me to cut it." This is the kind of thing that I as an editor deplore; this procedure wastes my time; it also wastes the author's time because he inevitably has to rewrite the manuscript. Frequently one feels that it would be better for the author to wait until he has enough to make a good manuscript rather than to submit something that is trivial, unimportant, and only part of a large picture.

There are various reasons for this large increase of routine articles since the war, not the least of which is the availability of government money in the form of university contracts. This kind of research is often of a type different from that in vogue before the war when a man shut himself up in the corner with a few graduate students and did what he chose to do. We now have large laboratories, where teams of people work together, where the crank is turned, and results appear without careful thought of their meaning and their interpretation. Moreover, some of these institutions now employ professional writers who do not know exactly what the scientific work is all about and who send us manuscripts that obviously place their emphasis where the author, himself, would not have intended it. A large amount of relatively routine material is submitted to us, and one begins to ask whether a journal that publishes 20,000 copies should accept material which has primarily only an archival value.

About a year ago, the board of directors of the American Chemical Society thought of trying an experiment, an undertaking that made us shudder. They said in effect, let us make the *Journal of the American Chemical Society* into a super journal. Let us take, for example, the best 20 percent of the 3600 odd manuscripts we receive each year and put them into the *Journal of the American Chemical Society*. Let us then establish subsidiary journals or sections of the big journal, if you wish, that will publish the remaining material which should be recorded somewhere but which is not very startlingly new. This made us shudder for several reasons. In the first place, it would have made the editors responsible for academic promotions. Another reason became apparent after we tried to look at the papers and to pick out the best 20 percent. Two assistant editors and I could agree easily that about 5 percent of the papers belonged in the super category; we could also agree that about 50 percent did not belong there; the remaining 45 percent proved extremely difficult to handle. We are grateful that the board of directors backtracked and decided not to make us carry out this program.

What is the quality of the scientific work? We tried to go over the manuscripts we received and to choose those in which there was an honest effort at interpretation of the data and correlation of facts—in other words, something more than the mere description of a routine synthesis or a routine set of physical measurements. Dr. Gates went over the organic and biological material; I went over the inorganic and the physical; our percentages checked exceedingly well. We both found that about 12 percent of the manuscripts really had some meat in the way of scientific discussion; the rest were mostly either recordings of routine observations, syntheses of compounds, or measurements.

I believe that in the near future we will have to decide whether a journal like the *Journal of the American Chemical Society,* which pretends to cover all of chemistry and which prints 20,000 copies of each issue, should accept manuscripts that have little reader value. Admittedly, all valid facts should be put somewhere in the records, because occasionally somebody will need them, but I think that we will have to confine our publication, with its large subscription list, to articles that have something more than just a few isolated facts. The solution, I think, is going to be some device such as microfilm or microprint, which is read with special glasses, or perhaps the formation of more specialized journals, leaving the big journals with large subscription lists for the articles that have some reader appeal. The chemist, of course, does not want to use a reading device. He frequently likes to sit in the laboratory and wave a bunsen burner at something while he reads a journal, and it is not convenient to have a viewer or a special pair of glasses on at the time. Hence, I do not think that the microcard idea will be universally accepted. In addition, the chemist, when it comes to his own field, is a most conservative gentleman. Hence, my prediction is more specialized journals; we will have to be more discriminating in the choice of articles we publish in journals of large circulation. This procedure will leave the problem up to the poor librarian who will have to get the funds to pay for the subscriptions to the specialized journals.

Problems in Financial Management of Scientific Journals

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These remarks on the financial management of scientific journals are intended to apply only to the group of scientific journals that have the following common characteristics: (i) They perform important and/or essential services for communication within their fields. (ii) They are the official organs and, therefore, the responsibilities of scientific societies. (iii) Their circulations are small. (iv) They are devoted largely or wholly to the original publication of the results of research. (v) They are specialized in content, often highly so. The number of such journals in the United States is unknown, but it is large. The birth rate is higher than the mortality; hence, the number is increasing, particularly in newer, highly specialized fields of scientific research.

Each of the common characteristics listed in the preceding paragraph imposes more or less specific financial problems which, although varying in degree among journals, combine to present a rather uniform picture. There is a constant struggle to keep a journal solvent; its physical quality tends to be mediocre; and there is often a losing struggle to meet the pub-

lication demands of the field represented. The most common cure for these ills has been for dissatisfied groups to start new journals without much practical regard for their nurture and growth.

