Science and Statecraft*

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A generation ago, the scientific laboratory and the political arena seemed worlds apart. Not so today. Once men achieved a self-sustaining chain reaction, it was inevitable that physical science and political science—or, perhaps more accurately, the art of government—would meet on common ground.

The control of atomic energy represented more than a tremendous scientific achievement—it opened a historical era in which science could either destroy civilization as we know it or else make men rich beyond measure. Today, not only our hopes for material well-being but also our very hopes for national survival are intimately related to the health and vigor of our science and to whether scientific discoveries are used foolishly or wisely. No responsible government official can now be indifferent to the happenings in our scientific laboratories. By the same token, our scientists—rightly concerned with the social consequence of their research—seek to know more about the art of statecraft. Put differently, science and statecraft today find themselves locked in a partnership born of hard necessity. It is up to the public officials and the scientists to make this partnership harmonious and productive.

By positive and affirmative deeds, the men and women of American science have demonstrated their awareness of their responsibilities in the partnership of science and statecraft and their willingness to carry them. I need not recount the names of those distinguished researchers who, despite longing to work in university laboratories on fundamental science, have helped develop the modern armaments we need if we are to stay alive and free. I need not recount the names of those who now work anonymously behind walls of secrecy, and who might have been Nobel prize winners if their research had been freely published and known to the scientific community at large. I need not list those who, by working on classified problems, have denied themselves the international scientific reputations that otherwise would have been theirs.

All of us who sit on the Joint Committee on Atomic Energy are grateful for what American science has contributed to our national well-being and military security. I would not expect any group of scientists unanimously to applaud every action of the United States Congress or the Executive Branch affecting scientific work—anymore than I would expect the American people to exhibit unswerving enthusiasm for all the policies of any administration. I ask only recognition of the tremendous complexity of the problems faced by our lawmakers in drafting legislation that bears on scientific research. All too often, our lawmakers must choose between imperfect alternatives, neither of which is completely satisfactory.

To cite one example—the problem of secrecy and security. It is easy enough, in the abstract, to outline the objectives of a wise security system. All of us would agree that military secrets of real consequence must be zealously guarded. All of us would agree, at the same time, that a democracy does not take happily to restrictions on the free interchange of information. We would agree that science is dependent for its very life blood on the cross-fertilization of ideas. All of us would agree also that men who give their allegiance to a foreign tyranny must be excluded from classified work. All of us would agree, at the same time, that patriotic dissent must never be mistaken for disloyalty.

It is one thing to reach agreement on such statements of principle. It is another thing to translate these principles into a working security system that protects both sacred individual liberties and the national interest and also guards precious military secrets without stifling scientific progress. In the working of such a system, there cannot be any substitute for humane and wise judgment. And wherever judgment is involved, men of reason and patriotism can entertain honest differences of opinion.

Certainly a good security system can never be static, and our regulations must of course be responsive to changing problems. For its own part, the Joint Committee keeps the Atomic Energy Commission security program under constant study and review. Recall that the Atomic Energy Act of 1954 includes major changes related to control of information. From time to time, it no doubt makes sense to take a completely fresh look at security. Yet we shall only delude ourselves if we think that such reexaminations, no matter how earnestly carried out, can result in programs that offer absolute guarantees against possible injustices, coupled with equally absolute guarantees against the compromising of vital information. Security is now, and will continue to be, a hard and vexing problem.

The only true and fundamental solution to the problem of security lies in building a world in which national survival does not depend on continued military supremacy. The prerequisites of such a world are clear: The Soviet rulers would be required to demonstrate, by affirmative deed, that they had irrevocably renounced their designs for world conquest. The surest proof of such change of heart would lie in the will-

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ingness of the Soviet government to put the manufacture of all armaments under effective international control.

Almost a decade ago, our country came before the United Nations with a just and workable plan for regulating the output of atomic weapons. We have been no less willing to submit the manufacture of conventional arms to international control. But to the world's loss—and to the loss of the everyday Russian people as well—the Soviet overlords have refused to enter into programs which could accomplish these ends.

