Science, Censorship, and the Public Interest

Gerard Piel

It is no secret that scientists today are enlisting the assistance of writers in order to talk to their fellow-men and to one another. There is even a special and different kind of writer for each purpose. The writer who helps to mediate communication to the public-at-large is, of course, a science writer. The writer whose job it is to facilitate internal communication—the writing of formal papers, reports, and manuals, addressed to other scientists, to engineers, and to technicians—is called a technical writer. Science writing and technical writing now have formal status as professions, with the organization of their respective national societies and the promulgation of their codes of ethics and standards.

The difficulties inherent in external communication are familiar to anyone who has ever tried to write about science for the public. One would think, however, that the internal communications of science might present a situation with ideal matching of impedance between transmitter and receiver. The report, the paper, or the manual is addressed to a small audience. The members of this audience may be presumed to be knowledgeable. They have reason to be interested, and they are compelled to understand. Yet, the technical writer is now accepted by the scientist and engineer in industrial, governmental, and university research organizations as a full-fledged partner and collaborator in the preparation of papers and reports.

Such concern with the technique of communication in this ideal situation suggests the frailty of human communication under any circumstances. It gives us also an impressive measure of the importance of communication in the process of research. It is not too much to say, in fact, that without communication there can be no research. Bishop Berkeley's dictum applies in an exact sense. Like "the tree in the quad" that does not exist if no one is there to perceive it, to borrow from Ronald Knox's restatement of the point, new research has no existence until it is communicated from the scientist to his brothers. The fact is there is no "fact" in science that is final or significant in itself. Work has meaning only as it is connected to the general fund of knowledge and thereby established as a base for further increase of knowledge. It gets so connected and established only by communication. No discovery is ever the work of one man or group of men, working in isolation from the concerns of the community of science as a whole. On the contrary, many discoveries are made simultaneously by two or more independent workers or groups of workers.

This consideration of the function of communication in research underlines the highly practical significance of freedom in the communications of science. Freedom is like the air, however, and we do not appreciate its importance until we are deprived of it. Recent developments in the information policies of our Federal Government, therefore, are instructive. The last two decades of war and cold war have seen a widespread expansion of secrecy in the operation of our Government agencies. The censorship, for obvious reasons, has pressed most heavily upon science. Not only does it blanket large areas of applied science. The technologic revolution in warfare is pushing the frontiers of knowledge; as a result, much work in basic science is classified as "top secret," "secret" and "confidential." And because people, as well as documents, are classified, censorship reaches far outside the Government payroll to embroil a frightening percentage of our scientific establishment in the security system.

All of this has been said before, and it has been the subject for more eloquent protest and indignation than will be sounded here. But there had been no systematic inquiry into the spread of censorship until a year ago, when the so-called Moss Committee of the House of Representatives undertook its investigation of Government information policies. This committee (a subcommittee of the House Committee on Government Operations), headed by Representative John E. Moss of California, has given us a model demonstration of the exercise of the Congressional investigative power. Its quiet and thorough work deserves much better coverage by the press, especially by the press of science. Testimony before this committee has developed, for the first time, the magnitude of the problem of censorship.

Witnesses have agreed that censorship since the outbreak of World War II has locked up something like 100,000 file drawers full of classified documents, in the city of Washington and at United States military and governmental installations throughout the world. The Army estimates that it alone has 2 million classified documents in its files. Such an accumulation of secret material must be deeply disturbing to anyone who prizes the institutions of our democratic society. It is a measure of the degree to which we have permitted anxiety about national security to compromise our traditions and our principles of government. As one eloquent scientist, J. Robert Oppenheimer, has said it: "Our own political life is predicated upon openness. We do not believe any group of men adequate enough or wise enough to operate without scrutiny or without criticism. We know that the only way to avoid error is to detect it, that the only way to detect it is to be free to inquire. We know that the wages of secrecy is corruption. We know that in secrecy error undetected will flourish and subvert."

One report of the Moss Committee reminds us that nowhere in our Constitution or in our statutes is the Executive Department authorized to declare things secret. The Government information statute is itself one of the earliest on our books. It set up rules and regulations for the disclosure of information by public officials and makes no provision anywhere in its language for secrecy. Yet it is this very statute which is now invoked in Presidential orders establishing censorship and secrecy. Now, of course, there is need for secrecy in the operation of government. But censorship has flourished in recent years throughout the Executive Department, without supervision or review by the legislature or by the courts. Perhaps this is because the original statute, making no provision for censorship, made no provision for its review. The Moss Committee is the first agency to undertake such an investigation.

The secret documents that cram the files in Washington relate, of course, to all kinds of concerns of government—to intelligence reports and to forgotten purchase orders as well as to current scientific research. Some of these docu-

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ments probably should not be declassified for a generation; it might be wise, for example, to reserve certain intelligence reports for inspection by future historians. Some documents, however, should never have been classified, especially in realms of fundamental science, and ought to be immediately declassified. But it is clear from the testimony before the Moss Committee that most of these documents will never be declassified. The sheer magnitude of the task and the scarcity of qualified personnel, they say, will make it impossible, no matter how well-intentioned we are and how determined we would like to be. The best the Army hopes to do is to declassify about 10 percent of the documents in its custody, a maximum of about a quarter of a million. Declassification at this rate could not even keep up with the current rate of classification. All of the testimony points to the conclusion that we must seek prevention rather than cure. The most that can be hoped is that some brake on the rubber stamp will slow the accumulation of secret papers.

