SCIENCE

23 April 1971

Vol. 172, No. 3981

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Vol. 172, No. 3981

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Baldwin Hills (California) Reservoir after the dam failure. Surface offset along the Reservoir fault can be traced from the gap in the embankment, across the floor of the reservoir, and on past the small cylindrical tank at the top of the photograph. See page 333. [California Department of Water Resources]

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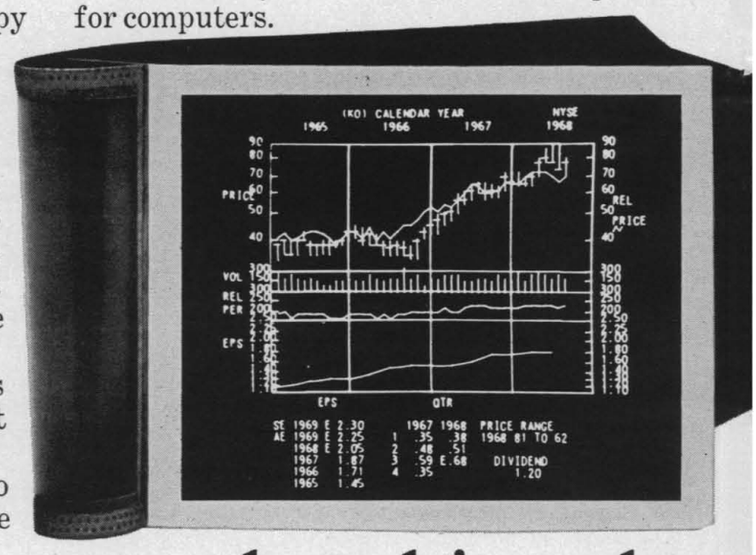

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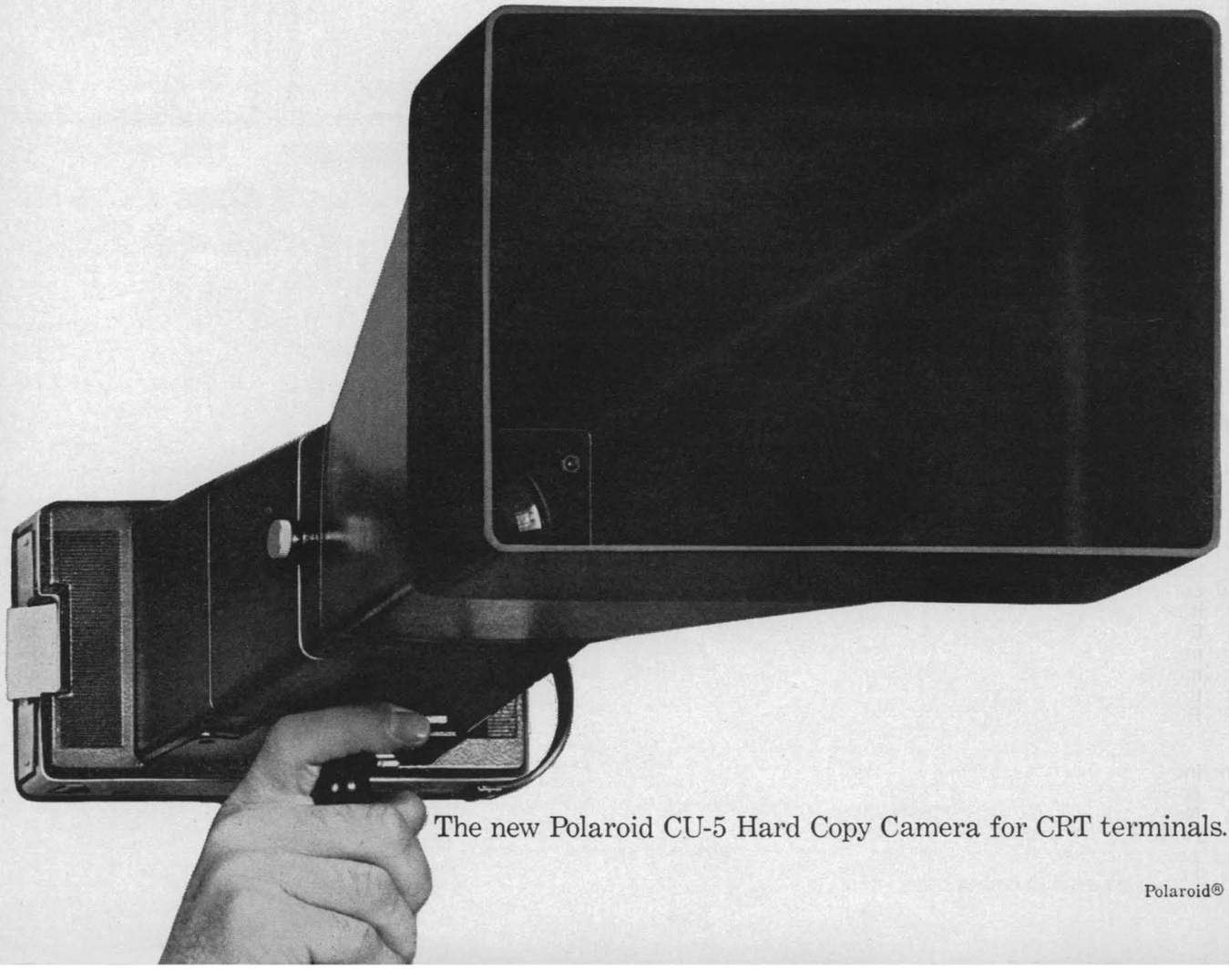