As a result, our nation is now denied the opportunity to employ its resources and skills solely in the pursuits of peace. Instead, we find ourselves forced to build a stockpile of nuclear weapons. We find ourselves forced to build more effective continental defenses against the atomic and hydrogen bombs now in the hands of our declared enemies.

To the great credit of American science, its representatives were in the forefront of those who warned that the Soviets would quickly achieve the atomic bomb. To the credit of American science also, its representatives are now raising storm warnings concerning the ominous progress of Soviet science and technology. Far too many Americans are still underestimating Soviet prowess in both basic and applied science. Far too many of us still believe it is impossible for the Soviets to overtake and surpass America's present scientific lead.

Yet the facts are these: The Soviets have assigned top priority to building up a vast reservoir of scientific manpower. This year, the Soviet educational system will graduate more scientists and engineers than will our own universities. Projections for the next several years indicate that the gap between the number of scientific and technical graduates in each of the two nations will widen—in favor of the Soviets. By 1965—if present trends continue unchanged—American science may be forced to yield world leadership to the Soviets. Since military supremacy is today almost synonymous with scientific supremacy, the balance of world power may thereby shift decisively in favor of the Soviet Union.

What are we going to do about it? I earnestly hope that the 84th Congress will ask itself whether new legislation is necessary to help speed up the tempo, without diluting the quality, of our scientific training. Would it be desirable to increase the number of government-sponsored fellowships in the scientific fields? Might revisions of our tax laws permit industry and philanthropic organizations to give even more support to science? Is it feasible to amend our Selective Service legislation, so that scientific education can be encouraged without compromising the principle of equality of sacrifice? Such questions are of supreme importance to the future of our country, and I am sure that the Congress would seek the advice of the American scientific community in attempting to answer them.

One word of warning, however: Let us never believe that we can maintain our scientific leadership simply by producing great numbers of doctors of philosophy on some educational assembly line. In science, quality overshadows quantity. Our Enrico Fermis may occur only once in a generation, and not even a scientific training program 10 times our present size could offer guarantees of producing another Newton or Faraday.

The problem of creating a better science, in other words, is not simply a governmental problem—it is a problem for all America. It is a problem that begins in our homes, where wise and loving parents can teach their children that intellectual exploration is among life's greatest delights. It is a problem that goes on in our schools and in our universities, where dedicated teachers can persuade their students that a life devoted to science is a rich life—in terms of both individual rewards and service to mankind. It is a problem that continues in our communities, where all of us can help create a climate congenial to those oftentimes lonely researchers whose minds dwell on the frontiers of our intellectual universe.

Today, I fear a few Americans do not understand the nature, and mission, of science. Such Americans lament the day on which the Pandora's box of the atom was opened. They grant that atomic energy, if harnessed for constructive uses can bring man unparalleled riches. At the same time, they question man's ability to use the atom exclusively for such ends. In their hearts, such men long to return to the preatomic age—an age of lesser rewards but also of lesser perils.

Yet surely the world will not find its salvation in vain attempts to turn back the clock on scientific progress. Surely history teaches that we go forward, not by suppressing inventions, or by artificially stifling intellectual inquiry, but by boldly exploring the unknown and then using our discoveries in a manner harmonious with the purposes of our Creator. It will be a sad day if ever we hesitate to cross new frontiers of the intellectual universe for fear of what may lurk in the unknown lands beyond.

Atomic energy, it cannot be repeated too often, is like any other force in nature. Like fire, like the wheel, like high explosives, like the high-combustion engine, the atom is indifferent to man's aspirations. It is not pro-American; it is not pro-Soviet. It is not pro-peace; it is not pro-war. The actions of man—and of man alone—will determine the meaning of atomic energy for world civilization.

Will the split atom split the world asunder and ravage our planet and destroy the works of man? Or will this new force prove to be man's greatest material ally in his timeless struggle against the common enemies to mankind—poverty, hunger and disease? A clear-cut and inescapable choice between unparalleled destruction and unparalleled abundance—this is the choice now confronting the world.

