommendations were endorsed and transmitted by NSAC under my chairmanship. The panel said: "The highest priority for new accelerator construction in the U.S. nuclear physics program is for an electron accelerator of high duty factor capable of producing beams in the energy range from 500 to 4000 MeV."

Later in 1983 the Department of Energy and the National Science Foundation asked NSAC to prepare a new long-range plan to provide a "framework for the coordinated advancement of the Nation's basic nuclear research program over the next decade" and suggested that it should look beyond the electron accelerator. Our report, *A Long Range Plan for Nuclear Science*, was issued in December 1983. The very first paragraph of the initial summary states, "From these discussions and studies, we reaffirm our earlier recommendation for the earliest possible start on the construction of a national electron accelerator laboratory," and this is followed by a summary of new recommendations for the future. There are a number of references to the physics to be done with the electron accelerator in the text of the report in discussions of specific scientific issues. In the final section we again summarized: "The new 4-GeV electron facility . . . is clearly the major near-term new initiative in nuclear physics. Its completion is awaited eagerly by our community." The observation of *Science* that the commitment of NSAC to the SURA facility in the long-range plan was left "untested and slightly cloudy" is certainly inaccurate.

A great deal of dust has been raised about the politics surrounding this project that has obscured the real scientific need for a continuous-beam (to allow all-important coincidence measurements), high-intensity electron accelerator in this energy regime. The cleanliness of electromagnetic probes is necessary to resolve a number of questions *in* nuclear physics as well as important questions that go *beyond* conventional nuclear physics to areas where excited states of nucleons and mesons and their underlying quark structure play an increasing role. The nuclear or many-body aspects of our current understanding of the strong interaction (contained in QCD), are not well understood or explored at present. Thus Marshall's article misstates the science of the 4-GeV accelerator (it has nothing to do with a new phase of nuclear matter or a quark-gluon plasma).

The issue of a major costly facility will inevitably raise some political controversy. *Science* should certainly report what is happening. On the other hand, by concentrating on political hearsay and by selecting information to make for a juicy story, such articles also have an influence on shaping events. The political aspects are important and newsworthy, but what most of us want is to see an effective facility built. The scientific need far outweighs any feelings of regional or institutional rivalry.

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We would like to comment on Marshall's 17 August article on the Continuous Electron Beam Accelerator Facility (CEBAF). The need for a high-energy-factor, high-duty-factor electron accelerator for nuclear physics was recognized in the late 1960's. Since then virtually every study of the future of the field has reiterated that need. The decision in 1982 to pursue such a machine was thus the culmination of many years of consideration. After this decision, the choice among competing proposals to construct the machine involved one of the most intensive peer reviews ever conducted by the U.S. nuclear science community. In 1983 the Southeastern Universities Research Association (SURA) proposal was chosen primarily because its design was cost effective, was deemed to have the highest probability of successful completion, and possessed the greatest flexibility. The situation relative to these events remains unchanged today.

During the past year substantial progress has been made on the project in both technical and organizational areas. Design work has been pursued, the staff has been increased, managerial and administrative systems have been established, and the involvement of the nuclear physics community has been organized. This effort was sustained by the universities and states of the Southeast. The contract signed by SURA and the Department of Energy (DOE) on 3 August represents the first federal support of the CEBAF project.

Advanced technical design was initiated shortly after the project was recommended by NSAC. All major facets of the facility and machine design were examined. The Brobeck Corporation was engaged to do a complete reexamination of the costs of the accelerator components. An architectural and engineering firm was used to evaluate, design, and estimate the cost of the required conventional construction. The results of this work were incorporated into a Conceptual Design Report (CDR) which was submitted to DOE in February 1984. In March the scope and total estimated cost of the project were agreed upon by DOE and SURA. A revised CDR, which represents a complete analysis of the facility's technical design, scope, scheduling, and total estimated cost, was submitted, and a fiscal year 1986 DOE Budget Validation Review was completed in June.

The technical staff of physicists and engineers has been expanded to 14 from the original group of three. In addition, 17 administrative and clerical personnel supported by the Commonwealth of Virginia have been permanently transferred to the project and are now located at the site in Newport News, Virginia. With funds provided by the Commonwealth, a training program in accelerator physics has been initiated at the Stanford Linear Accelerator Center. Within 1 month we will have five people involved in this program, and we expect to double this number by the end of the year. Now that funds are available, the infrastructure of the laboratory is being established, and a research and development program for critical elements of the accelerator has been initiated. The laboratory management has undertaken every effort to ensure that the project can proceed with construction in fiscal year 1986.

The involvement of the scientific community in the project is extensive. Several meetings of potential users of the facility have been held, and a CEBAF Users' Group has been constituted. Working groups to study specific research programs for the facility have been formed and are scheduled to meet on a regular basis to develop plans for major experimental devices. A workshop focusing on theoretical questions led to a separate proposal to DOE for support of a Theory Group at CEBAF. The interest in and support of the project by the nuclear physics community, as evinced by the involvement of a large number of its members, is strong.

An intermingling of rumor, innuendo, and unattributed comments within the political arena makes interesting and sometimes humorous reading; however, it is not the means by which advances in science are made. Nuclear physics is a diverse and complex field. No one probe or experimental technique can give all the answers. There always will be a need for different types of facilities. However, given finite resources choices must be made. Even with its faults, the scientific community has found no better method for a fair evaluation of scientific alternatives than the peer review system. Every nuclear science committee established during the past 5 years to judge both the scientific and technical merits of competing proposals has strongly agreed with the position of SURA scientists.

Nuclear physics is at a crucial stage in its development. Decisions made at this time will have a major impact upon the vitality, perhaps even the viability, of the field. The decision to proceed with the electron accelerator was based soundly upon the quality and merit of physics arguments developed over more than a decade. The physicists who initiated this project have and continue to play a major role in high-energy electro-nuclear physics research. They are confident that recent scientific developments only strengthen the case for construction of this facility.

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Erratum: As published, figure 2 in the report "Disruption of the terrestrial plant ecosystem at the Cretaceous-Tertiary boundary, western interior" by R. H. Tschudy *et al.* (7 Sept., p. 1030) contained two errors. The break in the stratigraphic column should have been 3 m, and the iridium concentration should have been in parts per trillion. The correct figure is reproduced below.