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15. This travel was made possible by the generosity of the Seattle Art Museum, Seattle, Wash.

Notes on the Reviewing of Learned Books

Good books, bad books, scholarly books, popular books, all pose problems for the conscientious reviewer.

George Sarton

There are many sides to every question and as far as the reviewing of books is concerned there are at least five points of view which are obviously different: the points of view of the author, of the reader, of the editor, of the publisher, of the sponsor. All of these points of view are familiar to me, for I have read innumerable books, written quite a few, edited *Isis* for thirty-six years. I am still the publisher of *Osiris* as well as its editor, and I have sponsored many books, either by contributing prefaces or in other ways.

Moreover, I realized very early the fundamental importance of good reviewing, because learning cannot progress without appreciation or criticism. Soon after beginning the editing of *Isis,* I published a little guide, *Recommandations aux collaborateurs d'Isis* (3 pp., dated Wondelgem, 19 décembre 1912), 2^e édition, revue et augmentée (8 pp., Wondelgem, juin 1914) (*1*). The following notes are derived partly from those *Recommandations* and partly from the outline prepared by me when the matter of reviewing was discussed in my Seminar on the History of Science, in Harvard University on 30 March 1939. As I have been thinking of this subject for at least thirty-six years and have been obliged to consider it from every angle, it may be worth while to summarize the results of my experience.

Before asking oneself how to review a book, it is useful to ask a more fundamental question, "How should one read a book?" (The following remarks deal only with books of learning; books of imagination and poetry should be read in a very different way and their criticism raises many difficulties which do not concern us.) How should one read a book in order to obtain and preserve information? How should one select the books to be read, and in each book the information which may be needed, and how should one record it for further use?

If it were possible to answer such questions completely, one of the main problems of scholarship would be solved. Unfortunately, it is not possible to answer them, except perhaps, after long experience, and then only for one's own satisfaction. Even if it were possible to answer them fully, the answers would not be intelligible or profitable to the people standing in greatest need of them.

One might, of course, publish a book entitled "How to become a scholar," but the reading of such a book would be almost as useful to the non-scholar, as a book entitled "How to become a millionaire" to the hobo. By the way, it is significant that such books as the last-named are not written by rich men, but on the contrary by poor devils, the kind of hacks whose industry publishers like to exploit.

The few indications which I now venture to give are not meant to solve the problem but simply to help the few people who are already so well prepared by their own nature and nurture that they can make the most of any guidance which is offered to them.

How does one absorb knowledge and wisdom out of books? Consider two other cases. When one looks at paintings one sees them at a glance. Of course, longer contemplation of them would reveal details in outline or color, in design, rhythm or intensity which one could not notice immediately; yet, the fundamental knowledge is obtained at once, as it were in a single intuition. Now, if one listens to a symphony, he cannot absorb its message immediately in its wholeness, because he must wait until it is unfolded, and if it be long, it may not be possible to remember the whole of it at one hearing. Examining a work of art implies a kind of spiritual involution, listening to music an evolution. Reading a book is something between the two, for if the book has a good table of contents one can appreciate the wholeness of it even before reading.

In every case, looking at a painting, listening to music, reading a book, little can be accomplished if the looking, the listening or the reading is not active, critical, creative. This requires experi-

The late author was a noted historian of science. These "Notes" appeared originally in volume 41 of *Isis* (1950). Reprints of the article as it originally appeared are available at 35 cents each from the editor of *Isis,* University of Washington, Seattle 5, Wash.

ence and energy and without expenditure of the latter and availability of the former no emolument can be gained.

The Art of Non-Reading

The art of reading implies the art of non-reading, and more energy is sometimes needed in order to skip rather than continue useless drifting. Many would-be scholars never learn anything not only because they cannot read, but also because they cannot stop reading: they are like asses turning round and round in a mill with blinkers on their eyes.

Before attempting to read a learned book one should find out whether it is worth reading, and if so one should prepare oneself to give it the kind of reading which it demands. The table of contents will tell us what the book contains and how it is built. The preface and introduction explain the author's purpose and methods. The bibliography lists the sources. The index enables one to do a bit of sampling. After having used those preliminary means of investigation, any intelligent scholar should be able to decide whether he should read some parts of the book, or the whole of it, or leave it alone. When the reading is begun, he should be prepared to interrupt it and to regulate its speed and intensity. Some of my friends have given me the evil reputation of being a very fast reader. It is true that I can read very fast when I am driven to it, but if a book holds my attention and is sufficiently difficult my progress may become very slow. If one should say of me that I am one of the fastest readers, it would be fair to add that I am also one of the slowest.

