Scientists and Politics

What is the proper role of scientists in the political arena today?

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The first interesting thing about Robert Gilpin's book, **American Scientists and Nuclear Weapons Policy** (Princeton University Press, Princeton, N.J., 1962. 352 pp. $6.95), is that a book on this subject has been written at all. Scientists are novices in affairs of state; nobody would have dreamed of writing a book on their political influence before the atom bomb burst upon mankind. In the 15 years that have followed, scientists themselves have not become accustomed to being considered a force in national policies, but Gilpin tells them: "The American scientist has become a man of power to perhaps a greater degree than scientists themselves appreciate. Neither in any other nation of the world, with the possible exception of contemporary Russia, nor in any other historical period, have scientists had an influence in political life comparable to that exercised by American scientists."

Gilpin's book is restricted to one aspect of the new role of scientists—the determination of American policy in the area of the development and use of nuclear weapons, negotiations on nuclear disarmament, and cessation of weapon testing. In fact, more than half the book is devoted to this last topic—the nuclear test ban.

Gilpin goes out of his way in trying to be objective and to represent controversial points of view with fairness to all. He regrets that disagreement between some scientists led to personal animosity and accusations of untruthfulness or disloyalty. He enumerates useful contributions scientists have made to the political *thinking* of postwar America; but he is not entirely satisfied with their political *actions*. For example, he considers that American scientists who participated in the Geneva conference of experts were disastrously outwitted by their Russian colleagues because the latter had the leadership of the experienced diplomat Tsarapkin. The contention that the presence at the Geneva conference of experts of an American equivalent of Tsarapkin would have led to greater American success will hardly convince most American scientists. After all, the record of American statesmen in negotiation with the Soviet Union is not something to brag about—from Roosevelt at Yalta to Eisenhower at Camp David. Or is clear disagreement the only sign of diplomatic wisdom in negotiating with the Russians?

Scientists as Political Activists

In trying to present a consistent story Gilpin divides all politically interested and active scientists into three groups, which he calls "The Control School," "The Limited Containment School," and "The Unlimited Containment School."

The Control School, in his terminology, is made up of scientists so impressed with the destructive possibilities of nuclear weapons that their main concern is to eliminate these weapons by some kind of international control. The "Franck Report" of June 1945 was the charter of this "school." Its second writ was the Acheson-Lilienthal Report, the so-called "Baruch Plan," which proposed international operation of all nuclear facilities.

In Gilpin's analysis, the failure of negotiations on international control of atomic energy in the years 1946 to 1948 led to a split among scientists, who had at first almost unanimously supported the ideas of the Franck Report. The ones who continued to concentrate their political activities on the abolition of nuclear weapons lost their influence, because they had no practical political advice to give the government. Gilpin excludes these scientists from further consideration and concentrates on the views of the two containment schools.

The first of these had advised, politically, that we limit the nuclear arms race by international agreement and, strategically, that we develop "tactical" nuclear weapons to support ground forces, rather than relying on "massive retaliation." Hans Bethe is repeatedly quoted as spokesman for this school. It has persuaded the American government to pursue a ban on nuclear weapons tests and continues to stick to this aim despite all disappointments.

The adherents of "unlimited containment" favor continued development of nuclear weapons, in the hope of preserving peace by keeping America ahead of the Soviet Union in the production of increasingly terrifying and versatile nuclear weapons. According to this group, the moratorium on testing nuclear weapons has placed undesirable impediments in the path of American weapon progress. They combat the ban by emphasizing the impossibility of maintaining airtight controls and the likelihood that the Soviets will cheat. Scientists of this group, whose best-known protagonist is Edward Teller, have prevented a test ban agreement based on the control system agreed upon by experts at Geneva by demonstrating the possibility of muffling the seismic shocks of underground explosions.

Gilpin traces the attitudes of these critics of the test ban and controlled disarmament back to Niels Bohr's appeal for an "open world." In Teller's oft-repeated view, only the free exchange of men and ideas throughout the world could make secret rearmament impossible; until the Soviet Union abolishes secretiveness and restores intellectual freedom, reliable disarmament control will remain impossible, and the arms race must go on.

