Documentary Photography and Research

By Dr. S. C. Bradford

RECOGNITION of the document, manuscript or printed, as an instrument of research, demands intensive study of the processes of collecting, classifying and distributing documents. Prominent among the subjects considered during the past twenty years, in the circles concerned with this endeavour, has been the photographic reproduction of documents, and especially the application of the micro-film to this end.

The value of the method is now recognized alike by historians and scientific men. Recently its importance was emphasized by Sir William Bragg in his anniversary address to the Royal Society. Photography has become the most suitable means of reproducing books and manuscripts, of which a comparatively small number of copies is required. It may be employed to serve the needs of a particular student, or, as a means of publication, alternative to the issue of a printed text. It is suitable as a method for the preservation of material, whether in print or manuscript, which is perishable in nature, or of considerable bulk in its original form.

Of the various photographic processes available for the reproduction of documents, collotype and photolithography have already taken their place as everyday operations of printing. It is time to consider how best to make use of the facilities offered by photography for the production of a smaller number of copies of documents. This is a matter of considerable moment, in which the scientific public is intimately concerned. It is important that the public should be cognizant of the relevant facts, which shall be stated succinctly.

The photostat and its various modifications are too well known to need description. Two other processes are specially notable, namely, reflection copying and microphotography. Perhaps the former is of greater theoretical interest. In this method, sensitized paper is pressed into contact with the material to be copied, so that light may pass through the photosensitive layer to the surface of the document, whence it is reflected back again through the sensitive layer. The difference in the amount of light reflected from the dark and light portions of the document is utilized to form the photographic image, which is produced in continuous tones, though with rather greater contrast. Silver bromide paper may be used in the process, giving a full-size reversed negative image, from which positive 'prints' must be made. Such are the Ruthurstat and Rectophot processes.

Perhaps the most intriguing, and at the same time most valuable, method is the so-called Retocee process, of recent introduction, and using thin sheets of 'Cellophane' coated on one side with a diazo compound. After exposure to an arc light, mechanized treatment with a suitable solution immediately develops a full-size positive image by the formation of a dye-stuff. The picture becomes dry instantaneously and is made ready for delivery by pressing the tissue on to a sheet of tacky white paper to show up the image. The complete operation occupies three minutes. Should a number of copies be required, they can be printed at the rate of perhaps three or more a minute, in black on white paper, from a brown-toned transparency, at a cost of a farthing a piece, for octavo size. Neither lens nor shutter is needed in the apparatus, which can be operated by any member of the staff in full daylight. At present, the cost of the materials for making a single positive copy by this method is very slightly more than that for a negative copy by the photostat method, or scarcely more than half the cost for a positive copy; the difference being negligible in comparison with the labour and overhead charges involved, which may amount to half a crown for each order of an average of four pages. The apparatus itself, of course, is much cheaper, while the cost of producing a number of copies is remarkably low. Now that typewriters are available with a double shift, giving three characters to a key and a range ample for typing scientific papers, this method is very suitable for the reproduction of such papers, of too limited an interest to justify printing.

The microphotographic process, which, on account of its cheapness, the small bulk of the copy, and the need for the production of grainless films and the design of new types of apparatus, has stimulated so much interest in documentary photography, was first described in 1907 by an eminent Belgian, Prof. Robert B. Goldsmidt, and M. Paul Otlet, who is well known as one of the founders of the International Federation for Documentation. Their invention was published in the Belgian *Journal des Brevets*, in an article entitled "Une forme nouvelle du livre—Le livre micro-photographique". The process consisted in the microphotographical reproduction of documents on standard cinematograph film and their enlargement for reading by the projection of an optical image. The term 'photoscope', given originally by Prof. Goldsmidt to his reading apparatus, can scarcely be improved. Complete mechanization of the method has

enabled exposures in a continuous run to be made at the rate of three or four hundred an hour, with a corresponding speed of processing the film and a resulting cost for material of about a halfpenny per exposure. The design of a perfect photoscope has presented the greatest difficulty, and although tolerably efficient instruments are now on the market, room for improvement still remains. As an alternative method, the micro-negative may be enlarged into a full-size positive photograph. But this method, involving two exposures, cannot compete in cost with methods that produce positive copies directly. Necessarily the same overhead charges apply, as with other methods. These completely swamp the cost of materials, when only a few pages are ordered, so that the cheapness of the process is fully realized only when applied to the reproduction of a large number of pages at a time.