This is especially important for science, because research tends to stay classified, once the rubber stamp has made its mark. Most strictly military censorship has its own built-in, automatic declassification. The order of battle cannot be kept secret for long, because military plans are self-disclosing as they are put in operation against the enemy. Similarly, the data surrounding the development of a new weapon are disclosed to larger and larger numbers of people as the weapon progresses from the laboratory and the factory to the field. But there is no such automatic process for research. Work in science will stay locked up unless sufficient pressure is brought to bear upon the military to declassify it.

Many fields of science, according to testimony before the Moss Committee, are now compromised by the taint of secrecy. Philip M. Morse of the Massachusetts Institute of Technology told a wry story in this connection. He published what he thought was a novel and significant contribution to queueing, or waiting-line, theory. This is a branch of mathematics that has many uses in a world in which increasing numbers of people are standing in line; it can help planners to schedule the landing of airplanes at crowded airports or to decide how many cash registers to install at a supermarket. When his paper was published, Morse found himself subjected to catcalls from certain colleagues who had been associated in a secret, wartime project with Bernard O. Koopman, now at Columbia University. Koopman, they said, had done the work long ago. Morse had never heard about it because he had not been involved in that particular project, and Koopman's work was still classified. When Morse sought to get the work declassified, he was told that, while Koopman's paper was itself concerned with a no-longer-classified project, it incorporated reference to work by a man named Clark that was still classified. The reason Clark's paper must remain classified, the censors explained, is that nobody has been able to identify this man Clark or to find his paper. Under the circumstances, Morse has taken the only sensible action: he has yielded that salient in the territory of queueing theory to the censors.

We have always opposed the tendency in our Executive Department to make government a private affair. We know from experience how secrecy can shelter corruption and incompetence and promote sterility in the making of national policy. Now we have a new reason for opposing secrecy in the operation of government: it obstructs the progress of science.

Secrecy has injured science in another aspect. It has added a smell of the sinister to the climate of sensation which has surrounded the popular discovery of science as the source of new technology for war and peace. Consider, as a recent instance, the statement by a federal judge that "the younger generation of pure scientists" is suspect of treasonable politics. But we cannot blame the censor exclusively for the poisoning of the public relations of science. The sensations have been expanded and inflated by the publicists of science, even by the well-intentioned, to the point where many of our fellow-citizens have science firmly identified in their minds as an accessory activity of the weaponeering, home-appliance, and pharmaceutical industries.

This brings us to our second concern: science writing, addressed to the public outside of science. This function of journalism has assumed an obvious new importance in our life. The theoretically informed citizenry of our democratic society must be especially informed today about the work of science if it is to make wise judgments in public affairs. But sound public information about science is also integral to the life of science itself, for this is an era in which science must turn to the public for its support.

Science writing has shown great improvement in matter and form in this country in recent years. Most scientists will agree that it is distinguished by greater accuracy and by less flagrant affronts to good taste. As a result, they have accepted the notion of collaboration with science writers, just as they have accepted the notion of collaboration with technical writers. But we have far to go. The principal appeal in the popularization of science is still the one-note siren song of utility. Science, in the public mind, is a means to ends—to all kinds of exciting and useful ends, to be sure: to the space ships that are being delivered this year by our automobile factories, to cancer cures, to bigger bombers and faster jets. As such, science is worthy of public support, the citizen says, provided that it comes through with more of the same. There is peril for science, however, in reliance on this distorted view. The same citizen is showing signs of ennui and anxiety at the prospect of further miracles.

There are other deficiencies. The current vintage of science writing shows a tendency to evade the difficulties of exposition; knotty topics are suspended, instead, in a solution of rich and beautiful prose. In the newer media of communication, which have more recently discovered that science is a matter of large public interest, the popularization of science is confounded by rituals of mass entertainment. One standard routine dramatizes science through the biography of a hero scientist: at the denouement, he is discovered in a lonely laboratory, crying "Eureka" at a murky test tube held up to a bare light bulb. Another treatment invites the audience to identify itself with a hopelessly fatuous master of ceremonies who plays straight-man for kindly, condescending Dr. Science.

All of this, we are told, is what the public wants. But even if it could be shown that the public had a taste for such dubious entertainment (the Hooper ratings are against it) it would still be hard to see how it promotes the popularization of science. The suspicion grows that the mass communication image of science reflects not the public taste but merely lack of ardor on the part of these popularizers.

But publishers and producers are learning that the half-life of bunkum in America is growing short. It is increasingly dangerous to underestimate the intelligence of the American public. Recently there have been notable additions to the casualty list of the American press. And stars are burning out faster these days.