The reviewer is professor of biophysics at the University of Illinois; he served as a member of the Manhattan Project, and he was one of the seven scientists who signed the Franck Report (the others were Franck, Hughes, Nickson, Seaborg, Sterns, and Szilard), one of the organizers of the Federation of Atomic Scientists, and a founder as well as editor of the *Bulletin of the Atomic Scientists*.

Opinions: Overlap and Divergence

Gilpin's rigid division of scientists into "schools" does some violence to their fluctuating and shaded opinions, but he finds it convenient to use these categories to make sense out of otherwise bewildering developments. (He notes, however, that Teller, the protagonist of "unlimited containment," has also been an enthusiast for tactical atomic weapons, to the extent of believing in the possibility of fighting a "limited nuclear war" on the continent of Europe with less destruction than that produced by World War II.)

Perhaps the main deficiency in Gilpin's classification is his lack of attention to the difference in viewpoint between the advocates of disarmament and the advocates of "arms control." Yet the idea of "arms control" (which has nothing to do with Gilpin's "control school"), advanced by Richard Leghorn, Don Brennan, and many others, as well as by Leo Szilard, has found great resonance in the scientific community and in government advisory councils, and this idea has strongly affected official American policies. The central thesis of this thinking is that America must choose between an open-ended and unlimited race in atomic weaponry, including the development of effective "anti-weapon weapons" (antimissile missiles and heavier thermonuclear bombs, able to destroy hardened underground bases), and a deliberate—(international or unilateral) concentration of "second strike capability" (secure capacity for retaliation in case of a nuclear attack on the United States or its allies). A corollary of this second-strike strategy is the development of non-nuclear conventional forces which will give the West the capacity to respond to local aggression by methods other than a destructive attack on the cities of the aggressor. (True, Gilpin notes, as one of the positive contributions of scientists to political discussion, their advocacy of the rebuilding of conventional armed forces while official thinking was hypnotized by the concept of strategic bombing as the money-saving answer to all war threats, great and small.)

The "arms control" concept is based on game theory. Its protagonists believe that, by means of a limited, stable retaliatory establishment, the all-out arms race can be stopped and considerable disarmament can be gotten under way, covering both nuclear weapons and a variety of conventional weapons. The criticism which Gilpin advances against the scientists' approach to military policies—overemphasis on rationality and neglect of irrational elements in the behavior of political leaders—could very well be applied to "arms control," since it presupposes a large measure of self-control by both sides in the conflict and calls for mutual revelation of the disposition and capacity of the retaliatory military establishment rather than for secrecy as to its capacity and concealment of its location. (The ultimate in this direction was reached in Szilard's proposal of a "city for city" exchange as an agreed price for aggression by either the Soviet or the American side.) A major controversy among scientists—leaving aside the partisans of disarmament at all costs—now exists between the adherents of "arms control" and the adherents of "controlled disarmament." The first group suggests that abolition of the capacity to destroy cities and populations should be, not the first, but the last step in disarmament, because this capacity gives each side the assurance that it is not going to become the victim of sudden attack, or of blackmail, with nuclear weapons concealed by the other side; the second group considers reduction or elimination of the threat of nuclear destruction the most urgent first step in disarmament.

With this exception, the history of the scientists' attitudes toward, and influences on, the development of American policy in the field of nuclear weapons is presented by Gilpin in great detail and with considerable fairness. Most interesting are the conclusions he outlines in the last two chapters ("Scientists as political animals" and "The task of political leadership"), where he deals with the way in which the advice of scientists on political matters should be solicited and utilized by the American government in the future.

