letters

in my article that "Research reactors and cyclotrons supply most of the medical isotopes." But the kilocurie isotopic sources such as the ^{68}Co units in hospitals, the $^{13}_{7}$Cs units for x-raying welds, or the ^{98}Sr power supply that was left on the moon are the product of high-powered reactors. Even so, Trumbull could make a good argument that the more important needs could be met by small research reactors and accelerators.

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Multidisciplinary groups

The symposium on Solid-State Physics, Science and Technology at the Dallas APS meeting this spring was enlightening for many academic physicists and gratifying for those physicists with industrial experience. The continuum of problems encountered in practice has required industrial solid-state physicists to make contact with metallurgy, ceramics and chemistry. Indeed, it was partly the success of such broad effort in materials science that led the Advanced Research Projects Agency to establish interdisciplinary laboratories at universities. However, the actual result of such establishment has been primarily to provide more research space for the traditional departments without fostering the kind of interaction that was expected. Hence even the new PhD in solid-state physics who has done a thesis in an interdisciplinary lab probably is not emotionally or intellectually prepared to make the contributions needed to solve the problems of interest in metallurgy, ceramics and chemistry.

Another approach, which was mentioned by John Bardeen in his speech at the symposium, is the joint appointment in physics and a related department. A professor in such a position is expected to develop a multidisciplinary group. In my case, for example, the group includes two graduate students in physics, two in ceramics and one in metallurgy, plus a postdoc in physics. The members of such a group acquire great regard for the expertise found in the other disciplines represented. They also learn some of the theoretical and experimental techniques and the ways of dealing with problems popular in these disciplines but perhaps novel to an outside student. In brief, all the benefits that were supposed to be realized in the "interdisciplinary" laboratory as an institution can, in fact, be realized much more readily in a single multidisciplinary group.

Not only does the multidisciplinary group arrangement benefit the students, it also stimulates the professor to address himself to problems in related areas that he might not have considered from a location in a single department.

Furthermore, a solid-state physics professor in such a role can use a large part of his research-direction effort on students in engineering departments who are in greater industrial demand than are PhD physicists. Thus he can practice solid-state science vigorously without adding to the overpopulation problem in physics.

In some universities, joint appointments are rare. Nevertheless, the multidisciplinary group could be developed around a given professor, attached to a single department, with the consent of the other departments involved. This can be politically awkward, however, while the joint professorship provides a ready mechanism for the initiation of such a group.

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Unfair to Senator Mansfield

The editorial in the February PHYSICS TODAY, "Hold That Meat Axe," was I think quite unfair to Senator Mansfield. On 20 March 1970 Senator Mansfield is quoted in *The Congressional Record:* "The Federal contribution to scientific inquiry should not be diminished by force of Section 203. If it is, it is because of ineptness at the interagency level." Later in the same speech he says: "A laissez-faire attitude is not justified in the implementation of a sound national science policy. This is not the time for benign neglect when it comes to this Nation's research and scientific efforts."

The portion of Senator Mansfield's speech you quote, *The Congressional Record*, 6 November 1969, has been distorted. The question raised was whether the Congress should vote "to sustain the overall level of academic research . . . or as a matter of national policy to reduce the overall level." The word used is "reduce" not "eliminate" as you used in reply to Orear's letter. In short, Senator Mansfield did not in any way suggest cutting $250 million in research support.

In the very speech from which you quote, Senator Mansfield repeated an excerpt from a speech by Lee A. DuBridge: "As long as science is the stepchild of the military, it will suffer in dignity; it will suffer through lack of assurance of long-term support; it will be under pressure to yield practical results . . ." This is indeed a relevant excerpt from a prophetic speech of 20 years ago.

In a letter to me Senator Mansfield states: "At no time did I demand immediate termination of projects that might not be found to comply with the