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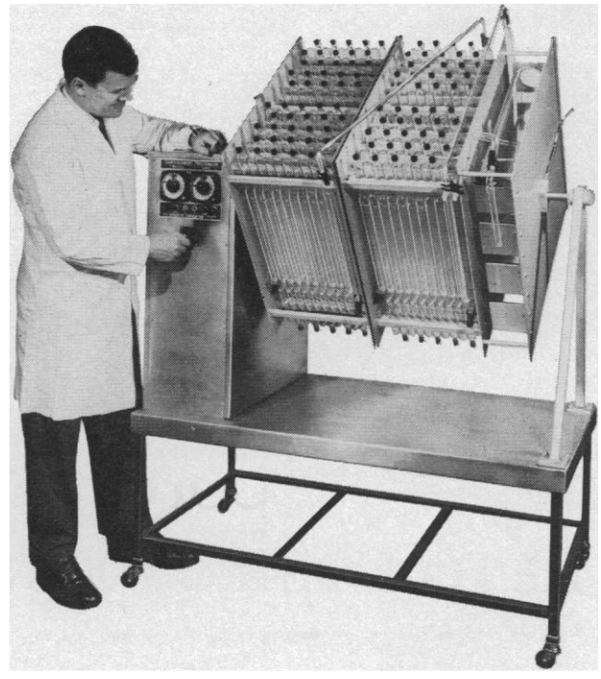

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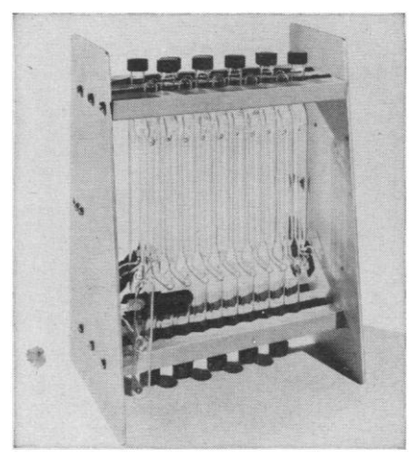

