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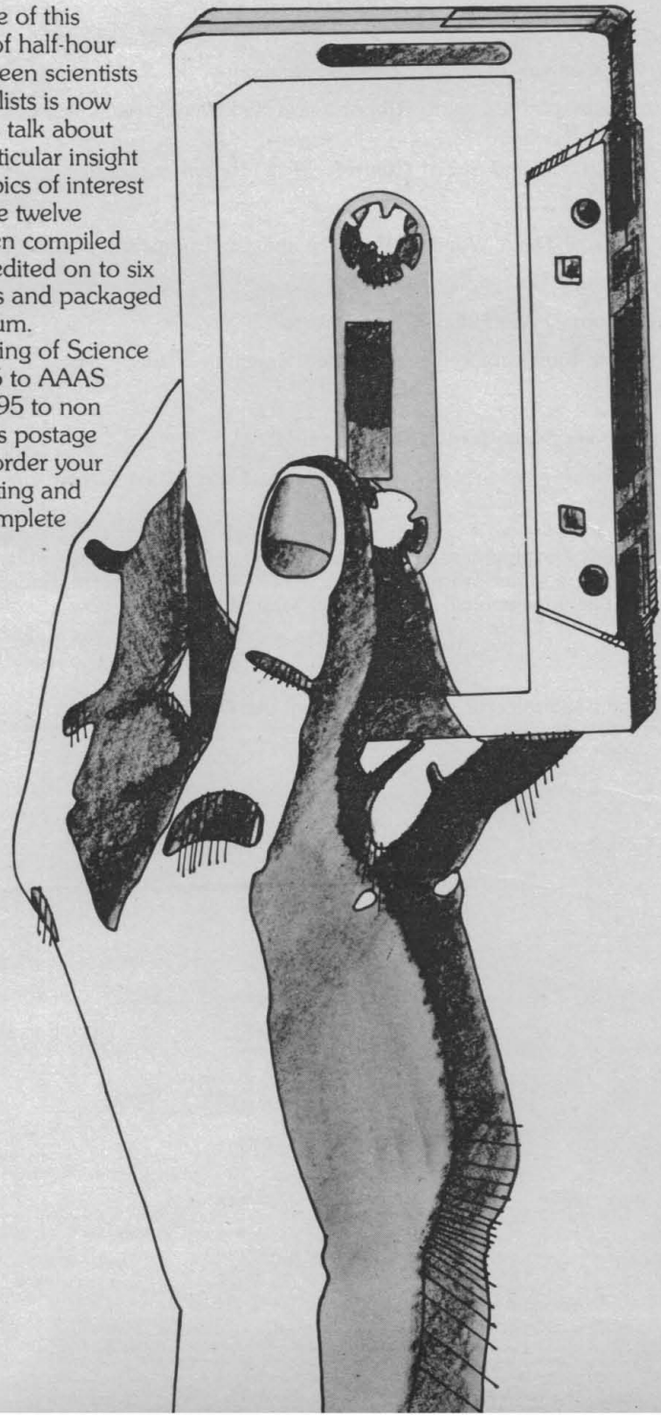

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Vertical air photograph of the northern end of South Cape Fiord, Ellesmere Island, Northwest Territories, showing three glaciers entering the fiord. See page 493. [Photo No. A-16722-10, courtesy National Air Photo Library, Surveys and Mapping Branch, Department of Energy, Mines and Resources, Ottawa, Canada]

Energy Supply

The problem of the present widening gap between available energy reserves and increased energy use is one of critical concern to all of us. As Philip Abelson points out (Editorial, 2 Mar., p. 857), "we cannot afford the luxury of sleeping for another 12 years."

There are two points raised in the editorial, however, that I would like to comment on, as they recur often in discussions of the petroleum industry. One is the idea of "windfall profits." Crude oil prices, over the last decade, remained remarkably more stable than prices in general and more stable than costs to the industry itself for equipment and personnel. During this period the price of crude oil rose 17.2 percent, from $2.90 a barrel to $3.40 a barrel. The U.S. Bureau of Labor Statistics wholesale price index rose 25.6 percent for all commodities over the same period. During these years, oil well casing prices rose 45.9 percent, oil field machinery prices went up 35.7 percent, and average hourly wages in oil and gas production climbed by over 57 percent. Over the past 10 years (1962–1971), the petroleum industry's rate of return on net worth has averaged 11.8 percent, compared to an average of 12.2 percent for all manufacturing industries, according to surveys reported annually in the April issue of the First National City Bank of New York's *Monthly Economic Letter*.

