set House ; and Sir Joseph Banks, in his presidential address of 1780, boldly declared that the Society's new home was a "generous recognition by the sovereign of the services which science had rendered to the state". Later, the State admitted the claims of some of the younger societies for accommodation, and still remains in the status of their landlord. We can deplore the lost opportunities of the middle years of the last century, when for a moment it seemed as though London was to be ennobled by a great centre for science. That was one of the grand visions of the Prince Consort ; and none was more eager to clothe it with reality than Sir Charles Barry, the architect. The latter's scheme, propounded in 1859, for the development of the Burlington House site, indicates how much London lost by its rejection by the Government of the day. Science lost too ; but it is very doubtful whether even Barry's scheme, designed as it was in the grand manner, would have met present-day needs. No one then suspected that the Chemical Society would increase its membership from about 500 to 5,000 : as Sir Henry Dale observed, no one then suspected even a future for physics ! Increase in membership and better facilities for publication have resulted in an expansion of libraries which was unthought of in the days when the societies moved into Burlington House.

What is the solution ? In the first place, the State must be made to appreciate that science has a right to adequate and dignified accommodation in the metropolis. We can but reiterate the words of Sir Henry Dale. "I do not think that we must stand by and allow the claims of science again to go by default. A fear of overstatement, a passion for critical accuracy which is part of the very spirit of science, may make us reluctant advocates. If necessary, however, we must be ready to remind all who may be concerned of the part which the British scientific effort has played in making it possible now to plan at all, with confidence, for our own civic and national reconstruction. But for science, we may remind them, the very different plans which our enemies were so recently making for our future might already be taking effect".

Sir Henry is right in thinking that the claim will, no doubt, be frankly acknowledged : it will certainly be by the ordinary man, but only when he is educated to know more about the nature of the claim. That this can be done has been abundantly proved in the U.S.S.R., where science has a real 'news value' in the Press and over the radio : it is an experiment which might properly engage the attention of scientific men in Great Britain. The scientific societies would not fail to benefit from it.

In the second place, any scheme for the rehousing of the scientific societies must leave room for expansion. The experience of the past has shown us that adequate accommodation to-day becomes inadequate accommodation to-morrow. No doubt a certain amount of rationalization can be effected, for example, in libraries and publication activities, thereby preserving a proper economy of space. But what is imperative is that the State shall immediately tackle this pressing problem. Again to quote Sir Henry Dale : "I think that we have the further right to expect that the home of science, in this capital city, will have a dignity symbolizing its value to the nation and empire, and enabling us to hold up our heads in the company of other countries, whose scientific academies, not more famous than ours, have so long been housed more worthily, and with a more generous recognition of their due place in an enlightened people's scale of cultural values". These are words which ought to be pondered by those who are now engaged in framing a policy of replanning for London.

THE BRITISH SCIENTIFIC INSTRUMENT INDUSTRY

ONE of the immediate results of the harnessing of the whole of the man-power of Great Britain to the war effort has been to engender an almost universal appreciation of the vital part played by scientific instruments in a nation's life. No longer is the scientific instrument an obscure device to be used only by the expert and to be understood only by the specialist. Rather, to the men and women of the factories and of the Fighting Services, it has become a familiar and essential tool, the use of which makes them masters of complicated mechanisms and processes and enables them to achieve, both in the workshop and in combat, a most satisfying degree of precision. The nation has, in fact, become instrument-minded, and this should hearten those who, by the written and the spoken word, have in recent times pleaded for a more vigorous application of science to our national life. For the scientific instrument is one of the main vehicles by means of which the fruits of science are made available to the ordinary citizen, and the general public has, as never before, first-hand evidence of the value of the application of science as it appears concretely embodied in the scientific instrument of daily war-time use.

The circumstances and conditions of the War should have compelled the nation to make the maximum use of its scientific knowledge and of its scientific personnel, and it is not surprising that a belief should have become general that they could be employed equally advantageously when the nation is confronted with its post-war problems even if the nature of these can only be conjectured. In consequence, reports have been prepared dealing with improvements in scientific education, with the provision of the right type of technical personnel for industry, with the necessity of increasing the scale of both academic and industrial research, and with many allied subjects. A point to be observed is that if the high hopes entertained of the adequate use of scientific knowledge in the future are to be realized, if research activities are to be markedly increased, if the scientific control of industrial processes is to be fully developed, and if scientific education is to be modified so as to provide an effective channel for the infiltration of scientific knowledge into the national life, an adequate supply of scientific instruments, suited to each and every purpose, must be available.

The scientific instrument industry should be so progressive in spirit and so efficient in technique as to be able not only to meet these potential heavier demands, but also to develop and to produce new types of instruments incorporating in their design and principles of operation any new phase of scientific knowledge of practical application. The moment is therefore opportune to review and to take stock of the scientific instrument industry in Great Britain, and an immediate occasion is provided by the issue of a handbook of the Scientific Instrument Manufacturers' Association of Great Britain, Ltd.