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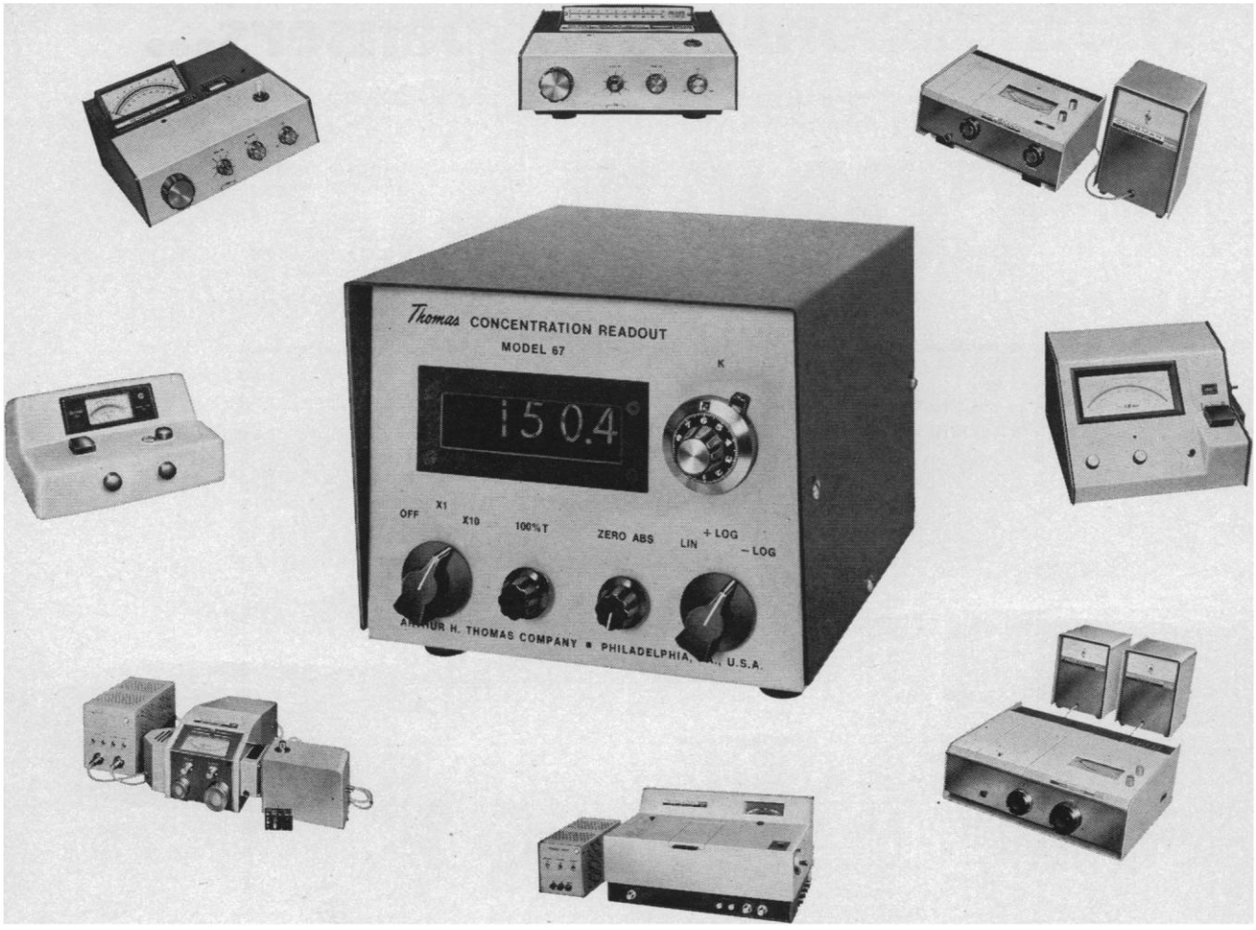

