

NAS survey: A push for physics as a humanistic science

*He's a real nowhere man
Sitting in his nowhere land
Making all his nowhere plans
For nobody.*

The Beatles in Yellow Submarine

In the title of one of his books Jacques Barzun referred to science as the great entertainment. This, coming from an historian, was regarded by many scientists as blasphemy by an infidel—rather as if a Buddhist bonze had sent an essay to the College of Cardinals denouncing the infallibility of the Pope. Now, in *Physics in Perspective*, a report of the National Academy of Sciences Physics Survey Committee chaired by D. Allan Bromley of Yale University, the bonzes of the American physics establishment are using the argument—though not the words—to justify continued public support for their endeavors: “Still, how does this bit of knowledge [the discovery that there are two kinds of neutrino] benefit the general public . . . ? The answer must be that the discovery was a step—a necessary step—toward making nature comprehensible to man. If man is going to understand nature, he has to find out how it really is.”

There used to be such an interest. Again from the report: “Long before the atomic bomb made mc^2 a catchword, the theory of relativity . . . engaged the public interest more intensely than anything else in 20th-century physics.” That was 50 years ago. Today physicists feel the same kind of excitement foreshadowing fundamental change in their science. They are on the verge of important discovery in so many subfields at once that it takes several hundred of the 1,000-odd pages in the report simply to describe them briefly. “We’ve been having a hell of a good time,” says Bromley. Yet the public seems uninterested. And if interested, unequipped to understand: “. . . a majority of college graduates have never heard of fermions or bosons, and . . . an even larger majority is not equipped to understand what the distinction means.” Like the college graduates, so the professional philosophers: “The philosophical implications of the fermion-boson dichotomy are still, after 40 years, poorly understood by philosophers.”

And just at the moment when all these little-understood flowers are blooming in physics land, it has been attacked by the blue meanies, who are cutting off its money supply. This is doubly disconcerting to physicists because ever since the bomb they have taken to justifying themselves in terms they thought appealing to blue meanies: technology, national defense, national prestige. In doing so they have given themselves a public image similar to the nowhere man, Jeremy, in *Yellow Submarine*. As Jeremy talks compulsively in verse, physicists talk compulsively in mathematics. Like him, they are always complaining about how much there is to learn, and making endless feverish plans.

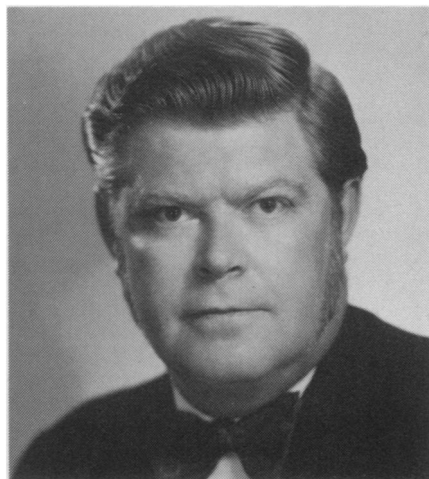
The present report however is full of a desire to return to that happy Pepper land where Max Born’s popular book *Die Relativitätstheorie Einsteins* sold like a novel. It expresses a renewed willingness on the part of physicists to regard their subject as one of the humanities and to seek to justify it on the basis of its contribution to the enjoyment of life. That enjoyment is viewed as physical as well as intellectual. The technological justifications are far from forgotten. In fact the report gives them a great deal of stress, but the illustrations chosen are of a most benign sort: tailored isotopes for medical treatment, cheap transistors for kitchen-cabinet computers, etc. The report is too establishment oriented to go as far as some younger physicists, who have been demanding a “sensuous physics.” (After the Beatles take Jeremy in tow on their way to Pepper land,

they sing the charming sensualization of elementary mathematics, “One, two, three, four, can I have a little more?”)

But the report does urge the physics community to make communication of physics to the public a high-priority issue. “Physicists have fallen below their responsibility to make physics available to the general public,” says Bromley. The report urges them to work as individuals and through their societies to see that the various communications media present publicly understandable material about the science. The recommendations include new emphases in teaching physics from kindergarten to graduate school, especially means to increase the knowledge of physics possessed by those who teach it in elementary and high schools, and to increase the possibility of physicists going to teach in those schools by such things as uniform certification requirements. Much of this has been said before, but usually in a technological, defense-oriented, keep-up-with-the-Russians tone of voice. Now it is being said humanistically, and it sounds different.

The other major change of tone in this as compared to previous reports is that the physicists are now willing to admit that there are other flowers in Pepper land beside their own. A prominent feature of previous reports on physics (or on science X for that matter) was the shopping list. Usually the reader’s eye was struck by a list of capital equipment that the science just had to have in order to keep up with the Russians or the Japanese or the Swiss. The list usually seemed to assume that funds were virtually unlimited.

The present report recognizes limitations. It does not make a bold-type recommendation for any new large capital equipment. It does pray that the Government will give



Bromley: “We have the strongest and most healthy physics establishment the world has ever seen. We want to maintain it in a state of health.”

Fabian Bachrach

adequate operating money to the large laboratories we now have (National Accelerator Laboratory and Los Alamos Meson Physics Facility especially), and it urges a heavy program in thermonuclear fusion research.

What is new is detailed prognoses of the future course of each of the subfields of physics under various assumptions regarding future funding ranging from a 7.5 percent annual decrease to an 11 percent annual increase. The 11 percent increase would be all the physicists could want, they say. The decrease would be, in Bromley’s word, “disastrous.” Realistically the physicists hope for some growth—and arguments from national prestige do come into play here—but they feel that in the present political climate 11 percent is too much to hope for. Bromley would not be pinned to a number. The report makes no numerical recommendations, he says, it merely presents the options for the Government and public to choose. Ladies and gentlemen, we all live in the same yellow submarine, and the physicists hope we are interested in what can be seen through the portholes. □