Challenges to Editors of Scientific Journals

Scientific papers should be judged for their lasting value before, rather than after, publication.

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In discussing challenges to editors I do not wish to underestimate the importance of innate imagination and originality, mastery of technical skills, knack of recognizing variance in biological materials, enthusiasm and persistence, and ability and wisdom to draw logical deductions—a few of the characteristics so vital to the experimental scientist. Nor do I wish to overlook the value of precise methods and instruments in research and, above all, of freedom for the creative, individual scientist to think and work. But here I restrict my remarks to the desirability of editors maintaining standards in evaluating manuscripts for new knowledge and logical conclusions, preserving integrity and good practices in scientific communication, and fostering cooperation and understanding in the world which science is helping to mold.

Evaluation of Manuscripts

When planned and controlled experiments on natural phenomena gained prominence in the 17th century, the great academies were the centers of discussion and debate and the places for evaluating methods and testing instruments. From the activities and experiments in the academies there arose, in the minds of members, healthy skepticism and logical reasoning in the search for truth. Eventually the discoveries and inventions that resulted were published in the form of "tracts," essays, and serial publications.

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This is not the place to discuss the philosophy of controlled experimentation or the scientific method that arose under Francis Bacon, René Descartes, and others in the 1500's and 1600's. But I do want to point out that editors spent much energy and thought at that time discussing and reviewing manuscripts before they were published. I have recently studied some of the early French and English documents that deal with the history of scientific periodicals, and I am amazed at what went on in the process of reviewing manuscripts. Most of the discussion was motivated by fear of religious censorship, which was then practically universal in Europe. But there was also a tremendous desire on the part of editors to publish only new findings in science that were fact and not fancy or fiction.

With the great flood of manuscripts that today's editors receive, in every scientific discipline, it is not possible to spend so much time and effort debating details. Science is moving rapidly, and the results of investigations must be published promptly or they will be out of date. Backlogs of manuscripts must be avoided. Editors can help keep down backlogs and hasten publication of important new results if they will insist on more careful and critical reviewing of manuscripts than is customary today. In many papers a new or unusual claim is either lacking or is so obscure that the author does not seem to realize which assumptions he used to reach his conclusions. The only alternatives to better reviewing are larger and larger (or more and more specialized) primary journals or an entirely new method of handling the primary literature.

Critical reviews. We may be able to bear the current burden of the scientific literature a bit longer if editors and editorial boards will assume their responsibilities and become something more than custodians of manuscripts and journals.

In discussions of standards for reviewers, one hears it said that "only history will tell us whether an insignificant finding in one specialized field may be of major significance for another," and that "no one knows when some investigator may come up with a good idea that will be lost forever if his paper is not published." Such statements favor mediocrity and weaken the healthy skepticism that is required of a scientist reviewing a manuscript.

The results of every piece of research must be judged on merit. Would it not be better for science if more contributions were carefully evaluated and judged for their lasting value before, rather than after, publication? This might be possible if editors and members of editorial boards were chosen with more care; they should be honest, knowledgeable, skeptical, and capable of judging new and worthwhile information in their disciplines.

In a recent study (*1*) by the Abstracting Board of the International Council of Scientific Unions on the publication of original scientific literature, 156 questionnaires completed by editors of well-known primary journals, were analyzed. The journals are published in ten countries where research is considered good. To the question, "Are manuscripts sent to a referee?" 16 percent of the editors answered "No," and another 8 percent gave equivocal answers. Even though the sample was small, these percentages seem shamefully large. Editors in every discipline should take their responsibilities seriously with respect to critical reviews and should be working to improve the present situation.

New forms of primary publication. I believe the current system of publication will become strained, or possibly changed radically, if the scientific literature doubles in the next 10 years, as has been predicted, and if the newly projected "manpower needs in science and technology" are even partially fulfilled.

We must have the vision and wisdom to recognize that we are about to see tremendous changes in the way scientific information is disseminated. The question is: Are editors and the scientific organizations they represent truly helping to chart the course of things to

come? With regard to this question I strongly recommend B. W. Adkinson's article "The role of the scientific society today" (*2*). But this is not sufficient. Editors are in a unique position to transmit information and challenges to their colleagues in various societies. This they must do, if for no other reason than to raise the issue of whether their present organizations are serving a useful function.

Analysis of its small sample by the Abstracting Board of the International Council of Scientific Unions shows that three-fourths of the leading primary journals are owned by learned societies and other nonprofit organizations. Such groups also disseminate much scientific information through means other than publication. In fact, they represent a scientific community of thought and attitude—a community of the kind that in the past has fostered the scientific method. The question we must raise now, however, is this: What will happen to scientific societies, and what will occur in discipline-oriented science, if responsibility for the dissemination of knowledge is shifted entirely to interdisciplinary groups, to the facilities of the old "invisible colleges," to government, or to commerce? One should pause to think about the impact of such possible changes on science.