A young scholar must necessarily begin with random reading. As his goal becomes clearer, his reading will be more selective but a certain amount of randomness should never be abandoned. It is not enough to see one's own goal in as good a focus as possible; one must be ready to look around it and sometimes to sweep the horizon far away from it.

One reads a book to obtain information on certain topics, but it is hardly possible to appreciate that information, without considering it in its setting. One must form an opinion of the whole book.

Reading a book, or simply using one, implies reviewing it, except that the review need not be written. As far as my own experience goes, I can truthfully say that I have seldom used a book—and this includes dictionaries and atlases—without having prepared a mental review of it (*2*). Indeed, how could one use a book profitably without knowing what it contains, what one might expect from it and what not? The scholar must know the potentialities of his book even as a carpenter must know those of his tools. This remark may seem commonplace, and yet I have often witnessed the misuse of books by scholars who had failed to take those obvious precautions.

"Reviewing a book" in the technical sense, that is, writing and publishing a review of it, is only a particular case of the methodic examination which must be made of any book if one wishes to use it intelligently. In most cases, the results of one's examination, the final judgment, will remain in one's consciousness unformulated; some scholars may summarize their conclusions on a card or in a note-book, but even then they will not bother to make them easily intelligible to other people.

The purpose of "public reviewing," as we might call reviewing proper to distinguish it from the private reviewing which is the culmination of good reading, is simply to communicate to the public the results of one's analysis. The scholar doing that is accomplishing a very important social function. Thanks to him other scholars will be able to decide whether it is worth their while to obtain the book reviewed and to study it. Moreover, they will be able to appreciate the personality of the author and the value of his achievement. This does not mean that they will necessarily trust the reviewer and accept his verdict, but whatever he writes will help them to form their own judgment. In the first stage, that judgment is restricted to the solution of a simple problem: "Should I obtain the book and read it or try to read it?" The reviewer's judgment may help the reader in various ways. I have more than once bought a book on the strength of an unfavorable review of it.

Main Points of a Good Review

The first point to remember is that a review should describe and characterize not only the book in question, but also the subject with which it is dealing. Of course, in some cases the subject is sufficiently indicated by the title. A biography of Faraday deals with Faraday and, if the reader is a chemist or a physicist, the name of Faraday needs no more explanation than those of Washington or Lincoln to any American. Yet, if the reader were a French mathematician or a Hungarian zoologist a brief definition of Faraday would be useful. In the case of biographies of less illustrious men more information would be needed, and more readers would need it. Happily, it is very easy to give the essential in a few words: times of birth and death, nationality and places of activity, field of work, main achievements. The reader cannot be expected to take any interest in the biography of a man of whom he knows nothing.

In other words, the reviewer should not be too self-centered, and imagine that the people and the things which he knows so well are equally familiar to every reader of even the most learned journal.

Many books ostensibly deal with a very large subject, say, the history of alchemy. Such a title seems clear enough, yet the subject is incredibly vast and the chances are that the author did not try to cover the whole of it. It is necessary then to explain what the author's subject exactly is. What kind of alchemy? Where and when?

This brings us close to the second point. What is the author's purpose? What does he try to prove? And this introduces a whole series of questions which it is the reviewer's duty to answer.

What are the author's qualifications for the fulfillment of his purpose? What were the sources of his knowledge? Did he actually go back to the very sources or did he lean chiefly on secondary material? If he explored new sources, were these well chosen and sufficient? Has his book a deep and sound foundation, and if not, why on earth did he write it? Do not forget, however, that a book based on derivative material may still be a good and useful book, if the work was well done.

How did the author use his sources? What are his methods? How did he organize his results? Is the book well built? In some cases (as in a biography) the development is simply chronological, and nothing more need be said about that. Very often the chronological development is insufficient, or it is necessary to consider not a single sequence of events, but many which may interlock in various ways. It then becomes necessary to analyze the book and to consider whether the divisions and subdivisions of the field and the

alternance of different points of view were wisely chosen or not.