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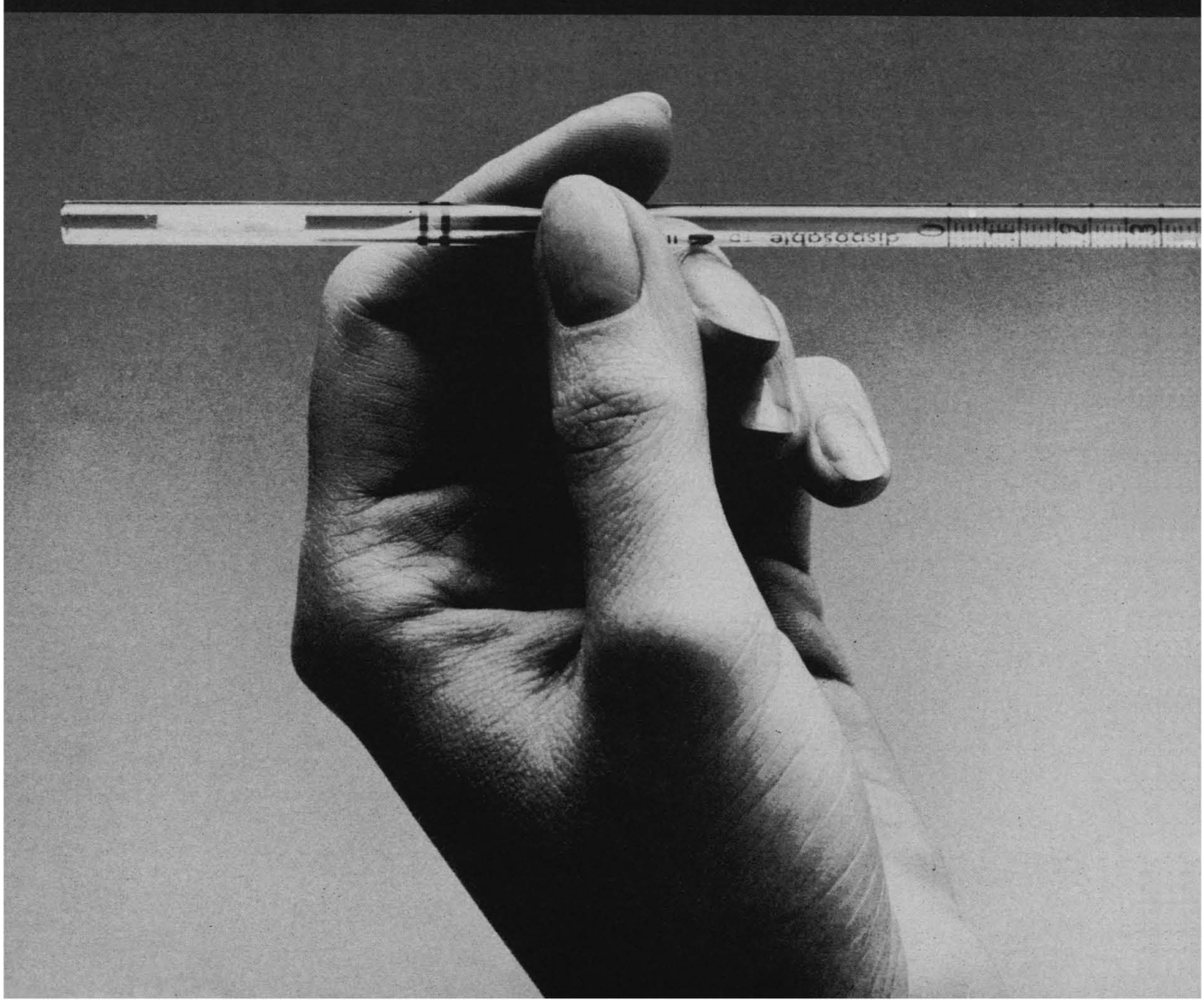

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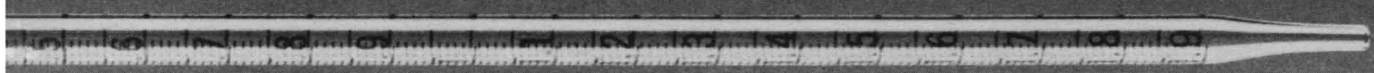

