

the settlement of stronger people among the uncivilized must lead to friction. But an honest narration of the facts makes it clear that Britain civilized, and is far the best colonizer in the world. The Dutch have worked well with us in the now most contested part of the front.

Mr. Muirhead is quite clear that we shall win, or at least that Germany must lose: "the financial and economic scales are too heavily loaded" against her. But the task before us—perhaps for some years—is the restoration of order when the Nazi chain is broken. For this purpose the Atlantic Charter strikes the note. In the post-war world there must be some international authority, and Mr. Muirhead would be content if we did the policing. He sketches a scheme of free-trade roads which would enable the smaller nations to trade and to gain their own necessities without the loss and vexation which attend the present system. We wish such a plan well, but before that we have to break the hideous yoke which has been imposed by the Nazis until they reached the barrier of Russia.

It is a long and determined struggle and we need to keep something of the crusader, with all the fire and finish of modern war. It is to be hoped and believed that the United Nations will perform it.

F. S. MARVIN.

## THE 'CELLULOSE AGE'

### An Introduction to the Chemistry of Cellulose

By J. T. Marsh and Dr. F. C. Wood. Second edition. Pp. xv+512+24 plates. (London: Chapman and Hall, Ltd., 1942.) 28s. net.

THE influence of chemical research on the industrial applications of cellulose has in general been slow in making itself felt as compared with results in many other industries. This, perhaps, is due partly to the fact that the cellulose industries have hitherto been regarded primarily as the domain of the engineer; although a contributory and more likely reason is the complexity of the chemistry of cellulose. It is not surprising, therefore, that the important advances in this branch of chemistry which have taken place during the past twenty-five years are putting cellulose on an entirely new footing as a material of industry, and it may well be that the post-war period will herald a 'cellulose age' marked by many varied and interesting developments of a chemical rather than engineering nature.

Several weighty arguments justify this view. First, as Cross and Bevan wrote in 1895, "cellulose is the predominating constituent of plant tissues, and may be shortly described as the structural basis of the vegetable world". The industrial applications of cellulose are therefore, like agriculture, a direct link between man and the plant world. Secondly, the achievements and possibilities of the cellulose industries are impressive in both magnitude and scope. Thus what may be described as the primary cellulose industries, such as timber, textiles (including rayon) and paper, are all essential features of modern civilization, as war-time shortages have demonstrated only too well; while the secondary industries and their ramifications, though still in their infancy, cover an extremely wide field ranging, for example, from the plastics, fine chemicals and organic solvents derived from the waste liquors of the cellulose pulping processes, to the explosives, cattle fodders, sugars and

other fermentation products obtainable directly from cellulose itself. There are many other examples.

It is not to be inferred that this volume covers all the fields indicated above; that it should result in reflections of this nature, however, is a measure of the importance of its subject and of the success of the authors, as well as the fullest justification for its existence—if justification is needed for a second edition which appears within three years of the first. The authors certainly have again done their work very well and have presented an up-to-date résumé of the subject, despite the great handicap of the rapid development of our knowledge in this field. This handicap is strongly apparent when, for example, the molecular weight of cellulose is considered; six different methods of determination are described, but the values obtained show marked variations, and this applies both to cellulose from the same source and to the results of different workers using the same method.

In this connexion there are occasions when the reader feels that he would like a little more critical comment from the authors themselves on contradictory results rather than bald statements, however accurate and concise, of the work of others; this is important in a book dealing with such a difficult subject, and intended (as the preface states) primarily as a guide to the younger chemist entering the cellulose industries. On the other hand, if the book is judged mainly for its value as a summary of current knowledge on the subject, it is impossible to praise it too highly. Little work of importance has been overlooked, and some of the few omissions (such as the convenient cupri-ethylene diamine reagent for the determination of the viscosity of cellulose) are probably the result of the long time-lag between publication and 'publicity' which exists at present.

Those who, like the reviewer, incline to the wider view of the importance of cellulose will be a little disappointed at the bias shown towards textiles, and in particular to cotton cellulose. Thus, for example, wood pulp (which may contain more  $\alpha$ -cellulose than cotton and is the basic material of large sections of the rayon and paper industries) receives little mention, and then only in passing. Again, while the chemical and physical properties of cellulose are fully discussed, the effects on these of mechanical action (such as the beating operation in paper manufacture) are not referred to; yet they make valuable contributions to problems such as the structure of cellulose fibres, including those of textile origin. A chapter dealing with this very important aspect of the subject would certainly be a valuable feature of future editions. This, however, is a personal opinion, arising possibly from an opposite bias to that of the authors, and it in no way precludes the reviewer from confidently recommending the book to all concerned with cellulose as well as to the 'ordinary' chemist.

It is necessary only to add that apart from the discussion of the constitution and structure of cellulose at an earlier stage, the general scope and arrangement of the material are the same as those of the first edition. There are, however, some eighty additional pages and several extra illustrations. Misprints noted in the first edition have been corrected, but a few more have crept in, and some of the abbreviations used for references (for example, B.C.I.R.A. and J.T.I.) will probably be meaningless to many readers and do not occur in the explanatory list at the end of the book. The standard of production shows very little deterioration from that of pre-war times.

JULIUS GRANT.