If taxes are excluded, the price of gasoline, the industry's most consumer-visible commodity, actually was *lower* in 1972 than it was 50 years earlier, when it averaged 24.8 cents per gallon. Permitting prices of petroleum products to reflect their true costs would certainly not lead to windfall profits.

I would like also to comment upon Abelson's allusion to the "tremendous resources, both financial and technological" of the industry. This, of course, is true, but size does not necessarily imply success. The tasks facing the industry are tremendous as well, if our energy needs are to be met over the next decade. The domestic capital needs of the industry are estimated at about $250 billion from 1971 through 1985—in 1970 dollars. According to one estimate, by 1985 we will need the equivalent of 160,000 productive oil and gas wells, some 400 to 500 large-capacity tankers, and the equivalent of more than 50 new refineries, for example, just to keep pace with rising consumer demands for petroleum.

To this end, the American Petroleum Institute has recently issued a statement of policy on energy, outlining the goals we believe are necessary to ensure continuing supplies of energy. Among the points we consider important are four that Abelson mentions: a return of coal to its former markets, a national storage plan for oil, immediate funding of research into nonconventional sources of fuel, and a national program to encourage more efficient use of energy. This statement is available free of charge.

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Jason and the National Defense

The report on the defense consulting group Jason by Deborah Shapley (News and Comment, 2 Feb., p. 459) mentions the assertion by critics of the Kennedy Administration that those who aided the American war effort in Vietnam were guilty of "arrogance, amorality, or naiveté." It is a fact, however, that this is a democracy and that actions by the U.S. government are on behalf of a majority of the American people. It is not consistent to condemn those scientists who aid our national defense without condemning the majority of the U.S. population. In fact, the question could be raised as to the morality of those scientists who would attempt to thwart the will of the majority because of their peculiar position in the society. Is it right for a scientist to weaken the national defense by refusing to contribute his part to it, so long as this is a democracy?

Shapley states that "Jason originated during Project 137, a 1958 conference involving economist Oskar Morganstern, and physicists Eugene P. Wigner and John Wheeler, who invited younger physicists along to familiarize themselves with military technical problems." Eugene Wigner had nothing to do with originating Jason. He has many times contributed his efforts to the national defense, but he has taken almost no part in the activities of Jason.

There are two compelling reasons why university scientists should act as consultants on national defense for the

U.S. government. (i) Such consulting introduces the thinking of university people into government planning. (ii) Without the contribution of American scientists to the development of new weapons, the United States would fall far behind predatory nations who would like to expand their borders and impose their will on others.

The News and Comment report pictures members of Jason as being continually apologetic for their contributions to national defense. I hope they are not, because their efforts are essential if the United States is to remain a government of free people.

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The Jason group itself did not originate during Project 137. But some young physicists who participated in the project formalized their relations with the Department of Defense, as the Jason group, the following year.—D.S.

We applaud the attention that *Science* has given to the Jason Division of IDA (Institute for Defense Analysis). Having recently published our own extensive study on the subject (*1*), we would like to comment on the issues that are reported.

We do not believe that Jason scientists are any more immoral, amoral, arrogant, or naive than many other scientists in this country. They are distinguished only by having been given the opportunity to participate at the very highest levels of national policy-making; and their now-publicized contributions to the war in Vietnam have brought them into the spotlight. While Jason members' possible complicity in war crimes is a serious legal question, our major interest lies in seeing the broadest *political* implications in the whole Jason story.

One cannot view the Jason participants as simply neutral technical advisors. They work within a highly politicized context, defined by the objectives of the Department of Defense (DOD) and, more broadly, by the foreign policy of the Cold War. The Jason members, in accepting the secret and subservient nature of their advisory relationship to the DOD, have isolated themselves from any alternative political potential. Given this state of affairs, it would be foolish for Jason members to think that they as individuals could exert a politically liberalizing influence through their inside connections. ("You don't confront generals," was how one Jason member described their relations with the Pentagon brass during a briefing on Vietnam.)