I suggest that each society, or that several societies collectively—possibly through organizations such as the Conference of Biological Editors—give more serious consideration to our future publishing needs. We are in a tremendous scientific revolution, and the outcome is partially dependent on the cooperation of scientists. Librarians, so-called documentalists, and other people in industry and government are working to give scientists and technologists what they think the scientists and technologists want. But are we as scientists giving such matters sufficient attention? Perhaps the time has come to stop worrying about vested interests and to orient ourselves toward action within our own scientific disciplines. Perhaps we should heed the warnings of science historians. For example, Derek Price (*3*), states that in a "saturation state" of scientific publication, it is doubtful whether scientists have the inalienable right to publish all their results. Price feels that we should arrange graceful deaths for the old-style scientific paper and journal.

At present no one knows whether the future requirements of scientists can be partially or completely met by (i) traditional primary and secondary journals, (ii) central depositories of unreviewed manuscripts, (iii) science newspapers, (iv) various types of mechanized information centers handling specialized single-subject or multidisciplinary information, where reports are reproduced as coded microimages, (v) permutation of titles, (vi) citation indexes, (vii) the medical literature and retrieval system of the National Library of Medicine, (viii) person-to-person communication, and (ix) mechanized private files and libraries patterned after Vannevar Bush's "memex." Editors should exhibit more leadership in their professional societies by discussing these matters. We know from experience that scientific publications and other systems for disseminating information will serve no purpose if they cannot be understood and widely used. If we shirk these responsibilities and ignore these challenges our future will undoubtedly be directed by others.

Integrity and Good Practices in Scientific Communication

One of the aims of the Conference of Biological Editors is to preserve integrity and good practices in scientific communication. The *Style Manual for Biological Journals*, prepared by a committee of the Conference, affirms this aim. We have no assurance that the manual is actually being used by the 15,000 people who have purchased copies during the past 3 years, but there are many complimentary letters on file. Members are pleased especially by reports from foreign colleagues. For example, a scientist from Denmark writes, "I find the *Manual* most useful as a guide when trying to express myself in proper English"; a teacher from Japan states, "I am an admiring reader of the *Style Manual* . . . it is very useful in the preparation of my own papers, and in a science-writing course which I teach"; a sociologist in Israel says, "Although I am not a biologist, I read with great interest your *Style Manual* . . . I have often been concerned with problems of editing and printing and have never seen an instruction booklet as concise, authoritative, sensible, and readable as yours"; and a biologist from Poland reports, "This concise manual should be owned, studied, and even learned by heart."

But let us not become joyous and complacent over the apparent success of the *Manual*. There are too many indications that good practices are being disregarded or abused in writing for scientific and technical journals.

Some time ago a college professor suggested that English and technical-writing courses be revamped and that only rules "that conform to actual usage" be taught, since "anything is all right if it fits the occasion and expresses the intended thought." The New York *Times* used this headline in reporting the story: "Prof Says Bum English Ain't so Bad after All."

According to Clifton Fadiman, "there seems little doubt that the Levelers, backed by the stern and inflexible authority of the Learned, are winning their battle. What would have been thought of as illiteracy 40 years ago, has been promoted to the rank of homespun American. The Levelers' thesis is now generally accepted . . . and the nasty notion of 'correctness' falls to the ground, and there we may well say *it lays*. The King's English is dead."

Warren Weaver commented in a similar way in his editorial last year in *Science* (*4*).

"Man seems to be . . . careless about preserving the integrity of his intercommunication. . . . [The] modern idea seems to be that 'language is a living, growing, thing'; and growth in all directions, including downwards toward the low level of the street, apparently seems entirely acceptable to many.

"One must grant that language is alive and evolving. Human words should change occasionally, but I think that at the best these mutations are the result of the radiant effect of poetic imagination or the responses to new necessities. It does seem reasonable to hope that new words should not be accredited merely because they are used by substantial numbers of careless, lazy, or ignorant persons."

The President's Science Advisory Committee in a recent report (*5*) also pleads for clear and succinct writing. Indeed, should not editors, and scientists as well, protest in general against current trends toward more and more sloppiness with words and with grammar? One of an editor's major responsibilities is to insist that authors prepare manuscripts that are understandable. In this regard, perhaps we can learn from editors of commercial magazines, who place the interest of their readers before that of the authors, or even from our forefathers, who wrote great historical

documents. The Gettysburg Address contained 266 words, the Declaration of of Independence 300, and the first scientific article published in an English serial publication, 341. These may not be models for the design of a scientific manuscript in 1963, but they do illustrate how a few well-chosen words can say much.

