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CHEMICAL IDEAS IN MEDICINE AND BIOLOGY[1]

By Sir HENRY DALE

DIRECTOR OF THE BRITISH NATIONAL INSTITUTE FOR MEDICAL RESEARCH

THIS is the second occasion within a period of some eighteen months on which I have been given the pleasant opportunity of taking part in the opening of new research laboratories in this country, supported by your great pharmaceutical industries. I hope I may detect, in this second invitation to take part in a ceremony of this kind, a willingness to regard me still as one of the workers in medical science who have found opportunity for research in laboratories supported by industry, although my work under such conditions came to an end all too many years ago. I shall never regret that experience, or cease to be grateful for the opportunity which it gave me. As I suggested when I spoke last year at Rahway, the immediate objective of research in such laboratories, and the kind of opportunity which it affords, may have their natural and proper differences from those of the laboratories supported by academic or public endowment. But the differences in result for the progress of medical science are often more formal than real; and it is my hope that the growth of co-operation between those working in these different spheres may yet bring to many the rather rare privilege which has fallen to my own lot of migrating from one to the other, and back again, and thus of knowing at first hand the best that each can offer.

We are opening to-day new research laboratories in connection with a modern pharmaceutical industry. To those of us who can look back over the period which has elapsed since my own student days, the change that has taken place in the scope of pharmacy has a revolutionary aspect. Forty years ago the earliest of the antitoxic sera ranked as recent discoveries, and accurate methods for measuring their activities in tests on animals had just been laid down by Ehrlich, on principles which provided the founda-

[1] Address given at the opening ceremony of the Eli Lilly Research Laboratories, October 11, 1934.

The Science Press Printing Company

An article entitled "The Journal *Science* and the American Association for the Advancement of Science," printed in the issue of the journal for October 8, 1926, contains the following paragraphs:

> In this connection acknowledgment should be made to the printers, The New Era Printing Company of Lancaster, Pa., and especially to Mr. Andrew Hershey. In 1893 they were printers of a local newspaper and of local job work. They offered terms much lower than any city printers and maintained the same rates for SCIENCE for twenty-five years. They proved themselves to be excellent printers and in 1920 were printing some fifty scientific journals. After one partner had died and the other two had advanced in years, the business was sold to a promoter, not himself interested in printing. Charges were greatly increased and the printing became less efficient.
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> Efforts were made to purchase the printing plant with cooperative ownership by the scientific journals that it printed, but these failed, partly because the $300,000 asked included at least $100,000 for the good will in large measure given to the business by SCIENCE, and partly owing to the difficulties of ownership by the societies and institutions that controlled the journals. When the Carnegie Institution was established in 1902, the editor of SCIENCE proposed the organization by it of an office for scientific printing and engraving which could have been made self-supporting, and, as in the case of the Oxford and Cambridge presses, would have rendered valuable service by assured continuity and expertness in scientific printing; but the plan was not adopted.
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> SCIENCE and the other journals of The Science Press were for a time printed in Utica, N. Y. In 1923 The Science Press Printing Company was incorporated with its office at Lancaster and with the cooperation of Mr. A. E. Urban as general manager and of those compositors, pressmen and proofreaders who had given that city distinction as a center for scientific printing. This company is now responsible for printing SCIENCE and a considerable number of other scientific journals, monographs and books.

As stated in this quotation The Science Press Printing Company was established to print SCIENCE and the other publications of The Science Press, including *The Scientific Monthly, The American Naturalist, School and Society,* and the Biographical Directories of "American Men of Science" and "Leaders in Education." The composition and press work of these publications show the high standards that are maintained. In order to bring them out efficiently and promptly —for example, the entire contents of an issue of SCIENCE can be put in type in one day and each week during 1933 about 14,000 copies of SCIENCE were printed, bound and mailed in a little more than one day—it has been necessary to have a shop of considerable capacity and to take in other work. The press now prints some thirty scientific and educational journals and series, and has printed many books and monographs.

It may be regarded as a real contribution to science that there should be a plant in which the workers are trained to deal with scientific material. Innumerable commendations of the accuracy of the proofs have been received; to quote only one, the late Professor E. S. Morse wrote to the editor of SCIENCE: "I corrected my first proof a year before you were born and the one I returned yesterday was the first one in my long experience that needed no correction."

It is also an advantage for scientific men to have relations with a company that maintains the same rates for the same kind of work under the same conditions. High pressure selling and competitive bidding—among the causes of the present economic depression which the codes promoted by President Roosevelt are intended to abolish—are thus unnecessary. A scientific man may assume that work entrusted to the press will be done at a cost as low as is consistent with high standards of work and the best conditions of employment for the workers. This is less than the cost of equally good work in large cities where wages and rents are much higher, but it is not so low as for inferior printing or where the welfare of workers is disregarded.

While the press must use efforts to obtain work when the capacity of the shop requires it, its object has been to make it as great an advantage for the scientific man to have work done by it as it is for it to do the work. This policy has succeeded, for employees have not on the average been idle as much as one day a year since the press was established; no employee has been laid off (up to October, 1934) even during the economic depression; wages were decreased by 10 per

cent. for only about fifteen months, when costs of living were lowest; the press has a profit sharing system for employees; all earnings on the stock have been used to improve the plant. The Science Press Printing Company is a business corporation; but it is also a scientific institution. It is conducted on the same principles as the journals that it prints. Its object is the advancement of science—at the same time it must be self-supporting, and it is desirable to make profits that are used to increase its usefulness.

Adequate facilities for the publication and printing of research work are essential for the advancement of science. The cost of conducting a piece of research that deserves publication, counting the time of the scientific workers and all overhead, may on the average be $2,000. The charge for printing by The Science Press Printing Company of a 32 page article or monograph in an edition of 1,000 copies is about $80, say 4 per cent. of the cost of the research. This is less than the interest on the investment, if there is a delay of a year in publication. Ordinary depreciation on machinery is charged at 10 per cent. a year, but it is much larger in the case of scientific research where delay seriously lessens the usefulness of the work and prevents the early recognition of its value. It is most important for science and for scientific men that there shall be prompt and efficient printing and publication of research.

The Science Press Printing Company has had more work offered to it continuously than it could do promptly, but owing to the completion of the printing of "Leaders in Education," followed by the fifth edition of "American Men of Science" (equivalent to 5,000 pages of the usual book) recently completed, it will soon want one or two scientific journals or several books and monographs in order that the full capacity of the shop may be used and all employees be given steady work. This is not only a need of the press but also an opportunity for those who take advantage of it. It is further reasonable to assume that The Science Press Printing Company deserves the support and cooperation of scientific men to the same degree as an institution, a society or a journal that contributes to their welfare and to the advancement of science.

Dr. J. McKeen Cattell was responsible for the organization of The Science Press Printing Company eleven years ago and has been president of the corporation. Since the untimely death in 1927 of A. E. Urban, the first secretary and manager, Jaques Cattell, one of the editors of the last two editions of "American Men of Science," has been secretary and later also vice-president; George M. Houck has been associate manager in charge of the composing room and later manager; Miles W. Eckman has been associate manager in charge of the press room. Inquiries concerning printing should be addressed to the secretary at Lancaster, Pennsylvania.

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