Thus, as was foreseen by its inventors, the great value of this method lies in its application (1) to the reproduction of bulky material, such as complete manuscripts, rare books and newspapers, and (2) as a potential means for the publication of records, reports and other documents of too limited an interest to bear the cost of printing.

The microphotographic method is suitable for the reproduction of works of considerable length, whether in a few or a comparatively large number of copies. By its means, masses of historical material could be made available or more readily accessible to the student. The method can be used to supply individual students with copies of otherwise unprocurable books, or to relieve the librarian of anxiety caused by the too frequent handling of rare originals. It may have greater value as a means of reproducing large works of reference, such as the Statutes of the Realm, or of assembling complete texts from widely scattered originals. The process makes possible the study, in the reader's own home, of the foreign press, in a manner which can be achieved at present only by prolonged visits abroad. Film photographs can be used for the preservation of records otherwise likely to be destroyed. Microphotography of newspapers facilitates the collection of complete files of the rarer journals at small cost and provides a method of preservation of such as are liable to disintegration. It relieves libraries of costs for storage and binding. Thus a bound file of the *New York Times* requiring 59 cubic feet of storage space, occupies, in film form, only $1\frac{1}{2}$ cubic feet. The method offers also means of avoiding inter-library loans of rare books.

In adopting photographic methods as a means of publication, the editions produced fall naturally within the scope and protection of the copyright laws. Arrangements must, therefore, be made to

satisfy the holders of any copyright in the originals reproduced, as would be done for works published in any other way. No difficulty arises from this fact. But, it is important to discriminate between the use of photography for the publication of a considerable edition of a work, and its utilization as a convenient means of copying an extract from a volume for the purpose of private study, or research. In the past, photographic copies of more or less inaccessible scientific papers have been of much service to research workers, on occasion. This facility should not be limited.

Fears have been expressed that the unrestricted sale of micro-photographs of articles in periodicals might 'kill' the journals. Let us be clear upon this point. In library experience, rarely is a second request received for a photograph of the same article. After the passing of the period when a discovery is first made known, by the publication of an article in a scientific magazine, references to that article are usually confined to single consultations, made by one, or occasionally a few, experts working on a cognate subject, or subjects. Such experts need to refer, not merely to one article, but to a number of articles, published at different times and in different periodicals. For the rapid performance of the bibliographical survey, which must usually precede the commencement of a new laboratory investigation, it is essential that comprehensive libraries should be available, where the experimentalist may find ready to hand the original literature bearing on his work. It is not an assistance, but a hindrance, to have to wait while photographic copies are being made of articles urgently needed for consultation. This applies, whether only one example of the original document exists, or whether a number of copies have been made and deposited in other libraries.

Photographic reproduction will be of service as a new means of publication; copies of periodicals so published will be deposited in libraries; but photography will not take the place of libraries, or kill the journals. Only when a library does not contain a copy of a paper needed by a research worker, is he glad to avail himself of the possibility of obtaining a photograph from another library. He would soon complain, if his library should cease to take periodicals, in the hope of satisfying him with photographs obtained from other sources.