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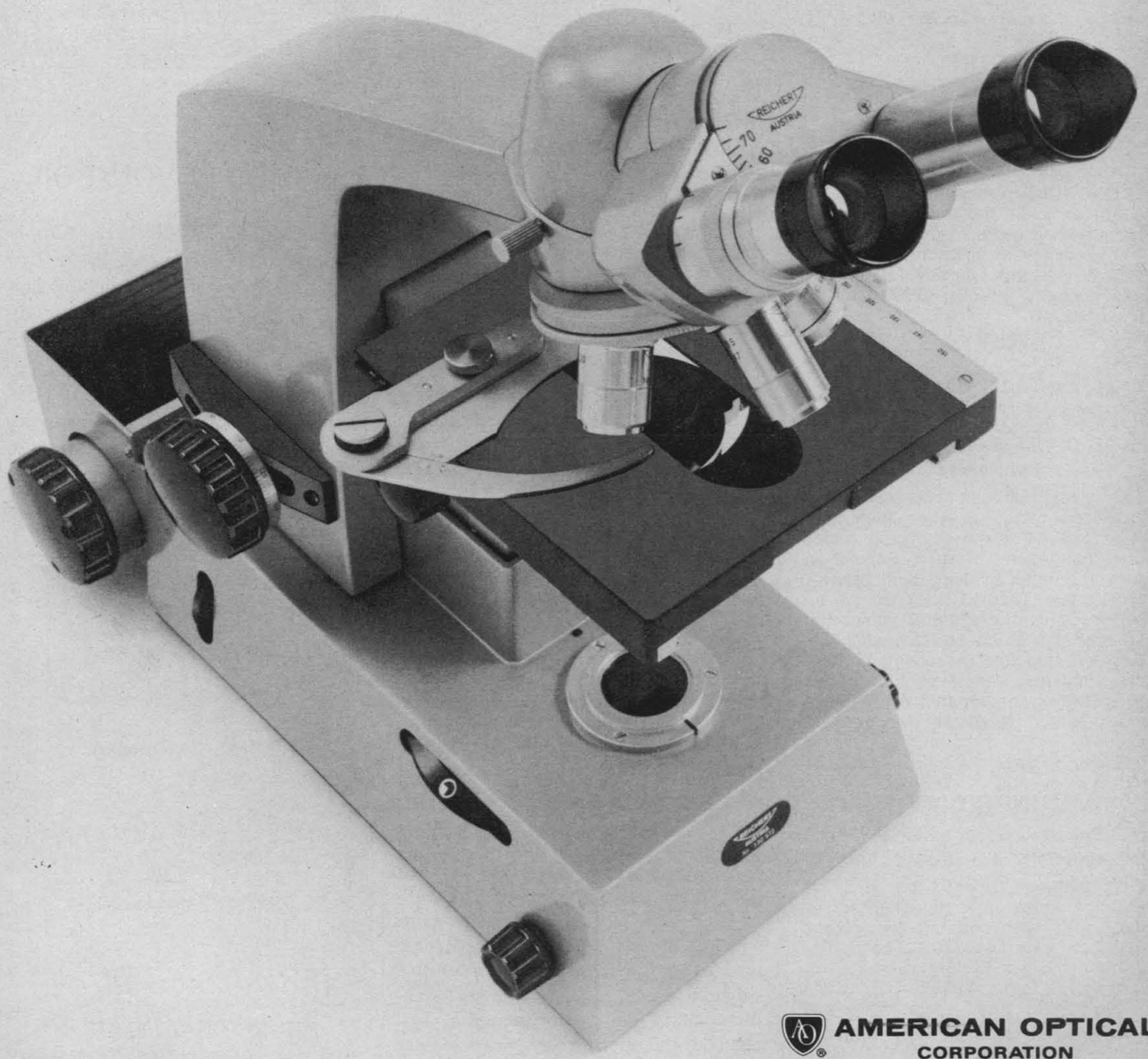

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T. SHELLEY ASHBELL
Department of Surgery,
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Public Attitudes toward Science: Righting a Wrong

It is remarkable that in the extensive discussion of the "crisis" in the funding of science, as it has been carried on in *Science* and elsewhere, virtually no attention has been paid to the educational origins of public attitudes toward science. When one considers what is taught about science to nonscience majors in even the best liberal arts colleges and universities one has no reason for surprise at uninformed attitudes toward the place of science and technology in our society. The remarkable fact is that in our liberal arts curricula (as well as in technical curricula) essentially no attention is paid to the dominant forces of contemporary civilization—science and technology as they interact with society.

Bentley Glass, in his editorial "Science education—process or content" (5 Mar., p. 851) and in the book from which it is derived, takes initial steps toward an intelligent appraisal of this situation. But it is a situation that warrants much more concerted and immediate attention from the scientific and academic communities. The causes for this gap in the educational system must be identified and ways of filling

it must be devised. The search for causes may not be insignificant, for if they lie (as I suspect) basically in academic departmentalism, then the cure could involve greater interdisciplinary activity in the universities, as recommended, on more restricted grounds, by F. A. Long (12 Mar., p. 961).