We may now return to the general purpose. How well did the author fulfill it? Did he introduce new facts, new ideas? Is the book a real addition to our knowledge, and if so, what exactly has been added? What is the book's place in the literature devoted to the same subject? Does it cover more ground or less ground than the other books? Does it cover its ground better or less well than they did their own?

The questions which have been enumerated are essential and the reviewer should try to answer most of them. A few subsidiary questions must still be considered. It is not enough that a book be well built and well documented, it should be well written. There is no excuse for bad writing, which is generally a symptom of poor thinking (*3*). It is the reviewer's privilege (which he may exercise or not according to circumstances) to discuss the form of a book, its style and mood, its title (*4*), its material presentation, paper, printing, illustrations.

The last word refers to the form of the illustrations, but in many cases the substance of the illustrations deserves full discussion. Some scholars are sadly deficient from the iconographical point of view (*5*); others, on the contrary, take pains to select pertinent and original illustrations and to explain their provenience and meaning. Full credit should be given for that kind of merit.

Every review should begin with a complete bibliographical identification of the book reviewed. Full title and subtitle, size of the book and format (if unusual), name of publisher, place and date of publication. It is advisable to indicate the price and in the case of limited editions, the number of copies. The reviewer's guidance in all this is the desire to help the reader or prospective buyer, and give him all the information which he may require (*6*).

The Faithless Reviewer

From the editor's point of view much damage is done by scholars who agree to review a book and fail to do so. This is very shocking. The faithless reviewer obliges the editor to write to him over and over again, but that is nothing as compared with the harm he is doing to the author and publisher, and to all the people who are anxious that the book be known. Clearly, even the best book needs a modicum of publicity, for nobody will try to obtain it and to read it unless he is aware of its existence. If a scholar wanted to hurt the author and prevent the reviewing of the latter's work in a given journal, the simplest way of achieving his devilish aim would be to undertake to review it himself and then to dishonor his promise. As the review copy would be in his hands, the editor could not ask another scholar to handle the book. Such deliberateness must be rare, but the procrastination of many reviewers causes the same results, whether they be evil-minded, impotent or lazy.

I have little respect for procrastinators, though I recognize that their guilt may be lessened by attenuating circumstances. Other duties may have been pressed upon them after their promise to the editor had been made in good faith; the general cause of delay, however, is mediocrity, weakness of will or other mental deficiencies. It may occur also that a man agrees to review a book, because he had a false idea of it; after having obtained the review copy and examined it, he may discover that the book is not what he thought it was, lose interest in it, and shelve it. In such a case the honest procedure would be to return the book to the editor (or the publisher) as fast as possible, just as he would do if he had bought the book. It is the buyer's and the reviewer's privilege to return a book when they don't like it; if they fail to return it in time, the buyer, at least, has paid for it, while the reviewer has obtained his own copy on false pretenses. That is not pretty.

I understand this kind of situation very well, because I am a reviewer as well as an editor. It has happened to me more than once that a book of which I had requested a review copy was not what I fancied it to be. In such cases, I gave it to somebody else to review (somebody who might like it), or if I thought that it did not deserve to be reviewed, I paid the cost of it to the publisher and that ended my obligation.

Procrastination is often due, I believe, to initial inertia. Many people have enough energy to continue a task, and even to carry it to completion, but not enough to begin it. Every scholar or writer is familiar with that kind of inertia. How hard it is to begin a new book, or even an article! The inhibition may be overcome in various ways: one may diminish one's exaggerated feeling of responsibility by undertaking the review somewhat casually, as if one were writing only for oneself or for a friend; or one may begin with the simplest preparatory investigations. By the time all the necessary investigations have been made, enough energy has been gathered to begin one's writing. Everybody will find similar tricks to outwit his own spiritual inertia, except that there is a degree of indolence and abulia which cannot be outwitted any more. The worst procrastinators are pathological specimens whom it is best to leave alone.

Writing the Review

It is much easier to write a review soon after having studied the book, the sooner the better. One must strike the iron while it is hot, and write what one has to write when the ideas to be expressed are still bubbling. The longer the delay the more difficult does the task become. This helps to explain chronic procrastination; the longer it lasts the less shakeable it is. Spiritual debts are in that respect like other debts; the older they are, the harder and the more hopeless they become.

