An Inquiry on New Forms of Primary Publications

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Some of the problems associated with present journal publications practices are discussed. These are attributed to the fact that as the literature has expanded, the needs of both authors and readers are no longer being met by printing and distributing all of the material accepted to all subscribers. A two-edition system is proposed, with short versions of papers in a broad circulation issue and expanded versions, including full details and discussion, in library-circulation microfilm editions. Reactions of chemists to such a system are discussed. It is recommended that two-edition journals be developed in an evolutionary way by increasing use of the ACS microfilm editions for sections of articles and for supplementary documents to accompany communications.

The need for greater efficiency in scientific communication and improved forms of chemical publications has been asserted frequently in recent years. A critical survey of publications was made in 1965 by R. S. Cahn,[1] and a symposium dealing with the problems, shortcomings, and possible salvation of the primary journals was reported in this Journal two years ago. These papers[2-4] and the authoritative SATCOM report[5] provide ample discussion and documentation of the thesis that some changes in journals are needed lest chemists become buried in paper that they can't afford to buy and haven't time to read.

However it is one thing to assert and document the need for improvement, and quite another to ascertain what changes in the journal structure would be accepted and supported by the readers and authors whom the journals serve. It is the purpose of this paper to explore directions that the journals might take to meet better both the needs and wishes of chemists.

THE JOURNAL PROBLEM

The primary journals exist for two purposes: the dissemination and exchange of information between authors and readers, and provision of a permanent record of research findings. The basic problem of the present journal system lies in the fact that the amount of material published far exceeds the available time and capacity of the reader. The disparity in the needs of readers, authors, and the permanent record has steadily increased over the years, but we are still trying to meet these diverse needs with the same journals. This system is costly and inefficient, since a great deal more material is delivered to the subscriber than he can use.

As the literature has multiplied over the years, the growth has been dealt with by dividing the journals into specific areas and creating new journals. Fragmentation into a large number of narrow sectional journals designed for small groups of subscribers has been discussed[4] as a possible means of improving the efficiency of information flow, but a serious drawback here is excessive parochialism. Although further subdivision of general journals into areas such as organic, inorganic, and physical may be needed, wide-circulation journals of some breadth will remain essential, and they will remain the responsibility of the professional societies.

An important development in this connection is the proliferation of journals that have been started in the past 10 years by nonsociety publishers. The rapid expansion of research in the 1960's completely outstripped the capacity of the society journals, and the overflow has been handled by commercial publishers. These journals are usually devoted to specialized areas; in the organic field, these include various narrow classes of compounds as well as specific experimental methods. For institutional subscribers the cost of these journals per word and presumably also per fact or idea, is typically 5 to 15 times that of society journals.

These journals have filled a need in providing and expediting publication, but the cost of this development to libraries has been very steep. An indication of this can be seen in the data (Figure 1) on the U. S. Periodical Price index of the American Library Association.[6] The cost of periodicals in chemistry and physics published in this country has in each of the past five years risen more rapidly than that of any other scientific area included in the index. This index does not include periodicals published abroad, where many of the more expensive journals originate. Clearly, this escalation in outlays for journals cannot continue indefinitely; ultimately, library holdings will be curtailed.

Another cost of the present system which is more pressing to the individual is the page charge, which becomes essential when the number of pages printed substantially exceeds the amount that can be sold to subscribers at a price that will cover costs. Page charges are defended as an appropriate part of the cost of doing research; they are, nevertheless, a controversial and unpopular measure, and to most chemists they represent an unwelcome demand on limited research funds. Page charges will be required, however, until a major improvement in efficiency is achieved.

