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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The need for increased use of microfilm in primary publications is discussed. The microfilm editions of the ACS journals are now being used for supplementary material of restricted interest. Details of this arrangement and experience to date are presented.

pers, or what I have earlier[2] referred to as "short papers," severely limited in length and prepared to fulfill primarily the current awareness needs of the users of the journal. While we have been working to define a short paper,[1] the growing acceptance of "communications" in place of the full scientific paper and what we have learned about the way in which scientists use the journal[3] suggest that the current awareness needs of the great majority of users would be met fully by the utilization of no more than two printed journal pages. The full record of the research would be available in the microfilm edition of the journal on an on-demand basis for those relatively few users who have immediate need for the details of a research effort. The over-all costs of producing such a system would be greatly reduced from equivalent production in a printed journal, and the time spent in reading journals would be much more productive.

The concept of providing access to papers through abstracts of digests is certainly not a new one. What is different is the archival availability of the paper at a number of locations sufficient to assure reasonably prompt access as well as through the standard abstracting and indexing services. For example, the microfilm edition of some or all of the ACS journals is now available in more than 200 institutions, and the number is increasing steadily.

A sign of the growing interest in the separation of current awareness from archival storage in publication of the primary literature is the system, "European Chemical Reports," proposed by Helmut Grunewald, director of publications for Gesellschaft Deutscher Chemiker.[4] Key to the system is a journal to be called "European Chemical Synopses." This journal will carry two-page articles consisting of an author-prepared abstract which "summarizes the important points of the manuscripts and is supplemented by structural formulas, reaction equations, diagrams, etc., relevant to the content of the paper," necessary bibliographic data, keywords, title, length, and original language of the manuscript. The full manuscript will be made available on subscription to libraries on microfiche or microfilm. Grunewald also proposes that the system include the capability to use interest profiles for the dissemination of specific papers of special interest to the user.

Despite what seems to this writer a very clear advantage to systems incorporating the principles outlined and what seems to be user and author readiness to accept the required changes, the attachment to the traditional system is still very strong and any change in the system will be accepted with reluctance. It is equally clear that before such a system can gain much acceptance, there will need to be a period of education for all concerned on the requirements imposed by this approach to the publication of primary literature. An attempt to gain some insight into author reaction to such a system has been made by James A. Moore, a senior editor of the *Journal of Organic Chemistry*.[1]

Since any quick change to a dual-paper system such as that suggested seems unlikely at this time, the American Chemical Society has launched a program which provides a means for testing the feasibility of elements of the proposed system. It is seen as an evolutionary process where we can move stepwise to the final objective—a process where publisher, editor, author, and user can begin to develop the patterns of use needed to develop a more efficient method of disseminating the primary literature of chemistry, and where the problems of a live system can be encountered and solved.

Specifically, the ACS now makes available to editors and authors space in the microfilm editions of ACS journals for the publication of material supplementing that published in the printed journal. Thus, editors under heavy economic pressure may adopt a more stringent attitude on what they will publish in the printed journal since there is now an outlet for whatever additional material might be required in the microfilm edition. Similarly, authors will be encouraged to accept microfilm as an adequate means of dissemination since more of their work can be included in the permanent record, and the supplementary material is submitted to *Chemical Abstracts* for abstracting and indexing. The prospect of lesser page charge billing also provides an incentive to authors. Looking ahead, it seems reasonable to project that when the economy of the microfilm edition is fully realized, page charges for the printed edition can be eliminated.

Briefly, the system works as follows. After editor and author have reached agreement on what is to be included in the microfilm edition, the entire manuscript, including the supplementary material, is sent to the editorial production office. When the portion of the manuscript to be published in the printed edition has been put into final page form, the supplementary material is sent to the microfilm-processing operation. Added to the article published in the journal is a footnote indicating that additional related content has been put into the microfilm edition with instructions on how to obtain either microfiche or hard copy, including prices. The supplementary material is paginated with numbers starting with the last page of the journal paper suffixed with the letter "M." At this stage of the process a copy of the supplementary material is sent to *Chemical Abstracts* for abstracting and indexing purposes. When the issue is microfilmed, the supplementary material is positioned following the article to which it applies. In the interim between publication of the journal and the issuance of the microfilm edition, users may obtain either microfiche or hard copy of the supplementary material through the ACS office.