When I have to review a book my habit is to read it in the evening, writing notes or simply page numbers on a pad as I proceed. My review takes shape during the night, and I am ready to study my notes and write the review the following morning. If some other duty obliges me to postpone the writing for one or more days, I am annoyed because I know that the task will become more difficult if it be delayed and may even lose a part of its freshness and goodness. Of course, a review may require new investigations the length of which cannot be foreseen, but I find it expedient to write it before the investigations are completed. Indeed, their results can generally be stated in a few paragraphs which it is easy enough to interpolate; they seldom oblige one to change his conclusions, or rewrite his review. Even in such extreme cases it takes less time and energy to rewrite the review than to postpone the original writing.

Soon after the foundation of *Isis*, I received a letter from a very distinguished scholar, a professor in one of the northern universities of Italy, asking me to obtain for him review copies of a number of important books. I wrote to the publishers and obtained these volumes for him, but he did not review

a single one of them. From the publishers' point of view I had obtained these volumes under false pretenses, making promises which were never fulfilled. Though I was not the swindler, I was responsible for him. Did he ever think of the harm he was doing me? A young journal like *Isis,* whose reputation was not yet established, might have been dishonored by such swindles.

At the time of the first German invasion of Belgium, when I had decided to abandon my Wondelgem home and library, I made a note of a few volumes which I had received from the publishers and had not yet been able to review. When the publication of *Isis* was resumed five years later, the new number (No. 5) contained reviews of those volumes. My debt was paid.

Publishers of to-day are generally less interested in the progress of learning than in the earning of money. It is one of the ironies of the trade that while it becomes more and more difficult to publish an original book, the fruit of long and honest investigations, even if it be very well written, publishers are all the time instigating the production of hasty books on familiar topics, books which have to be composed as it were to order and "de chic" for commercial purposes. Some of these books written by good men, are good enough, but even then they are likely to be superfluous. When half a dozen books have been devoted to a definite subject, say the life and works of an illustrious man of science, the writing of a seventh one, according to the publisher's specifications, is merely a literary exercise. But what is the good of that seventh book, if it is simply based on the previous ones? It can easily be worse than they; it will rarely be better.

If the original and honest books, to which we referred before, are finally published, they deserve to be reviewed with special care. On the contrary, it is not necessary to review at length in learned journals the other kind of books, those which were brought into being by commercial enterprise. The publishers of such books hardly wish for learned reviews; they prefer superficial notices in the newspapers and the best that the literary editor can do to please them is to copy their own blurbs.

Let us examine now a few examples of the kind of reviewing which it is better to avoid. Consider first "James the Egotist," who does not think half as much of the book intrusted to him, and of the author, as he does of himself. His purpose is much less to explain the book than to show off his own superior qualities. His review may be interesting and even instructive, but does not answer the reader's main questions (the questions which have been outlined above). After having read it, one does not yet understand what the author really meant and what his work contains.

Then "John the Obscure" who tries to hide his own ignorance and meanness under a veil of spurious profundity. The "demi-savants" indulge in such tricks; they try to give the impression that their own knowledge is deep, so deep that clear speech could not reveal it. Their statements are ambiguous; they suggest and insinuate, and one does not know what to think of the book.

There is also the critic who is so "impartial" that he too leaves us in the lurch. He is afraid of committing himself to any opinion, for he might have to defend it. He says "yes" and "no" in the same paragraph. Such a critic reminds me of a Frenchman who refused to read the book which he had undertaken to review. "I am anxious to remain completely impartial," said he, "and I could not read the book without getting to like it more and more or less and less. Impartiality would become impossible." Of course, many critics follow the same course not because of any desire of impartiality, but simply because it is much easier to copy the jacket or the preface and let it go at that (*7*). Some of them copy the table of contents; that is easy enough, but there are better and briefer ways of describing the contents of a book, and it is a shame not to use them.

Some reviewers indulge in superlatives. They will not say, "It is a bad book," but "It is the worst book ever written . . . ," or else it is "by far the best one." How do they know? Have they read all the others? As Pliny the Elder remarked a long time ago (*8*), no book is so bad that one cannot find something good to glean from it. It is the critic's privilege to point out that which is good. On the other hand, no book deserves unconditional praise, and when a book is particularly good, it can stand any amount of adverse criticism. The author of a good book is anxious to be shown the errors which it contains in order that those errors may be corrected and the book improved.