Scientific societies are formed and exist mainly for the purpose of communication in one form or another. Once formed, they usually become the responsible agencies for maintaining communication within their respective fields. Their jorurnals, as they become established and recognized, acquire a special significance in the furtherance of our scientific culture. Their independence, usually high standards for quality of scientific content, and responsibility to the best interests of their fields have often placed them in the enviable position of being almost indispensable.

However, most of our scientific societies operate on very modest funds derived from nominal membership dues. Membership in them is usually considered an honor, a recognition of professional attainment and competence. As with most honors, the recipient tends to consider himself on the receiving end only. Society members in general seem to be reluctant to accept the financial responsibility for support of their journals. If they are willing to require journal subscription as part of their dues, they set unrealistically low rates for themselves and place the rest of the burden of financing on nonmember subscriptions. These are increasingly from libraries, laboratories, and institutions rather than from individuals.

The expenses of scientific journals are conventionally broken down into the following costs: manufacture and distribution (composition of text and tables, imposition, presswork, binding, paper, covers, wrapping, addressing, mailing); engravings; printing, binding, and shipment of reprints; servicing of advertising; discounts to subscription agencies; storage and servicing of back issues; personnel services, editorial and business; and rent.

There are numerous and fairly obvious ways of keeping the cost of production of our scientific journals minimal or of decreasing it in many cases. These include the use of economical formats, page size and makeup, keeping to even signatures to fill forms, grouping and makeup of cuts, reduction of size of illustrations, simplification of tables, omission where possible of rules and boxed heads in tables, and in some cases the reproduction of tables as cuts.

The editors of journals can do considerably more than their printers in reducing costs. They can insist on reduction of the amount of verbiage in which many authors conceal their contributions; they can insist on the simplification of tables and on these being prepared to fit the format of the journal, on simplification of mathematical derivations, and on restriction of bibliographic citations to those specifically pertinent to each paper.

Many research papers are documented with detailed or extensive tables of data, illustrations, derivations of mathematical equations, protocols, appendices, detailed description of methods, long bibliographies or other materials that are of specific use and great value to a very few other workers in the field and that are expensive to compose and print. To the majority of readers of the published paper, however, the detailed documentation is neither necessary nor desirable. The relatively high cost of its publication in the printed journal is not justified, provided that the easy availability of the material to the few who need it is assured.

There fortunately exists a mechanism, through the Auxiliary Publication Service of the American Documentation Institute (administered by the Library of Congress), whereby editors of scientific journals may deposit such detailed documentation in lieu of printing it. Copies of material so deposited are available in photostat or microfilm form to any worker who needs it in the future; a footnote carried in the paper published in the journal calls attention to the deposition of such material and gives directions for obtaining it. This service should have much greater use by editors and authors than it has at present and could serve to reduce considerably the cost of publishing minutiae that are of high value to a relatively few readers. It involves, of course, the acceptance by both authors and readers of the desirability or necessity of restricting the amount of such minutiae in our printed journals.

On the business side, expense can be decreased by the elimination of discounts to subscription agencies, by insistence on payment of subscriptions in advance, by use of machine methods and standard business forms whenever practicable for billing, records, and accounting.

A journal derives earned income from the following sources: subscriptions; sale of single copies and back issues; sale of reprints; advertising; and, in some cases, authors' charges for space.

On the side of increasing the income of journals, the possibilities are usually greater than for decreasing costs. Subscription prices can be set at levels that are realistic in terms of actual costs of production, including editorial services in addition to manufacture and distribution. Many scientific journals now derive the bulk of their subscription income from libraries, laboratories, foundations and industry, rather than from individuals as subscribers. Even to those with a large individual subscribership, the income from these other sources is important. Subscription prices can, in many cases, be increased moderately over present rates without losing this support.

Heretical though the suggestion may be, there seems to be no valid reason for the members of a society paying a smaller subscription price than that paid by nonmember individuals or libraries. If membership entails the responsibility of helping to maintain communication within a field, does not a society member's responsibility include fully as much financial support to the society's journal as is asked from a nonmember? If such a policy were generally adopted, it might act to decrease the number of specialized societies in which a scientist holds membership, but it should serve to sharpen his interest in and responsibility to

those in which he wishes to retain membership. Concentration, rather than diffusion, of interest and support has its advantages.