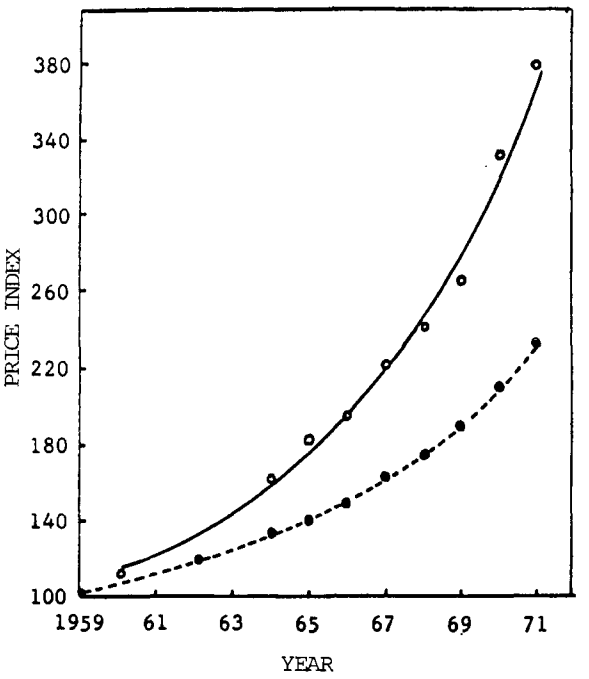

Figure 1. U. S. periodical price index, 1960–1971
●———● Chemistry and physics
●- - - -● Over-all index

The ACS is committed to providing its membership journals at a reasonable subscription cost, and at the same time providing a widely accessible permanent record of all sound and significant work submitted by members. Efforts to maintain these functions with the present journal system have led to page limitations, page charges, and delays in publication schedules. Commercial publishers do not have the same responsibilities and are able to serve the author promptly and usually without page charges. The author controls the input to the system, and if the constraints of the Society journals become oppressive, papers go elsewhere. The burden of an inadequate Society system is thus transferred to libraries and, ultimately, users. If the ACS is to continue its historic role of leadership in the scientific literature, its journal system must be competitive and capable of meeting the demands that are placed on it.

A TWO-EDITION APPROACH

To address the problems of the present journals, the system has to come to grips with the differing requirements of authors and readers. The author wants to report his main findings and conclusions to as broad an audience as he can command; he generally also needs the opportunity to discuss and analyze his results. Finally, the work should be documented with experimental data. These three components of a paper, particularly the first two, are often not clearly delineated in the present journals, but it is possible in most papers to identify certain elements that will be of more general interest than others.

Articles in the *Journal of Organic Chemistry* now occupy an average of 4.7 pages, compared with 4.4 in 1968 and 4.0 in 1964. This increase in length is not due to verbosity, but rather the fact that experimental work is more thorough and sophisticated, and compounds are more completely characterized with spectral data. In other words, more data are generated in the course of a study; this additional information is of value, and necessary for a complete report, but it is usually of less central importance to the main thrust of the work.

The limitation on readership is indicated by a survey of reading patterns in *Journal of Organic Chemistry* carried out in 1968.[7] Replies indicated that the average subscriber glanced at or began to read about 17% of the papers of a typical issue, and read half or more of only 4% of the papers in the issue. The average time spent in reading a 413-page journal was 2.2 hours; it is clear that the author must get his message across quickly.

Although a large fraction of the readers of a given paper may be interested only in the main findings, the entire account must be readily available to those readers who want to examine and evaluate the work critically. Equally important, the detailed data must remain an integral, permanent part of the journal, accessible many years hence. The obvious way to accommodate these diverse requirements would seem to be a journal in two editions, one for broad readership containing the material of central interest, and another, for limited circulation to libraries, containing the complete papers.

In late 1968, several suggestions were made independently to the ACS publications office for such a two-edition system. As a first step toward a realistic assessment of this approach, a fairly specific proposal was drafted for such a system as it might operate with the *Journal of Organic Chemistry*. The main provisions of this proposal were separately written short and long versions of papers, with full experimental data and details in the long version; the latter (or a combination of both versions) would comprise the archival edition, prepared either on microfilm or off-set hard copy from typed manuscript pages.

Reactions to this proposal were obtained from the Journal Advisory Board and about 40 other organic chemists. Roughly, two-thirds of the replies indicated at least guarded agreement with the approach outlined, many with reluctance and reservations on specific points. The other third expressed general disapproval of a move to create separate editions. One of the objections was the extra burden placed on the author. The suggestion was made in several replies that rather than two separately written versions, the long, or complete, version should be simply the short one plus a supplementary document. It was also observed that such a system, while perhaps needed, could not unilaterally be adopted by *J. Org. Chem.* without loss in favor.

The principal objection raised by individuals who opposed the two-edition journal was the absence of full experimental details in the personal subscription copy; the full experimental section must be "on my desk" or "at my fingertips." Various alternatives were advocated, among them limiting all discussion sections to one-half page, and allowing journal size (and subscription price) to rise indefinitely.