The expense of adding pages to the microfilm edition is negligible since the reductions are made directly from material supplied by the author, thus avoiding the high cost of typesetting and reproduction of charts and drawings. Only in a few cases has the material supplied by the author been inadequate for microfilm reproduction. We expect to provide instructions to authors pointing out the need for original copy for good microfilm reproduction. A third or fourth generation of a computer printout does not make for the best possible result in the final microform.

During 1971, the first year of operation, 10 ACS journals placed more than 700 pages of supplementary material from 148 papers in the microfilm edition. About 600 of these pages were charts and tables, 34 pages involved graphics of one type or another, and bibliographic references took up another 19. The remaining pages consisted of text matter. Many of the depositions consisted of a single page while the largest amount of material associated with a single paper added 51 pages to the microfilm edition. This particular material also proved to be most popular with users as 14 orders were received. The number of orders received by year-end for the supplementary

material totaled 34, of which seven were for microfiche and the rest photocopies.

For every page not carried in the printed journal the saving in printing, paper, and distribution costs varies from $60 to $100, depending on the circulation of the journal. From this must be subtracted the loss in page charge revenue. In the main, the material now being placed in the microfilm edition of the ACS journals would not have been carried in the journal. Thus, the saving in cost of production was not great this first year. But more important, the material would have been lost to the permanent record. There was one worthy exception. The journal *Inorganic Chemistry* placed about 80 pages of structure factor tables in the microfilm edition that would have previously been published in the printed journal. The resultant reduction in production costs was about $5000, less any lost page charge revenue.

In addition to the increasing usage by the editors, ACS journals are beginning to receive papers prepared for publication in two versions—a brief one for the printed journal and an expanded version to be carried only in the microfilm edition. Also, authors have begun to submit communications with additional material to be placed in the microfilm edition. A very small step by authors, but what may prove to be a very large step for the future of scientific journals.

To encourage the further development of this program the Board of Directors of the ACS has established a special committee to recommend guidelines for determining what kinds of scientific and technical information should be archived. The committee is to include representative editors of the Society's journals and advisors including representative readers and authors. Guidelines set up by this group will provide further stimulus to editors and authors in the selection of material in order to take fullest advantage of the microfilm edition for archival use.

The record of use during the first months of operation and the steady growth in the amount of material placed in the microfilm edition (2000 pages is the estimate for 1972) suggests that a useful addition to the journal system has been opened. As editors and authors see the system grow and prove useful, it is to be expected that they will be more and more encouraged to utilize it to its fullest potential—that is, to move toward more emphasis on current awareness in what is published in the printed journal and toward expanded use of the microfilm to provide as complete an archive of chemical information as possible. The over-all result will be a journal system significantly improved in terms of the efficiency of transmitting information from author to user and of lower costs of publication and distribution.

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Symposium on Wordage Problems—Amount, Languages, and Access*

INTRODUCTORY REMARKS

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The purpose of this symposium is to look into the three wordage problems of amount, languages, and access. These three problems seem to be the most pressing ones that we face today. More and more engineers, medical people, and scientists have come to realize that they are unable to keep up with their technical literatures. Quite simply put, we have come to know that we can no longer read all that we believe we should read, that we can read only a few per cent of the languages we know carry important messages, and that our access to information, documents, and surrogates is far from satisfactory.

In this symposium, we have stepped back from the canvas we have been busily painting for the past quarter century to view what has been accomplished and to see what we should do next. In my view, most of the canvas is untouched despite 25 years of intensive work. Parts of the picture completed are ingenious, brilliant, and useful. Other parts are muddy and in some places the paint has been scraped off. In short, we have done a lot of research and development. Now, observe closely what we have to show for it.

The 26 billion dollars invested in all kinds of R&D each year is still largely wrapped and buried in paper. Nobody is satisfied with the situation. Yet, I am convinced that even spectacular improvement can be made by application of the knowledge that we have already gained and with the investment of only one or two tenths of a per cent of the 26 billion dollars. Each participant in this symposium will probably view the three problems and their solutions differently. This is expected. It is time, however, that we take more positive action toward improved knowledge transfer. It is impossible to convert into action the reading that we cannot do because of amount, languages, and lack of access. The cost of "not knowing" is steadily rising. Lives, health, security, progress, and wealth are at stake. Information science is coming up for much closer scrutiny. Why has it not made more progress in the last 25 years of active research? Why have we not implemented the improved services and systems that we have developed? Answers to these and other questions may be given by the following papers.

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