Thus, the only option for Jasons who personally opposed the war in Indochina was to offer alternative technical solutions to the failing military campaign, solutions which were then utilized by the government, in fact, to prolong the war. This is the history of the automated battlefield, conceived by Jason in 1966.

Jason serves to oversee and correlate scientific research in many areas and to select for future exploitation those developments which might prove valuable to long-range military interests (*2*). Thus, when many concerned scientists bemoan the fact that so much of "pure" research ends up being applied to objectionable ends, we should understand that this is no accident, but a direct result of careful design. Furthermore, beyond its purely technical functions, Jason serves as an important ideological model for science in this country, since the prestige of such groups serves to legitimize the whole spectrum of scientists' involvement with the military.

Our basic criticism of Jason is that it is intrinsically antidemocratic. It helps to put more power into the hands of a centralized and secretive military-political-economic apparatus which already has monopolized too much of the power in this country and throughout the world. It is not enough, at this time, for Jason members to express their personal regrets over their past contributions to the Vietnam war. The most constructive action they can take is to publicly resign from Jason, and from any similar organizations, and to make public the full scope of Jason-type activities.

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References and Notes

1. *Science Against the People* (Berkeley SESPA, Berkeley, Calif., 1972).
2. The *Report of the 1971 Jason Laser Summer Study* (IDA Study S-391, Arlington, Va., 1971) is an example of this. Their figures show that 80 percent or more of the federal funds for laser development are in military areas, but we cannot learn more about this because volume 3 ("Unique military applications of lasers") of the Jason report is classified.

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Spain—Another Japan?

On 11 to 14 April, an international symposium in Madrid brought together some of the Western world's formulators and students of policy for science and technology. The meeting was particularly well timed, for it came at a moment of change when well-established policies were being questioned amid universal awareness of the role of technology in improving standards of living. Moreover, with a nuclear stalemate, commercial competition has become the principal arena for rivalry and the guest for prestige among nations.

For many years the United States was the world's unchallenged leader in science, and our mass production methods provided a great advantage in commercial competition. But other nations, particularly Japan, have adopted and even improved on our production methods, and such advantage as remains lies largely in high technology based on new science. Still, the aura of leadership remained, and others tended to follow us in policies for science and technology. The sudden abolishment of the President's science advisory apparatus and another devaluation of the dollar have raised questions about our status as leaders.

Impressed by our prowess in matters involving high technology, most of the advanced countries had attempted to adapt our policies to their use. These policies included emphasis on basic research at universities and large total expenditures for research and development (up to 3 percent of the gross national product). But now that our role as leader is coming under question, there is a tendency to look toward other models. An obvious alternative is Japan.

In its postwar development, Japan followed a different course from that of other advanced countries. While it supported some research at universities, it did not depend on technologies arising out of its own scientific efforts. Rather, Japan invested in foreign know-how, and then improved on it. This had the advantage that the Japanese did not pay for research that failed or for processes producing products that did not sell. In addition, they saved the many years required for R & D. Japan's example is now being followed by Spain, and Spain, in turn, may well serve as a model for other developing countries.

Spain, which is in the midst of a great industrial and construction boom and which is being hailed as "another Japan," has departed even further from U.S. policies. There is practically no research at the universities and little in industry. Government support of R & D is at the level of about 0.2 percent of the gross national product. Industrialization is heavily dependent on foreign know-how. Direct payments for royalties, patents, and the like last year amounted to $170 million. However, indirect payments (for example, participation in ownership ventures) may bring the total payments to $500 million (more than seven times governmental expenditures for R & D). This is a huge sum for a country only modestly endowed, but at present the proceeds from tourism (more than $2 billion) far exceed it.

It is difficult to argue against success, but are the present policies of Spain viable for the long term, and are they useful models for other developing countries? Probably not. Other developing countries cannot hope to earn huge sums from tourism. Spain's failure to nurture a scientific establishment consigns it to a long-term dependency on foreign expertise, to being a follower rather than a leader.

The Spanish are a proud people, and the scientists among them are now deeply frustrated. They know that, given a fair chance, they could compete well and contribute internationally, while serving their country. It is sad to see a nation that neglects its greatest natural resource—its brains.—PHILIP H. ABELSON

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