Following this initial appraisal, ACS Organic Division members were asked in early 1969 to answer a brief questionnaire on possible changes in journal forms. The response was gratifying; nearly 2100 persons (roughly half of the division membership) replied.[8] About 85% of the respondents indicated that they regularly read both *J. Amer. Chem. Soc.* and *J. Org. Chem.* In their initial reading, 60% of these individuals devoted 0 to 10% of their reading to the experimental section of papers; 53% indicated that they would continue subscriptions if the experimental section were not included in the printed journals, but were made available in microfilm. There was strong opposition, however, to restricting the printed journal to full papers of "maximum interest," with those of less gen-

eral interest available only in microfilm. Finally, about half of the respondents favored a change to some type of abbreviated take-home journal without full experimental data within 2 to 5 years.

The response to these inquiries encouraged us to attempt to define more exactly what the content and scope of a "short paper" should be from the standpoint of both author and reader. A small group of authors was asked to prepare a short version of one of their recently published articles, including what they considered the "core" of the paper within the limitations of two journal pages.

With these as models, a number of potential authors were then invited to prepare a manuscript for publication in *J. Org. Chem.* in which the first part (A) of the paper corresponded to the core version, and the second part (B) to the supplementary section which in a two-edition journal would appear only in the "archival" edition. This approach was much more attractive to authors than that of writing separate core and full versions. It was also the only practical way of obtaining broader participation, with "live" papers, since both parts of these "two-part" papers could be published in the existing Journal without overlap. Moreover, it was felt that there would be a significant advantage to the journal reader if authors could be encouraged to present the context, main findings, and conclusions in an initial section of the paper (part A), apart from consideration of a two-edition system.

This invitation with extra reply sheets, was sent to 160 persons, and 60 replies were received, 28 from academic laboratories and 32 from industrial labs (the latter group included 20 replies from two large firms). Comments were favorable to the experimental program in 41 replies and negative in 19; the ratio of *pro* and *con* was essentially the same among academic and industrial groups. From the 60 replies, 27 individuals indicated willingness to participate and ultimately 11 papers were received and published in the November 1970 issue of *J. Org. Chem.* Four other two-part papers were published subsequently.

The authors were given a few guidelines, but no requirements, on the content of part A (the "core section"). These were based on comments and reactions that had been received at various stages of the program. It was suggested that the optimum division of material between parts A and B would in general not be simply the traditional results and discussion in part A and experimental section in part B, but rather part A should contain key experimental data, and part B might often include discussion and interpretation. As it turned out, all but one of the papers contained at least some discussion in part B; also with one exception, all of the material specifically designated as "experimental section" appeared in part B. Over-all, the division varied considerably. In columns of print, the collective part A comprised 40% of the total and parts B 60%; however, the former was entirely in 11-point (standard) type and much of the latter was in smaller 8 point.

In a followup inquiry, most of the authors indicated that they had encountered no difficulty in writing a "two-part" paper, and found it advantageous to place supplementary discussion sections in a separate "part B." A majority of the authors also felt that the division into parts A and B improved the readability of the paper; but they were about equally divided as to the desirability of having only part A in the printed journal.

These experiences with two-part papers have not resulted in a clear blueprint for a two-edition journal, but responses at various stages of the program have taught us several things. First, authors can in fact identify segments of their paper which they view as having broad and restricted interest, and these do not correspond exactly to the traditional organization of a paper. Another point is that rapid, convenient access to the full paper (or supplementary section) is a crucial factor in the acceptability of any type of two-edition journal. Much of the opposition or reluctance to such a journal stems from apprehension on this score, and misgivings about the use of microfilm.

Finally, responses have underscored the importance of flexibility in such a system. If a rigid prescription were laid down on the division of a paper into two parts, or the form of presentation, authors would simply seek publication elsewhere. In particular, it will be necessary to publish brief complete papers or Notes in the broad-circulation edition—i.e., not all papers would differ in the two editions or have additional material in the "archival" section.

THE ROLE OF COMMUNICATIONS

An important consideration in the projection of a two-edition journal is the present brief communication. This form of publication closely resembles what we have designated as the "short paper" which would appear in the broad circulation edition of a journal. The publication of preliminary communications has increased substantially in the past 10 years. In *J. Amer. Chem. Soc.* and *J. Chem. Soc.*, the ratio of communications to articles has risen over the past six years by about 40% and 200%, respectively.