Role of Editors in Promoting Cooperation

In 6 years the Conference of Biological Editors has done a great deal. But much remains undone, especially in the way of cooperation with other groups working on the problems of communication. Let me mention a few instances where such cooperation may be worthy of consideration.

"Research librarians." The situation is changing rapidly from one where individual scientists subscribe to, and read, a number of primary and secondary periodicals to one where scientists depend more and more on the services of libraries and project-oriented centers of information.

In 1961 one editor consulted with the executive secretaries of the Special Libraries Association, the Association of College and Research Librarians, the Medical Library Association, and other related organizations. The interesting results indicate, as one might expect, that librarians are anxious to cooperate with editors of scientific periodicals. One distinguished librarian stated in writing, for example: "editors and librarians could educate one another."

I suggest that editors take steps to cooperate with librarians in a more positive way than through correspondence.

National Federation of Science Abstracting and Indexing Services. This organization was established as a result of a conference in 1958. Its aims are to "foster, encourage, improve, and implement the abstracting, indexing, and analyzing of the scientific and technological literature of the world, and to foster the interchange of scientific and technological information among scientists and technologists in the United States and foreign countries and to strive to provide for them the best possible research information services."

The Conference of Biological Editors has held several round-table discussions at its annual meetings on problems associated with abstracting and indexing. There has always been a realization in this organization that primary and secondary publications are of equal importance. But much more must be done on a cooperative basis.

For example, I suggest that the members of the Conference who are not associated with the Federation be allowed to study the reports of several surveys made by the Federation. Cooperation will be required among many groups before a so-called "national master plan" can be put into effect for handling the scientific and technical literature. I am sure there are several ways in which editors of primary scientific journals can help without loss of autonomy or fear of directives, if new plans seem desirable and worth while.

Documentalists (Programmers). A few journals now require authors to label their articles with key words taken from an assigned thesaurus. The Engineers' Joint Council, for example, is preparing an engineering thesaurus to help code articles with descriptors for machine retrieval of information. I am sure there are many disciplines that do not lend themselves to keyword classification as readily as engineering does. Again, several questions may be raised. Should scientific societies and editors, individually or collectively, be cooperating with documentalists on the preparation of specialized thesauri? Should editors encourage their professional societies to take an active part in asking colleges and universities to provide instruction in modern methods of handling information? Only by close cooperation can editors keep abreast of research on machine documentation and help apply it to science.

Journalists and broadcasters. Many people agree today that it is desirable for laymen to know more about science. The form that the interpretation or popularization should take is not clear. In one approach, science is made spectacular and glamorous. In another, an attempt is made to explain the scientific method, the reasoning behind certain experiments, and how much is *unknown* in the world, even to the scientist. In yet another, the practical side of science is explored and, in some cases, details are given on how to "do it yourself." Regardless of the approach, scientific accuracy is necessary if the public is to be properly informed and if the results are to be respected by the scientist. Scientific news must not be used or "managed" as a weapon against society but must be presented, rather, as knowledge and truth to give mankind liberty and freedom.

Laymen and scientists should realize that science is an integral part of the intellectual life of civilized society. The communication of scientific ideas should be accepted by the public for the same reasons that art, music, and literature are cultivated or appreciated. Without proper recognition of the significance of science in society, even the administration of public affairs will suffer.

Editors of scientific publications can play an important intermediate role in promoting adequate and worthy coverage of science for the public through the mass media. They may accomplish this in various ways—for example, by referring good science writers to research scientists whose papers contain information of interest to the public; by taking part in educational conferences for newspaper editors and other people working in mass media; or by cooperating with such groups as the newly formed Scientists' Institution for Public Information.

Science historian. The preservation of original manuscripts, letters, and records is extremely important in the history of science. Such materials help historians to discover how scientific ideas develop and how science influences civilization. Editors of scientific journals and memoirs should follow the rule "that every official obituary or memoir include a statement regarding the location and condition of the private papers of the scientist concerned."

Perhaps editors should cooperate closely with the History of Science Society on such matters. Joint meetings may even be in order.

Psychologists. New methods of communication among scientists will undoubtedly require the abandonment sooner or later of long-established procedures. But mechanical methods and techniques of processing information will have to become readily available before they are accepted and widely used. There are no simple mathematical formulas for bringing about such changes, because the changes are costly and involve human thought, emotion, and behavior. The scientists concerned will have to be persuaded, through education, of the necessity of change.