The maintenance of stocks of back issues extending far into the past does not seem to be warranted in these times. Once they were necessary to insure that scientific publications would be available indefinitely to users anywhere. Acceptable substitute mechanisms are now in use to discharge this obligation—through microfilming, microcarding, and offset-reprinting. The cost of printing, storing and inventorying of large stocks in excess of the subscription list is considerable. The demand for back issues falls off sharply after from 2 to 5 years. It is questionable that the investment and servicing for stocks larger than needed for this short-time demand are warranted.

Reprints of published papers are often sold at practically the cost of the press work, paper, binding, and shipping. Realistically, their pricing should include a portion of the composition cost of the paper and of the editorial office overhead.

Many societies seem to feel either that their journal has something unique to offer as an advertising medium, or that industry as a gesture of good will should buy advertising space. This is an extremely naive point of view. The sales and promotion department of any industry is not interested in charity, and the mixing of charity and business is resented. In general, small-circulation journals can look for little support through advertising. In any event, they are not equipped to properly handle and service advertising contracts.

The picture as regards advertising is not wholly black, however. Certain specialized journals may be ideal media for the advertising promotion of some specialized items of industry. The problem of proper servicing of advertising contracts, usually far beyond the capability of the volunteer editor or business manager, still remains, but the possibility exists of a group of journals in a broad field—botany, zoology, physics—sharing cooperatively the services of professional advertising representatives who can do the work of servicing and distributing advertising in a group of journals in a thoroughly competent manner.

Some journals are now making a practice of charging a page rate for publication, or of charging for the cost of tables, illustrations, and formula material above a certain free allowance. This is based on the following premises: (i) communication through publication represents the final step in almost any nonclassified research; (ii) the research project has probably cost from several to many thousands of dollars; (iii) it is false economy to stint on publication—the final and essential stage of the research (actually 1 or 2 percent of the funds used for almost any research would cover the costs of publishing its results; (iv) it is essentially fair that the original publication of the results of research be, to some extent, at the expense of the funds that supported the research.

This practice is a rather unpopular mechanism at the present time for meeting financial problems of scientific journals. The experience of those groups that have employed it, however, has been that author acceptance can be achieved, that it provides a necessary relief of the burden on subscribers and therefore leads to wider use, and that it need not result in authors having to meet such charges personally. Before the practice is widely accepted it will be necessary for those who plan and prepare budgets for research projects to include an item for publication.

The desirability has frequently been stated for mergers of already existing journals, for the expansion of some to include subsidiary fields that are pressing for the initiation of new journals, and for the sectionalizing of large journals in order to avoid separate new ones. In many cases, considerable advantage would result, both economically and in effectiveness of science communication. It is obviously true that, in certain areas of science where journal development has proceeded along these lines, the whole matter of communication is more effectively handled than in other areas where unrestrained competition and division of effort has been the rule.

Our scientific journals, containing as they do, the permanent records of research, must certainly continue their existence, but they have the responsibility of discharging their function in an effective and economical manner.

Problems of the Editor of a Small Journal

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The editor of a small journal usually has duties far beyond those of selecting and preparing articles for publication. Extra and related duties seem to rub off on him. He may find himself acting as subscription manager, advertising agent, head of the complaint department, and last, but not least, the custodian of all back issues of his journal. After a bit of history, I shall restrict my remarks to the problems that are of an editing nature.

The Brooklyn Entomological Society was founded in 1872 by a small group of men who were drawn together by a common interest in insects. Most of these men were born in Germany, where natural science was an important part of the curriculum, even of the elementary schools. During the early years, the meetings were conducted in German and were held in the backroom of a local beergarden. Within a few years, this group increased in size, and many native Americans were brought into the society. By 1879, the meetings were conducted mostly in English, and the meeting place was moved to the backroom of a store that specialized in the sale of insect specimens and entomological supplies.

In 1879, the society started publication of a monthly journal devoted to the topics of general entomological interest and to the insects of the area around New York. Although very few of the members were pro-