The growth of communications over the past decade has roughly paralleled the pressure of material to be published. Communications present the essence of a study in minimum space and have therefore been encouraged by editorial policies. They are attractive to the author since he need not write up and pay page charges on all of the experimental details that traditionally accompany a full paper. Although there are no statistics, there can be little doubt that communications have a higher readership than any other type of publication, not only because of timeliness, but also the fact that they are concise and to the point.

On the other hand, despite their popularity, communications are considered by some chemists as pernicious and undesirable because of the absence of full experimental data. Another objection is that when a follow-up paper is presented, it is inevitably somewhat redundant. Both of these points were mentioned in replies to our proposal and invitation for papers. In the 1969 Organic Division questionnaire, a number of chemists urged that some type of "back-up" document with experimental details be required for all communications.

In recent years, an increasing number of contributions published as communications are not preliminary to a full paper, but represent a terminal report. They are very concise articles (or notes), usually of rather narrow compass, with highly abbreviated data. The presentation sometimes approaches a virtually telegraphic style. The depth of the supporting material varies, depending on the scope of the work presented, but it is seldom as complete as that in an article since length is rigidly restricted. In addition to the problem of less than optimum experimental coverage, this type of publication breeds excessive fragmentation.

Thus while communications effectively present the elements of central interest in compact form, there are drawbacks to the present practices. The problems in many cases could be overcome by a supplementary or back-up section containing full experimental documentation and

characterization data, and, if the author desires, interpretation or commentary. If these items were carried in the supplementary section, the author could use his allotment of space for a more effective presentation of context and results. The supplementary section would stretch the space and permit more comprehensive scope and more complete treatment.

This communication plus supplement would, of course, correspond closely to the two-part division discussed above. The implied evolution of communications into two-part papers does not mean, however, that all communications should be transmuted or that all material should be written in the present communication format, with fixed length and expedited handling. A need will remain for strictly preliminary disclosure of a major advance, and requirement of a supplemental document would compromise this function. On the other hand, it would be undesirable to require that all papers be restricted to the present dimensions of a communication. It is clear, however, that communications, which are increasingly popular, represent fertile ground for introducing some improvements. If the use of supplementary sections can be successfully developed, it will probably lead to a redefinition of communications, and realignment of the boundaries between articles, communications, and notes.

CONCLUSIONS AND RECOMMENDATIONS

The reactions of authors and readers to our inquiries have demonstrated a keen interest in publication problems. The desirability of a more concise and efficient personal subscription journal is widely acknowledged, but the accessibility of full papers is certainly equally important. If both of these features can be provided with a reduction in total costs, a two-edition journal will be accepted and supported. The key to success will be a gradual adaptation of existing practices and journal forms. Aside from the practical difficulties of starting up a new competing journal or abruptly retooling existing journals, authors, readers, and editors will all need time to adjust and gain experience with a two-edition approach.

Fortunately, a mechanism for evolution to a two-edition system already exists in the microfilm editions of the present ACS journals. As described in the following paper by Kuney,[9] the microfilm editions now include supplementary material which is not present in the printed edition. However, the system is not yet geared to handle a major increase in supplementary material of the type that will be wanted on a rapid retrieval basis by other than a very occasional reader. The next stage needed for development along these lines is to make all of the supplementary material in each issue of the journal available as microfiche or offset printed copy, and deliver it with the printed journal as part of the microfilm subscription. This supplementary material will have to be sold separately as well until microfilm subscriptions are more widely adopted.

To take this step, the supplementary material must be adequate in amount and in sufficient demand. The responsibility for this lies with authors, editors, and journal reviewers. Two approaches have been suggested—transferring material of limited interest from the printed paper to the supplement and adding supplementary sections to certain communications. Both of these measures can be put into effect in the present journals without significant changes in practice, but it will require the cooperation of all concerned, and recognition of the need for change.

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The Role of Microforms in Journal Publication*

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Some of the problems of journal publication have been discussed in the preceding article by Moore.[1] The favorable economics of microform production coupled with the growing acceptance of microforms for archival storage suggest a solution that may have great benefit for the publishers and users of the scientific paper. The virtually unlimited capacity provided by the compaction of the microform process offers an excellent medium for the production of a full archive of scientific research. The elimination of typesetting costs and the reduction in printed copies are additional plus factors. The availability of such a record would enable publishers and authors to utilize the more expensive printed journal for a shorter, more concise form of paper better suited to fill the current awareness needs of most users.

For example, one such system might be based on a printed journal consisting of a series of digests of full pa-

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