Unhappily, it is an equally good rule for the science writer not to underestimate the ignorance of his public. This applies not only to the public-at-large; it holds equally well in addressing the otherwise educated members of our society. The ignorant include most of the spokesmen and articulators of the public consciousness: our scholars, artists, writers, lawyers, and legislators and our administrators and executives in business and government.

It is this ignorance that underlies the divergence, in the academies of America, between the scientific and the humanities faculties. This is an old story, of course, dating back to the mid-19th century. It arose from the need to specialize, which has sharpened with the increasing complexity of civilization. But the gulf has widened and deepened in recent years. Ignorance of science is advertised today as the warrant of the self-styled humanist. The argument goes this way: "The aim of education is a decent, moral world made up of decent, moral people. Science must therefore be secondary, because science cannot help anyone to be a decent, moral person. Science is vacant where value is concerned. The humanities provide the value."

The humanities, by this line of argument, are staked out as the territory of the antirationalists. "Reason," they say, "must ever be the slave of passion." Science can show us how to achieve our ends. But for motivation and purpose we must seek guidance elsewhere, in tradition or faith, in the sensibilities, emotions, and yearnings that well up in the human spirit, beyond the understanding and control of reason.

To argue thus is to ignore how much of the outlook of all men in our time is conditioned by science. In politics, the choice of the aims of national policy is profoundly conditioned by what we know, from human biology and from cultural and physical anthropology, about mankind, its history, and its place in nature. Never again can a nation assume the mantle of a "master race" or take up a "white man's burden" or proclaim a "manifest destiny." Cultural relativism has even invaded the world behind the Iron Curtain, where the 19th-century naivetes of Marxism are undergoing revision. The politics of the world is modified, equally, by what we can do with what we know. The vision of the United Nations and its technical agencies is that of a world at peace because it has eliminated human destitution, misery, and disease. Contrast this vision with the view of the 17th-century moralist who held that human life is, of necessity and by definition, "nasty, brutish, and short."

In personal morality, the notion of the good life and of what men live for has been deeply modified by scientific understanding of the cosmos, of the origin of life, and of the structure of the human personality. Reason is the instructor of passion in other departments of our culture. Consider, for example, the bearing of science upon esthetics. Recent investigation of the giant molecules has shown us how nature achieves, in extraordinary perfection, the aim of art: in the molecule, function is the expression of structure; it is what it is because of the way it is made.

Such are the concerns that inspirit the scientist in his work. They are not different from those that move the painter or the composer, the historian or the poet. Utility alone could never have sufficed to bring science to its present wealth of understanding. The motivating drive could never have been less than passions which all men share and which inspire the best achievements of men in other fields of intellectual endeavor.

This is the aspect of science most neglected by science writing. It is, I submit, the facet that is most susceptible to popular appreciation and comprehension. The preoccupation with information should give way to popularization of the objectives, the method, and the spirit of science. If the public is to support the advance of science for motives other than utility, then people must be able to share not only the useful but the illuminating and the beautiful that come out of the work of science.

Abbreviations

Uptake of Laboratory Shorthand in *Science* (ULSS; $Q_{\mathrm{abbr.}}$)

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In fitting articles and reports to the necessarily stringent space requirements of *Science,* authors frequently find it convenient to substitute capital-letter abbreviations for nouns and adjectives that they must use several times. The abbreviations are usually ready to hand, for they are used every day in the laboratory to save time and notebook space, and every science, and perhaps even every laboratory, has its own shorthand expressions and jargon. A few authors explain all their abbreviations in a footnote, some explain each abbreviation the first time it is used, some explain some of their abbreviations, and some do not explain any.

To what extent is the use of laboratory shorthand from many different sciences justified in a periodical that circulates among scientists of many different fields? Several points bearing on this question were discussed in a short article that was reprinted from *Nature* in last year's Book Issue of *Science* (*1*). We were impelled by this article to make a brief study of the capital-letter abbreviations that have been used in signed articles that have been published in *Science* during the past 2½ years. For material, we used a card file that we have accumulated for editorial purposes.

In making this investigation, we sought to determine particularly what abbreviations have had more than one meaning, especially in different fields, and what meanings have had more than one abbreviation. In addition, we considered the meanings that individual letters have had as elements of abbreviations and the number of abbreviations that have never been explained. We found that the overall result is a startling hodgepodge.

Of the abbreviations that have had more than one meaning, the following may be cited as examples. BP has been used for "before the present," "blood pressure," and "boiling point." BT for "bathythermograph" and "blue tetrazolium." DMF for "dimethyl formamide" and "decayed, missing, and filled teeth." DNP for "dinitrophenyl" and "dinitrophenol." EA for "experimenter associated with the agent" (used in parapsychology) and "enzyme activity." H for "sorbitol" and "histidine" as well as for a well-known element. IDP for "inosine diphosphate" and "integrated data processing." PNH for "reduced pyridine nucleotide" and "paroxysmal nocturnal hemoglobinuria."

On the other hand, several different abbreviations have been used for one

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