The Political Animal

Gilpin argues that the differences between the conclusions reached by scientists of the two schools—for example, with respect to the reliability of detection methods or to the dangers of testing—are not scientific disagreements. There is no disagreement on fact; but the significance of these facts cannot be interpreted without using arguments of nonscientific—that is, of political or ethical—order, and it is here that experts disagree. Gilpin does not accuse scientists, as many do, of misusing their authority as experts to support political and ethical ideas based on broader considerations. He thinks that scientists are fully entitled to express views and advocate policies on such a broad basis; in fact, he thinks that, on matters such as the development of the H-bomb or the cessation of nuclear weapons testing, no valid advice can be given except through such comprehensive considerations. (In this, I fully agree with him.) In the last chapter he considers what the political leadership should do in the case of a conflict between experts. He has advice not only for the government but also for scientists. He advises scientists to become "political animals," accepting the importance, in political life, of personal sympathies and animosities, and of proper tactics. Scientists should accept the fact that every government can select scientific advisers in whom it feels personal and political trust, and that when they engage in political life scientists cannot escape the risk which every other political appointee bears—that of losing power and influence as a consequence of change in political leadership or of dissension within the leadership. (During the Oppenheimer trial I made this point—that the government had full right to substitute other advisers for Oppenheimer, but that accusations of disloyalty and unreliability, used to bring about this replacement, were unnecessary and improper. There was little response from either side.)

According to Gilpin, both sides, the government and the scientific community, have shown a lack of understanding of the essentially political nature of top scientific positions and of the legitimate vulnerability of their holders to political change. He admonishes scientists not to overemphasize the importance of ideas and intellectual conflict in politics. For example, he argues that while intellectual conflict was an important factor in the decision to build the hydrogen bomb, this decision must be placed "within the larger array of political forces." That scientists and politicians place different emphasis on *facts* in the formation of political ideas does not occur to Gil-

pin. The overemphasis on ideas causes the scientists, he thinks, to believe in the "capacity of scientific ideas and methods to cut through the web of complexities to a final resolution of the issue." He quotes Wiesner's assertion that "the complexity and pace of the times are such that only large measures seem appropriate to resolve the problem of nuclear weapons" and contrasts it with Churchill's statement that "when events are moving at such speed and in such tremendous mass as at this juncture, it is wise to take one step at a time." Gilpin does not ask whether the basis of the scientists' conviction that radical measures are needed lies perchance not in their ideas, but in their evaluation of the facts of the situation. Radical decisions are often called for at critical junctures, in private as well as in political life. The difficulty of making them does not invalidate their necessity. Gilpin says that, for scientists, "political reality does not always constitute a 'given,' which must be taken into account; instead it is often assumed to be a malleable superficiality, which man's reason can change in accordance with his heart's desire." No mention is made of the possibility that advocacy of radical solutions may arise not from "heart's desire" or from lack of understanding of the political facts of life, but from a greater sense of urgency, based on better acquaintance with facts. Cassandra and other seers of ancient myths called for radical changes because of their visions of the future—and their advice was neglected, to the detriment of those who looked only at the political realities of the day. In the same way, the suggestion made in the Franck Report that the use of atomic weapons in Japan should be considered in the light of possible long-range developments and not of immediate military advantages did not influence the decision of the United States Government to use them. Whether this decision was necessary and wise has been subject to doubt ever since, not only by scientists but also by politicians and historians.

The captain of a ship or of an airplane would not now neglect the advice of a radar operator who sees on his screen a storm far out of the field of human vision, even if this advice calls for a sharp change of course (as the captain of the *Titanic* refused to do when warned of danger, mindful above all of setting a new record for the Atlantic crossing on his ship's maiden voyage). There are situations in which clear vision calls for neglecting political niceties and pressing for radical changes. The fact that such advice has not been effective in the formation of American nuclear policies between 1945 and 1962 does not prove its wrongness, or even its uselessness. Constant repetition of such advice can gradually sap the prejudices with which the political mind protects itself from the need to explore new ideas. As a matter of fact, in the last 15 years both the United States Government and the Soviet Government have moved considerably away from their original rigid position and toward political aims and plans which, not so long ago, would have been considered outside the confines of *Realpolitik*, and the prodding by American and Soviet scientists has been an important influence in this shift. To take an example from a different field, the proddings of the partisans of a United Europe, long considered idealists without understanding of the realities of age-old conflicts between European nationalisms, have gradually succeeded in making a United Europe a concrete political aim, adopted by many European governments, even if still repulsive to others. These "dreamy idealists" were in fact the spokesmen for realism, because, realistically considered, Europe has no future unless it puts an end to its internecine rivalries and wars. In the same way, the "dream" of scientists who, according to Gilpin, "put too much weight on ideas, and not enough on political realities" are gradually shifting the policies of national governments, because scientists, too, are spokesmen for the realities of our time—realities which politicians, however wise in the ways of politics, refuse to see in their full terrifying scope.