Pedantic critics see nothing but the faults, however, and make capital of them. They insist so much on the errors (often trivial ones) that careless readers might be led to believe that the book is entirely untrustworthy. Wiser readers, who are able to detect at once the pedantic bias, are not so easily put off. They distrust the critic's judgment and wish to see the book themselves.

Some narrow-minded critics take a large book and, instead of considering it in its wholeness, do just the opposite. They look up their own names in the index, or the names of their friends, or their pet subjects, and judge the book (they often condemn it!) on the basis of a few unimportant samples. Their angle of vision is so acute that they are incapable of understanding the author's purpose; they do not even think of that, for it is only their own purpose which matters; they see only a very small part of the book, yet proceed as if that were the whole of it (*9*).

Of course, when a book is very complex it is fair for any critic, after having described the whole of it, to restrict his examination to the segment which he is most competent to criticize. He should make it clear, however, that he is dealing only with a segment and should indicate the relationship and proportion of that segment to the whole.

The "Procrastinator" has already been mentioned, but if he fails to review a book he can hardly be reproached for having misunderstood it. His betrayal is of another kind and one might suggest that he betrays himself more than the author. His failure gives him away. It is sometimes claimed in his defense that he simply "forgot." The "Procrastinator" forgot nothing. He is like the people who borrow books and do not return them. They too "forgot." Did they? Any psychiatrist will tell you that they "forgot" to return the books which they wanted to keep. Even so, the "Procrastinator" is too lazy and too busy to keep his promise; yet he wants to keep the book. Therefore, he "forgets." This is an especially mean kind of prevarication.

Books and Critics

In the criticism of any book, reviewers, especially the younger ones (who have not yet won their spurs), should remember that the writing of a tolerable book is no mean achievement (*10*). It is irritating to listen to the "pooh-poohing" of a book by a man who has not yet proved himself capable of a similar effort. The writing of a

book implies a greater continuity of effort than most people are capable of. Therefore, every honest book deserves some respect, in spite of its imperfection.

The inability to write a book, that is, to marshal a large number of facts and ideas in telling order, may be associated with great merits of other kinds and even with genius. The best example of such an association was given by Leonardo da Vinci. In most cases, however, the inability is not associated with genius, but simply with the lack of grasp and the lack of will. The difference between throwing out ideas and writing a well organized book may be compared to the difference between casual flirtations and a responsible marriage (*11*). Lots of people are ready to flirt with ideas, but do not go any further; curiously enough, such people, who could never gather enough energy and persistence for the writing of a whole book, are often the most severe critics of other people's books.

One should not confuse a popular or semi-popular book written, say, for a series of biographies, with an elementary textbook prepared by a master for the guidance of tyros. Such elementary books deserve to be criticized with particular care, but it is very difficult to find reviewers who are willing, competent and reasonable. Good scholars are often too snobbish and supercilious to judge elementary books as they ought to be judged, severely with regard to essentials, leniently with regard to details, kindly always. Perhaps the best judge of an elementary book is a young man, not yet too far removed from the elements, provided he is sufficiently modest and generous.

Some readers seem to think that the importance of a book is somewhat proportional to the length of the review devoted to it. That is a mistake. There is really no relationship between these two things. When a book is very good, it suffices to describe it, and to praise it briefly. On the contrary, if it is defective, the defects must be explained and discussed. If one says that a book is bad, one must be prepared to prove it. Hence, an imperfect book often requires a longer review than a book nearer to perfection. There are books which are so imperfect and superfluous, however, that they hardly deserve to be discussed; it is enough to include them in a bibliographical list.

Looking at the problem in a different way, one might claim that the better a book is the more it deserves to be criticized with severity. The errors to be found in "standard" books, which are often referred to, are far more dangerous than those obtaining in books which lack authority. It is thus worthwhile to point out, correct, and if possible to eradicate, those errors which may persist in the best books. The errors of bad books are relatively unimportant, and in any case there are so many of them that one could not enumerate them without waste of time and space; it is simpler then to condemn the whole book, and to forget it. If a new book must be written to cover the same field, let it be written without reference to the bad books.

A good review is descriptive and critical, but it should also be substantial and instructive; a distinguished review should include some novelty (fact or idea) on the subject dealt with, but only the experienced scholar can do that. In the case of important novelties, however, it would be better to publish them separately (and more briefly perhaps in the review) in order to focus the attention upon them; otherwise, they might be overlooked or wrongly credited (*12*).