A single photographic copy of an extract, whether of microscopic or legible size, becomes useful when the work itself is not available for consultation. The supply of such copies is not publication, in the sense of making available to the general public. It has not restricted the continual growth in number of new periodicals, nor does it appear to have diminished their circulation. Publishers have

not objected to the practice, and authors are concerned rather to make their discoveries better known. The making of a single copy of an article, by any means, is not a trespass upon the moral rights of the holder of any copyright. Carried to the extreme, such an idea must prevent the loan of books, or even the establishment of libraries for general use. It would be an ill service to science, if the advent of microphotography should be the cause of the suppression of a useful aid to research.

In order to take full advantage of the facilities offered to research workers by the various methods of documentary photography, the organization of the service would require to be placed in the hands of a central institute, which would be in a position to study the many problems involved, to choose the best means of tackling individual cases and to

bring about the standardization of apparatus and material. The present tendency to leave the making of photographs of documents to individuals, commercial firms and miscellaneous institutions, working independently, is both wasteful and a source of confusion. Expensive apparatus is used intermittently, overhead charges are increased and experience wasted. Moreover, the lack of agreement upon standard measurements creates the possibility that microphotographs made by one agency may prove to be unreadable upon apparatus available in another place. Already the United States has led the way by the foundation of the American Institute of Documentation. A similar centre is needed in Great Britain, where production may be organized and the fullest efficiency and minimum cost achieved.

Josiah Wedgwood and his Portraits of 18th Century Men of Science*

By Dr. John Thomas

THE eighteenth century gave birth to some remarkably interesting personalities in the realms of both industry and science. From the Midland manufacturers in the persons of Wedgwood, Boulton and Watt, there can be singled a trio who became fellows of the Royal Society. In science, the Midland men of fame include Joseph Priestley and Erasmus Darwin. The spirit of inquiry of the age, with its zest for experiment, led Wedgwood to convert his manufactory into an industrial "elaboratory", as he termed it. He was determined to convert crude clays into artistic ceramic products. He had to wrestle with all the four familiar elements of philosophers in the pre-scientific age—fire, air, earth and water. His "Trial Books" now in the Etruria Museum justify his claim to be considered a man of science.

Josiah Wedgwood was elected a fellow of the Royal Society in 1783, and made several contributions to the *Philosophical Transactions* in 1782, 1784 and 1786. His pyrometer, which was the subject of his Royal Society papers, was the result of experiments extending over a period of six years. It is a very simple instrument marked and graded to indicate the shrinkage of clay bodies when inserted in the potter's oven. At first, Wedgwood placed small cylinders of clay at the wide tapering end, but later he made cylindrical balls or marbles of clay, which he called pyrometrical

pieces. These "contraction bits" have been used regularly in potteries the world over since the invention of the pyrometer by Wedgwood.

This thoroughness in scientific exactness was not confined to the firing of the ware, but it permeated the earlier stages of preparing the clay. The potter's mill, like "the mills of God", is expected to "grind exceeding small"; hence Wedgwood's anxiety to replace the wind- or water-mill with the more reliable source of power found later in Watt's steam engine. The Boulton and Watt archives* contain ample evidence of Wedgwood's faith in the new scientific inventions of James Watt. At Etruria, the last steam engine installed by Watt in 1800 worked continually until dismantled in 1912. We thus see a powerful link between Etruria and Soho.

There were earlier links between Wedgwood and Boulton when Fothergill was his partner. In the earlier days of his pottery career, Wedgwood sent small cameos and pottery trinkets to Soho to be mounted in metal before being sold by jewellers. Arising out of this kind of trade, where pottery was a subsidiary of the metal trades, we get a further commercial link, where Boulton and Fothergill often acted as wholesale merchants for Josiah Wedgwood until he later set up his own sales room in London. Like the Prince of Potters,

* From a Friday evening discourse at the Royal Institution delivered on December 16. A small selection only of the many medallions by Wedgwood mentioned during the discourse are reproduced here.

* The Soho order book for steam engines sold to Staffordshire shows orders from Etruria in 1782, 1784, 1793 and 1800. In 1793 Wedgwood drafted a document for Boulton and Watt stating the performance he expected of the steam engine in his pottery.