Psychology will play an important

part in this education and adjustment to new situations. But, as was pointed out recently by Neisser (*6*), "the view that machines will think as man does reveals misunderstanding of the nature of human thought." We can help in this educational process, if in no other way than by exhibiting an understanding of the problems of psychology and sociology. But in so doing let us realize that we cannot simply educate the scientist to a different way of life so that his ways will conform to the commerce of the world. A moral code must also exist under which an individual scientist can think, work, and reason as a unique personality and with freedom to express his intellectual individuality.

Scientist-editors in other countries. Many laudable activities are going on within the great international scientific organizations. Unfortunately, for various reasons some of the good intentions and practical work of these large groups may not bring about needed change. I feel that small working sessions, such as the one members of the Conference of Biological Editors held last year with their colleagues from Latin America, should be encouraged. Preliminary plans to have a similar meeting this year with representatives from Europe did not materialize, but we may hope that this will be arranged in the next few years.

Scientists who believe that the old, tried, and true is sufficient or who underestimate and fail to understand the need for change may soon be lost in a challenging and exciting period of history. But those who have the vision to see beyond the obvious, the wisdom to search for and recognize the truth, and the ability to apply basic knowledge for the good of mankind will find this period one of great reward and satisfaction.

References and Notes

1. "A tentative study of the publication of original scientific literature" (International Council of Scientific Unions Abstracting Board, Paris, 1962), p. 292.
2. B. W. Adkinson, *Am. Meteorol. Soc.* **43**, 119 (1962).
3. D. J. D. Price, *Intern. Sci. Technol.* **1963**, No. 15, 37 (March 1963).
4. W. Weaver, *Science* **137**, 1025 (1962).
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6. U. Neisser, *Science* **139**, 193 (1963).

News and Comment

NSF: New Director Has Ordered Small But Significant Steps Aimed at Improving Operations

During the few months that have passed since the leadership of the National Science Foundation (NSF) changed hands, there have been no dramatic changes at that colossus of support for scientific research; rather, the new director, Leland J. Haworth, has instituted a series of small but significant changes aimed at simplifying NSF's relations with the scientific community, and he has been attentive to maintaining the rather good relationship that NSF has come to enjoy with the capital's political community.

As far as the immediate interests of the scientific community are concerned, it appears that the principal difference is that it's going to be easier to get a speedy "yes" or "no" from the Foundation. Furthermore, for the present, at least, there is nothing to indicate that NSF is going to be swept up by congressional concern over tighter bookkeeping on federal expenditures for research. Of course, a blast from Capitol Hill, such as the one that pushed NIH into more rigid accountability procedures, would be the ultimate test. But there has been no specific pressure for NSF to follow the NIH example, and within the Foundation there is confidence that the existing bookkeeping requirements will stand scrutiny—that they strike an intelligent balance between protecting the taxpayers' funds and sparing the researcher undue paper work.

It is acknowledged that last year's AIBS affair was a regrettable and highly embarrassing one, but the episode is regarded as a painful fluke rather than a symptom of widespread difficulty. AIBS's diversion of grants was unearthed after expansion of the Foundation's audit activities, an expansion that was initiated to catch up with the Foundation's phenomenal growth of recent years. It is now felt that the audit operation is of suitable size, and there is no expectation of any growth of auditing, beyond that necessary to keep up with the Foundation's growth.

This expectation, however, is based on the assumption that the scientific community is its own best watchdog; it is not unreasonable to assume that if some particularly pungent incident were to come to public attention, the Foundation might, in self-defense, be forced to adopt more restrictive policies.

Actually, Haworth has had very little time in which to make his imprint on NSF, but the few things he has done have elicited approval both inside and outside of the Foundation. He took over the post early in July, and in mid-August he left for 3 weeks to visit the Soviet Union for an international conference on accelerators. (This was an engagement that he had made while in his previous post as a member of the Atomic Energy Commission.) Prior to his departure, however, he took a number of steps aimed at moving a considerable amount of decision-making authority from his own office to the lower echelons of the Foundation. As might be expected, this has not harmed the morale of his subordinates.

In many respects the relocation of authority is testimony that Haworth's predecessor, Alan T. Waterman, had brought the Foundation safely through some long and dangerous political channels and that now it is no longer considered necessary for the decision-making process to be concentrated in the director's office. (To some extent, though, the shift is a reflection of Haworth's style of operation, which one Foundation official summed up as, "I'll give you the authority, and I'll back you up. Now it's up to you if you sink or swim.")

As the Foundation's first and only