It is better not to write too long a review of a book, for a short review is more likely to be read than a longish one. Reviewers often ask what is the optimum size; it is difficult to answer such a question, because the situation varies in each case, but it should be possible, I think, to do justice to almost any book, that is, to give a sufficient description and appreciation of it, in a thousand words or less. If the reviewer adds some original material of his own, the length of the review might be increased agreeably.

Responsibility

According to an old tradition, reviews appear in the leading English journals without signature. Such a practice is inacceptable in *Isis*, because, in the first place, the value of a review (as of any other article) depends partly upon the qualities of its author (*13*), and secondly, unsigned reviews are credited to the editor. Now, this is nonsense, for how could the editor be held responsible for the reviews of books which he has not read? The Editor of *Isis* prefers to leave the responsibility, where it belongs, upon the shoulders of the reviewer. He has often published favorable reviews of books which he did not like, and, what annoyed him more, unfavorable reviews of books he personally admired. It was necessary in each case to allow the reviewer to have his own say, without hindrance. The good reviewer may write what he pleases but only upon his own signature.

The reviewers are just as fallible as the authors themselves. In spite of every precaution, they are bound to commit errors—errors of fact or judgment. It is possible that some of the procrastinators delay their reviews, and even fail to produce them, because of the morbid fear of errors. Such a fear is obviously wrong. Human beings must learn to accept their imperfection. We should do all we possibly can to avoid errors, but recognize that the limitations of our nature are also the limitations of our duty. Nobody can be expected to do more than his best.

I may add that instead of being deterred by the possibility of error, I am rather encouraged by it. If I were certain of knowing the truth, the whole truth, I would not dare to criticize anything, because my judgment would be final and inexorable. I am not afraid of expressing my candid judgment of a book, after having examined it carefully and honestly, because I know that such a judgment is at best, imperfect and precarious. It is the best I can do; yet, I may be wrong, and I am always deeply and humbly aware of that danger, and of the non-finality of my criticism.

When a scholar has written a faithful review of a book, he has rendered a great service to the author and the publisher, and these should be the more grateful to him, because that service is generally a labor of love, which the learned journals cannot remunerate (*14*) except by the gift of a copy of the reviewed book; that gift can hardly be called a fee, for it is too small; we should consider it rather as a friendly gift for a friendly office.

Every scholar should produce a few reviews; it is part of his general responsibility to publish criticisms of the books which he is best prepared by his own investigations to criticize. No scholar should write too many reviews, for he could not do so without cheapening them and himself; he should write a few, and as well as possible.