Role of Fearmongering

Gilpin admonishes scientists that "fearmongering" is useless and makes rational political decisions less rather than more likely. In some sense, he is correct: the spreading horror of nuclear war does create attitudes of desperation, defeatism, apathy, or even of "let's get it over with"—attitudes that hamper rather than assist the charting of rational policies. Yet in the longer run, the shock treatment is wholesome. Where would we be today if scientists had not prodded mankind into acquiring some inkling of the horrors of nuclear war; if national policies had continued in a blissful atmosphere of "history as usual"? Now, nations and their leaders are sufficiently aware of what nuclear war would mean to all of them to be willing to listen to new ideas in the area of international relations. It is this visceral fear that causes the Soviet leadership to seek disarmament, coexistence, and even cooperation with the West, with an entirely new emphasis—quite different from the purely tactical armistice that was occasionally advocated by their predecessors. The same fear prevents the advocates of "let's defeat communism now" from acquiring a wide followship in the West, despite widespread irritation with the aggressiveness, uncooperativeness, and "we will bury you" boasts of the communist regimes.

Ultimately, what distinguishes scientists in politics—or at least those scientists whom Gilpin accuses of a lack of political savvy—from politicians is the difference in significance that they attach to different aspects of the present situation. A politician may have a correct understanding of the destructive (and constructive) capacity of modern science, but the consequences of this knowledge are subordinated, in his mind, to more urgent facts of day-to-day external and internal political affairs. For a scientist, the implications of science for the future of mankind are in the forefront of his thinking, not lurking somewhere in the background.

There is need, in the political life of the United States, for scientists of the type Gilpin appreciates—scientists-politicians with the tactical flexibility needed to survive and maintain their influence in the Washington whirlpool. They are needed to strengthen, in the government's day-to-day policies, consciousness of the facts and the potentialities of the scientific revolution. The great political trends of our time develop, however, on a wider basis than that of infighting in the White House, the Capitol, or the Pentagon. These trends are formed in the minds of the people—first, of the intellectually and politically conscious and then of increasingly wide groups of the population. The other and perhaps more

important function of scientists in politics is to foster this reorientation of nations; and what Gilpin calls fearmongering is an important part of this effort.

Gilpin's book is informative, helpful, and fairminded. It is full of sharp observations, incisive comments, and good advice to both scientists and politicians. What Gilpin lacks—in common with many other commentators—is a sense of the revolutionary character of our times, the feel for the tragic challenge now placed before mankind by the discrepancy between the rapid advance of science and the stagnation of an obsolete international system. Gilpin writes as if the structure of American democracy were something permanent, a stable basis for planning into an indefinite future. Scientists, on the other hand, cannot divest themselves, even when they enter politics, of a sense of impending crisis, of the inevitable heading into a storm which could splinter our ship of state and others as well. This sense of a tragic crisis is what accounts for scientists having become active in political life; in fact, it is the only valid justification for this involvement. A scientist who becomes an important cog in the political machinery without this sense of tragic challenge is merely a technical expert, accidentally involved in politics—which is what many traditional politicians want him to remain.

Clear and Concise

Pleuropneumonia-like Organisms (PPLO) Mycoplasmataceae. Emmy Klieneberger-Nobel. Academic Press, New York, 1962. ix + 157 pp. Illus. $6.