It has been the glory of this generation to penetrate the deepest reaches of the physical universe and to discover a new force of nature of incalculable

power. But history will judge this generation according to how it employs this new force. We Americans do not regard ourselves as the moral custodians of the world, and we may not be responsible for how other nations confront the great challenge of the atom. But we are responsible for our own conduct—for what we do or do not do.

In his magnificent speech before the United Nations in December 1953, President Eisenhower made it clear how the American people proposed to resolve the atomic dilemma. He made it clear that we stand willing to join with the other nations in using atomic energy in a great world-wide crusade against human misery and want. In passing the Atomic Energy Act of 1954, the United States Congress declared its support of the objectives of our President's peacetime international atomic pool plan. Following this, our Government announced its willingness to contribute significant quantities of atomic materials to a peacetime international atomic energy agency, and our British and Canadian allies made similar offers.

Men of small minds can always prove, in advance, that such magnificent undertakings as this peacetime international atomic energy agency will never be consummated. But I say that this nation of ours has not prospered and grown great by heeding the advice of those with no vision.

I refuse to believe that man is now inadequate to the task of using the atom for the betterment of man. I refuse to believe that the road the world is now traveling must end in the destruction of all we hold dear. I believe instead that the atomic age is as full of promise as of peril. I believe instead that man, using the wisdom and the fortitude that God has given him, has it in his power to meet and conquer the great challenge of this era—making the atom the touchstone to a world of abundance and justice for all men everywhere.

News and Notes

Marine Biological Laboratories

From 18 to 23 Apr. 1955 an International Conference on Marine Biological Laboratories sponsored by IUBS was held in Rome at the Consiglio Nazionale delle Ricerce. Seventeen panel members representing marine laboratories in 12 countries and 19 observers representing either laboratories in seven additional countries or international organizations took part in the conference. Official participants were Philip B. Armstrong (U.S.A., unable to attend because of illness), Lawrence R. Blinks (U.S.A.), Hans Brattström (Norway), Adolph Bückmann (Germany), Reinhard Dohrn (Stazione Zoologica di Napoli), Pierre Drach (France), Louis Fage (France), H. A. F. Gohar (Egypt), John L. Hart (Canada), Robert W. Hiatt (U.S.A.), Carl L. Hubbs (U.S.A.), Denzaburo Miyadi (Japan), John Runnström (Sweden), F. S. Russell (Great Britain), Tonko Sŏljan (Yugoslavia), Gunnar Thorson (Denmark), Charles M. Yonge (Great Britain), and G. Montalenti (Italy).

An organizing committee composed of Runnström, Yonge, and Hiatt prepared the conference program and selected the participants. In making selections the committee was forced to limit the number because of financial considerations and the need to insure efficiency in discussion. Other items considered in the selection of participants were geographic factors, types of laboratories, and the experience of individuals in educational and research programs sponsored by such laboratories. Hiatt presided as general chairman.

The chief aim of the conference was to assess the role of marine biological laboratories in the light of present-day trends and demands in biology and in the ever-expanding general field of oceanography, and to explore possible solutions to the practical problems that these laboratories face. Because marine biological laboratories have been established in many countries and for divers reasons, this conference was designed to bring key persons together to achieve world-wide focus on their objectives and problems. The organizing committee was fully aware that the small group of invited participants could in no great measure reflect universal views of those responsible for all laboratories, but all participants agreed that the results of the conference were far reaching in scope and clarified many problems for those responsible for administrative affairs of these research and educational centers.

There were no prepared papers; instead each panel member reviewed the current status of marine biological laboratories in his country or geographic area and then took his turn in leading a general discussion on a specific major problem. In this manner a comprehensive discussion was had on each subject on the agenda by all participants.

Yonge opened the conference by reviewing the historical development of marine biology with special reference to marine biological laboratories. This excellent presentation was then followed by accounts of laboratories, stressing their locations, ecologic associations, affiliation and support, objectives and scope of activities, and major research and teaching facilities. During subsequent days the following topics were discussed at length. (i) Is the marine biological laboratory a logical unit in the service of present-day demands in the marine sciences? (ii) How can marine laboratories make their greatest contribution to educational needs in marine sciences? (iii) What types