References and Notes

1. This second edition is a bibliographic curiosity, because it was published in the form of an offprint from *Isis* (*Extrait anticipé du tome* II, *fasc.* 2), but Belgium was suddenly invaded by the Germans, so that that number did not appear until five years later at the end of 1919, and did *not* contain the *Recommandations*. That pamphlet is thus a "preprint" of an article which was never printed!
2. It may sometimes be necessary to consult rapidly a number of books which one had no opportunity of "reviewing," but casual reference is not real use.
3. *"Ce que l'on conçoit bien s'énonce clairement . . ."* Boileau's saying does not apply as well to our contemporaries as to his. Men of substance, distinguished men of science, presumably educated, often lack a sufficiently deep knowledge of their own language. It may happen then that their clear ideas are betrayed by linguistic impotence, and steady thoughts, by wobbling expressions. See S. E. Morison, "History as a literary art" [*Isis* **39**, 197 (1948)].
4. Strangely enough, some books bear a misleading title. This should be pointed out, for it is a grave defect. Yet, the reviewer should not condemn the book because it does not tally with the title; it is the title which is wrong, not necessarily the book itself. Let him thus condemn the title and then examine the book without allowing himself to be prejudiced by the inadequacy of its label.
5. G. Sarton, "Iconographic honesty," *Isis* **30**, 222–234 (1939); "Portraits of ancient men of science," *Lychnos* (Uppsala, 1945), pp. 249–256.
6. For example, the price should be quoted whenever it is possible to do so. The reader may be anxious to obtain the book, but he cannot buy it unless the price be within his means.
7. In the "Critical Bibliographies" of *Isis*, the title of a book or article is often followed by an extract from the preface, the text, or even the jacket, the extract being quoted as such. That is not a review, but simply a statement of the author's purpose in his own words; no criticism of the book is implied.
8. He died in 79. The remark has been transmitted to us by his nephew Pliny the Younger (*Epistolae* III, 5): *"Nihil enim legit quod non excerperet; dicere etiam solebat nullum esse librum tam malum, ut non aliqua parte prodesset."*
9. Compare the saying of the French critic Edmond Schérer (1815–89), who was in some respects superior to his older and more illustrious contemporary Sainte-Beuve (1804–69). Said Schérer, *"Rien n'est plus répandu que la faculté de ne pas voir ce qu'il y a dans un livre, et d'y voir ce qui n'y est pas"* [*Etudes critiques* **1**, 195 (1863)].
10. It is well to say the writing of a "tolerable" book, for the writing of a bad book may be easy enough (however, some bad books have been composed with extreme difficulty). The art of writing implies many steps: (i) orthography of words, (ii) writing of correct sentences, (iii) composition of paragraphs, (iv) composition of articles, essays, or chapters, (v) composition of books. Some idiots have jumped to (v) in one leap; they have learned some tricks of strategy without bothering about tactics. They are ingenious enough to write books, plenty of them, and hardly think of their substance. Their books may be "paying" books, however, and publishers love them.
11. That comparison has been ascribed to Freud, but as I don't know where and when he made it, I must assume responsibility for it, at least pro tempore.
12. A classical example is the review of Whitehead and Russell's *Principia mathematica* [ed. 2 (1925), vol. 1] by Henry M. Sheffer [*Isis* **8**, 226–231 (1926)].
13. Praise and blame have no absolute value; it all depends on who is praising or blaming. To be blamed by an idiot may be equivalent to being praised by a good man.
14. It was not always so. A little more than a century ago Blomfield received 20 guineas for his review of Samuel Butler's *Aeschylus* in the *Edinburgh* and no less than 100 guineas for that of Barker's *Thesaurus* in the *Quarterly* [Martin Lowther Clarke, *Greek Studies In England* (Cambridge, 1945), p. 6; *Isis* **37**, 232 (1947)]. This was truly a golden age for learned critics; but was it a golden age for criticism? I doubt it.

Modern Science and the Intellectual Tradition

The dissociation of science from the rest of our culture has deep-seated causes and disturbing implications.

Gerald Holton

When future generations look back to our day, they will envy us for having lived at a time of brilliant achievement in many fields, and not least in science and technology. We are at the threshold of basic knowledge concerning the origins of life, the chemical elements, and the galaxies. We are near an understanding of the fundamental constituents of matter, of the process by which the brain works, and of the factors governing behavior. We have launched the physical exploration of space and have begun to see how to conquer hunger and disease on a large scale. Scientific thought appears to be applicable to an ever wider range of studies. With current technical ingenuity one can at last hope to implement most of the utopian dreams of the past.

Hand in hand with the quality of excitement in scientific work today goes an astonishing quantity. The world-wide output is vast. There are now over 50,000 scientific and technical journals, publishing annually about 1,200,000 articles of significance for some branch of research and engineering in the physical and life sciences. Every year there are about 60,000 new science books and 100,000 research reports (*1*). And the amount of scientific work being done is increasing at a rapid rate, doubling approximately every 20 years. Every phase of daily and national life is being penetrated by some aspect of this exponentially growing activity.

It is appropriate, therefore, that searching questions are now being asked about the function and place of this lusty giant. Just as a man's vigorously pink complexion may alert the trained eye to a grave disease of the circulatory system, so too may the spectacular success and growth of science and technology turn out, on more thorough study, to mask a deep affliction of our culture. And indeed, anyone committed to the view that science should be a basic part of our intellectual tradition will soon find grounds for concern.

Some of the major symptoms of the relatively narrow place science, as properly understood, really occupies in the total picture are quantitative. For example, while the total annual expenditure for scientific research and development in this country is now at the high level of over $10 billion, basic research—the main roots of the tree that furnishes scientific knowledge and the fruits of technology—has a share of about 7 percent at best (*2*). Correspondingly, a recent manpower study showed that of the 750,000 trained scientists and engineers, only 15,000 are responsible for the major part of

The author is professor of physics at Harvard University. This article is reprinted, with some amplification, from the anthology *The Intellectuals* [George B. de Huszar, Ed. (Free Press, Chicago, 1960)], with permission.