There has been, over the last few years, a growing interest in the pleuropneumonia-like organisms (PPLO). This interest has been generated by an increased awareness of the pathogenicity of these cells, by new developments in the study of bacterial L forms with which they have some common properties, by the finding of PPLO as contaminants of tissue culture, and by a realization of the significance of these very tiny forms in studying cellular processes. It is therefore an appropriate time for a book on the PPLO, and it is fortunate that the project has been undertaken by E. Klieneberger-Nobel who has contributed so much to this field by her own research. The result is a concise, clear, easily readable monograph covering all aspects of the PPLO. There is useful material, both for those interested in PPLO as etiological agents and for those concerned with the cellular physiology of these microbial forms.

Chapter 3, on morphology, is of particular interest. In it are collected the wide variety of reported morphological information. From this, Klieneberger-Nobel has formulated a model to account for the conflicting results that have been reported. The model presents a coherent scheme for the replication of the PPLO, and it appears to account for all the present observations.

The nutrition and metabolism of PPLO is reviewed in chapter 8, which was written by S. Razin. His review is exhaustive and collects in one place the available information on the subject. But the paucity of such information should serve as a stimulus to the biochemists who have virtually ignored this class of organisms.

Chapters 1, 2, 9, and 10 relate to aspects of the PPLO that are of direct interest in the study of diseases caused by these agents. The wide variety of PPLO infections in domestic and laboratory animals, and the relatively small amount of information on PPLO in humans, suggest that the veterinary bacteriologist has been more alert than his medical colleague to the pathological potential of these strains. The recent identification of Eaton agent, which causes a pneumonia in human beings, as a PPLO reinforces the notion that the organisms may be far more important in human disease than has been previously recognized. Klieneberger-Nobel's work on the pathogenicity of PPLO has been a pioneering study, and it is summed up in these four chapters.

Chapter 4 is a brief note on laboratory procedures. A much expanded section on methods of isolating, growing, assaying, and otherwise experimenting with these cells would have been useful. There is a general misconception that the PPLO are very difficult to work with, and I am afraid this book does little to alleviate the notion.

Bacteriologists will be especially interested in the discussion concerning the relationship of PPLO to L forms (chapter 7). An attempt is made to differentiate the PPLO from chicken coccobacilliform bodies (*Mycoplasma gallisepticum*) (chapter 6). In view of the great similarities between these strains and other PPLO and the range of diversity within the PPLO group itself, one wonders why the author tries so hard to separate these strains into a different grouping. It is difficult for me to accept many of the arguments in this chapter.

In all chapters the author's opinions are stated clearly and strongly. Even where one disagrees, one must of necessity respect the hard work and careful reasoning behind the conclusions. This book is clearly an essential addition to the library of anyone interested in modern developments in the pleuropneumonia-like organisms.

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Medical History

Galen on Anatomical Procedures. The later books. Translated by W. L. H. Duckworth. M. C. Lyons and B. Towers, Eds. Cambridge University Press, New York, 1962. xix + 279 pp. $7.50.

David Edwardes' Introduction to Anatomy, 1532. A facsimile reproduction, with English translation and an introductory essay on anatomical studies in Tudor England. C. D. O'Malley and K. F. Russell. Stanford University Press, Stanford, Calif., 1961. 64 pp. $2.75.

Lectures on the Whole of Anatomy. William Harvey. An annotated translation of *Prelectiones Anatomiae Universalis*. C. D. O'Malley, F. N. L. Poynter, and K. F. Russell. University of California Press, Berkeley, 1961. vi + 239 pp. $8.

Anatomists and medical historians will recognize in these three scholarly books a significant contribution to the refinement of the perspective from which we view the development of anatomical science. Duckworth's carefully edited translation of Galen's last major work does much to enhance the stature of the Great Pergamene. The book firmly establishes the solid scientific outlook and achievements of Galen's career-long study of anatomy and permits a more generous attitude toward his errors, which have been so much emphasized since Vesalius.

Anatomical teaching in Britain began officially in 1505 at Edinburgh