There are, of course, a small number of educators in departments of history of science, sociology, and intellectual history as well as the sciences who are concerned with the problem and who are developing courses in this area. There is also an extensive literature growing up that can be used, including novels, autobiography, and historical studies as well as journals such as *Science* and the *Bulletin of the Atomic Scientists*. But given the character of the problem, that of producing a *broad* understanding of the nature of science and technology, the establishment of a few "centers of excellence" in this field is not adequate.

I propose the creation of a committee along the lines of the various groups which in the 1950's so successfully created curricula in physics, biology, and chemistry at introductory levels. The committee could address at least two aspects of the problem: First, it could produce a report which would be of direct use to an individual instructor who intended to give one or more courses in the area of science and society, presumably at the college level. The report could also contain examples of syllabi which have been used under various approaches and an extensive annotated bibliography. Second, the committee could take a careful look at the academic conditions which have discouraged the development of this sort of study and those conditions which could encourage it. The committee itself would, of course, have to be broadly interdisciplinary.

If the efforts of such a committee were successful, its ultimate contribution to the future of science in this country could be more profound than its predecessors whose concerns were with pure scientific curricula. Its actions could be a first step toward a more general understanding of a key element in modern civilization, a step toward that necessary insight referred to by Glass which comes from studying "the right thing at the right time."

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23 April 1971, Volume 172, Number 3981 **SCIENCE**

A Matter of Perspective

Coming after a period of anguished debate over an apparent national disenchantment with science and technology, the President's budget request for fiscal year 1972 is heartening.

The budget by no means removes the need for belt tightening. Inflation eats up some of the increase. But, more importantly, changes in emphasis that reflect major concerns of today—the environment, natural resources, food, cities, transportation, and the quality and durability of our society—will have the effect of lessening support to many areas that have over the past decade become accustomed to increasing budgets. What is important to recognize, however, is that the overall support to science remains high.

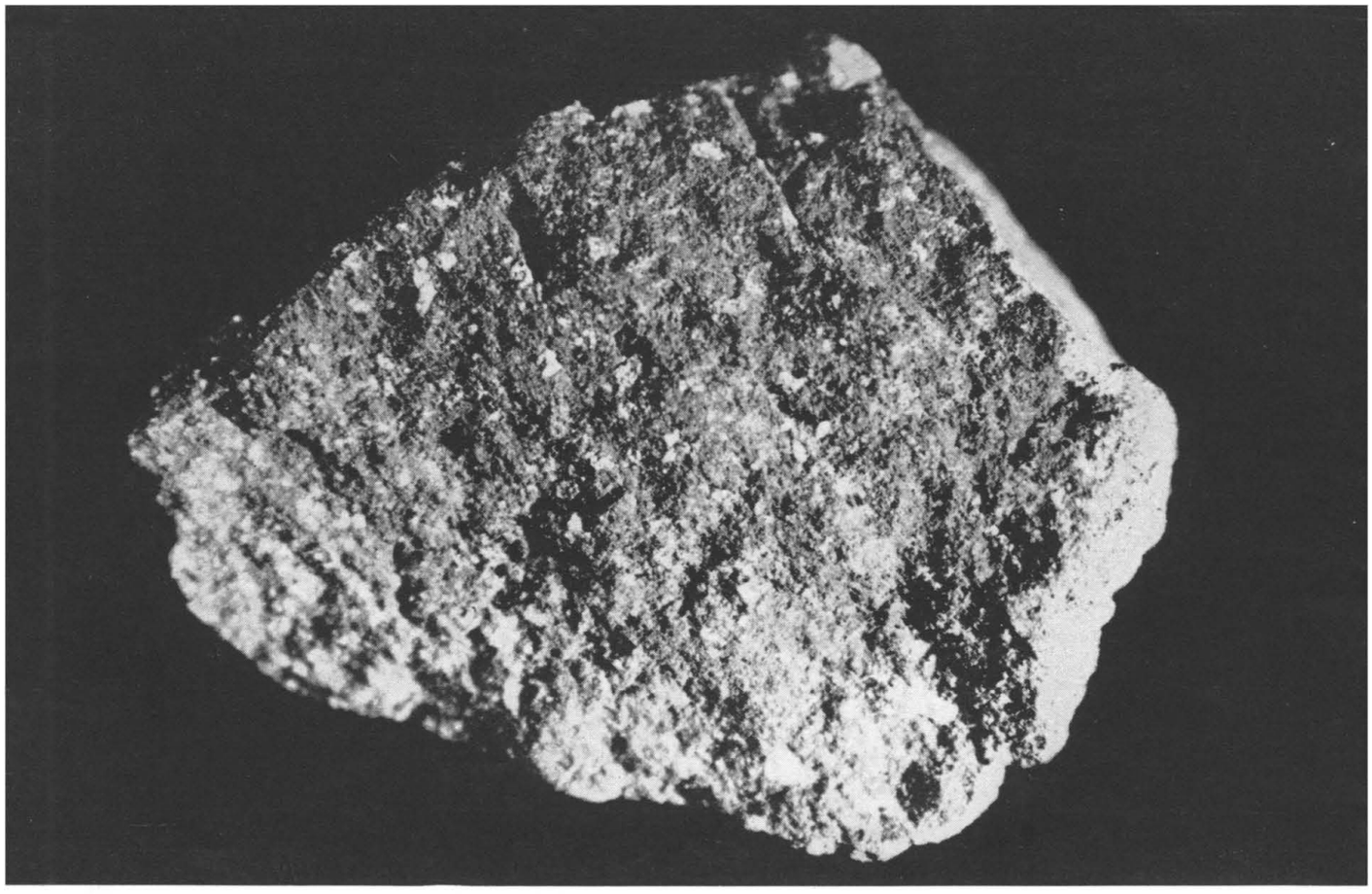
Thus the impassioned pleas of the last years appear to have had an effect. In my view, however, there was never a real threat to substantial support for science. The prime questions have been: How does one rationally establish the appropriate level for support to science? How does one set priorities? How does one choose among different problems or areas for emphasis or expansion? How can administrators and legislators foster the maximum beneficial returns from the national investment in research? These have been the real questions—not whether to support science and technology.

And these continue to be the questions. The scientific community must in the years ahead apply its utmost in expertise, wisdom, and statesmanship in working with our national leaders to develop understandable and acceptable answers to these important questions. If they do not, the turmoil of the recent past is bound to continue into the indefinite future.

It will be particularly important to give careful attention to the last question: How does the nation maximize the benefit that it should receive from its investment in basic research? In addressing this question, it will be especially critical to present our total national effort in its true perspective. Often, because of their spectacular and newsworthy nature, research activities like space science, underseas exploration, huge accelerators, Antarctic expeditions, and projects to drill deeply into the earth appear to be receiving all the attention, while major societal problems are so vexing, difficult, and clearly unsolved that they appear to be wanting for attention. But, if dollars are at least some measure of attention, such is not the case.

The funding proposed for 1972 for basic science ($2.4 billion), or even that for the entire space exploration program ($3 billion), is a very small fraction of the funding that is proposed for efforts to ameliorate societal problems today ($90 billion). The real need is not so much for additional dollar attention as it is for attention of a different kind. Ideas, new approaches, and new insights into the wise management and utilization of our human and natural resources are what is required. Many of the solutions will rest squarely on modern science and technology, and this is a fundamental reason why society should continue, as it has in the past, to invest in these two related areas.

But science and technology are only the tools. The wielder of the tools must give wise and careful thought to how they may best be applied. This responsibility is one that rests on every citizen who would serve society, but, in today's world, it rests especially heavily on scientists and engineers whose careers are supported by society and whose talents and capabilities are an essential ingredient in the total overall perspective in which, quite properly, science and technology are made to serve the needs of mankind.—HOMER NEWELL, *Associate Administrator, National Aeronautics and Space Administration, Washington, D.C.*



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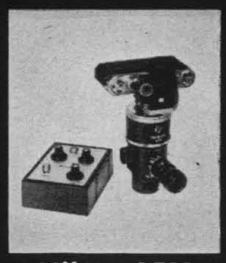

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