It is instructive to be reminded that the early scientific men were their own instrument makers, and that in the seventeenth and eighteenth centuries the historic names of science were associated with instrument invention and production. Many of Sir Isaac Newton's investigations were carried out with instruments made with his own hands; the same may be said of Robert Hooke and later of Sir William Herschel. It was in these early days of modern experimental science that the origins of the British scientific instrument industry are to be found. Instrument-making firms were established in Newton's time and at an even earlier date, two, at least, of which survive to this day. As Mr. R. S. Whipple points out in an interesting article in the handbook, the increase in the numbers of workers in the scientific field created a demand for skilled and professional instrument makers, but even up to very recent times the experimental scientist evinced a keen interest in instrument design and development. One need only mention the instruments associated with the name of Lord Kelvin and the existence of instrument firms the boards of which, a generation ago, were composed almost completely of men of professorial standing. New advances in scientific knowledge frequently lead to the eventual creation of new types of instruments, and one obvious advantage of the close association of the scientific man with the professional instrument maker lies in the probability that by it the implications of a scientific discovery in the field of development will not be ignored for an unnecessarily long period. It is perhaps unfortunate that in recent years the links between the scientific worker and the instrument maker have, in Great Britain, become weaker; in some countries they have been strengthened. The reputation of British scientific instruments was never greater than when the great names of science were linked with scientific instruments, and the prestige given to the industry by that association still remains a lively asset.

The pioneer work of British instrument makers should not be forgotten and can be remembered with much satisfaction. The science of surveying owes much to Jesse Ramsden and to William Simms, and that of photography to Andrew Ross and to Dennis Taylor. A notable contribution has been made to the development of the microscope and telescope, while in the science of electrical measurements the names of Faraday, Maxwell, Wheatstone and Kelvin will be for ever remembered. Moreover, this pioneer work was accomplished in the high days of craftsmanship, and among the traditions with which a long and honourable past has endowed British instrument manufacturers, none is of greater worth than that of the highest standard of workmanship. While it is true that the quickened tempo of modern industrial life no longer permits the use of methods by which each individual instrument becomes a monument to the craftsmanship of the worker, there yet remains in the manufacture of instruments of precision ample scope for the display of workmanship of the highest quality. During this War, the Services owe much to the compelling force of conservative tradition which has not allowed workmanship in the instrument industry to fall a victim to the claims of production, but has insisted that instruments shall have that distinctive quality which craftsmanship alone can give and that standard of performance so essential in creating confidence in the mind of the user.

The achievements of the industry during the War are too obvious to require enumeration. As has been remarked, there exists a common knowledge of the importance and ubiquity of scientific instruments in both the industrial and the combatant spheres, and the scale of production of instruments is well appreciated. It is a truism that 'instruments are the eyes and the ears of ships and aircraft and the nerve centres of armies and navies in attack and defence'. A special word should, however, be said of the work of the optical instrument industry. The manufacturers of optical instruments are in the unfortunate position of producing goods which are in no sense perishable. The equipment of a laboratory with, say, microscopes, serves not for one, two or even five years, but for a generation. The elderly Service officer even now boasts that his prismatic binoculars served him well throughout the War of 1914–18 and are rendering excellent service in the present one. The size of the optical instrument industry can never be commensurate with the importance of its products, and yet in war-time the demands made on the industry are insatiable. The proportionate minimum requirement for skilled workmen and craftsmen is probably higher in the optical instrument industry than in any other, but in war-time man-power boards are apt in this respect to regard any minimum as largely excessive. In spite of its original limited capacity and of the large dilution of its skill with inexperience, the optical instrument industry in Great Britain has successfully met the demands which have been made upon it, and has done so while still retaining to a very large degree its traditional insistence on good craftsmanship and high instrumental performance. Notwithstanding its inflation, the industry has not lacked adequate British supplies of the various types of optical glass, the quality of which has not been excelled anywhere or at any time. It is appropriate here to pay a tribute to the work of the Inter-departmental Scientific and Technical Committee on Optical Glass and to the wise planning which inaugurated that Committee.

The future of the scientific instrument industry in Great Britain cannot be considered without reference to the closing period of the War of 1914-18. It is generally believed, and hoped, that the circumstances and conditions of the latter half of the year 1918 are

reappearing. The immediate future will show whether this be true in the military sphere, but it is certain there was then, as now, a 'stirring of the waters' in regard to the urgency of a greater application to industry of science and its principles, and the same realization of the dependence of such application on an adequate supply and use of scientific instruments. It was at that time that the research association movement of the Department of Scientific and Industrial Research came into being, and the British Scientific Instrument Research Association was formed in that year. Then, as now, an expanded and efficient scientific instrument industry had arisen which had met all the demands of war and seemed capable of satisfying all requirements of the post-war future. It is now a matter of history that the response of industry in general to the opportunity presented by the Government's sponsorship of research was only half-hearted. The instrument industry, and in particular the optical instrument industry, dwindled to its pre-war level, and, more lamentable still, much of the new skilled labour which had been developed within the industry was irretrievably lost.

Into the special conditions, which it is fervently to be hoped will not re-occur, and which resulted in the years following the war being particularly lean ones for the instrument industry, it is not proposed to enter here, nor is it appropriate to consider the measures, involving high policy, which might be taken to prevent their recurrence. Rather will it be assumed that the immediate future will witness a marked evolution in scientific education and a revival of intense research and development activity in industry. In the Report of the Committee of the Privy Council for Scientific and Industrial Research, 1927–28, the following statement occurred: "The British Scientific Instrument Industry occupies a peculiar position. Its direct economic importance is small, but its indirect value is out of all proportion to its size. We shall not be far wrong now in regarding the sales of scientific instruments as a measure of the health of our chief manufacturing industries." This statement is obviously true, although the words "and of scientific progress and education" might well be added to it. The responsibility of the scientific instrument industry to industry in general is apparent and, of all industries, it should be research- and development-minded. Since 1918 the industry has maintained, with assistance on generous terms from the Department of Scientific and Industrial Research, its Research Association, albeit on a modest scale. The Research Association has carried out both basic and immediate investigations into the problems of manufacture of instruments and of the processes employed in manufacture, the results of which have been of great benefit to the industry, and the full fruits of which have been realized during the War.

There is a feeling within the industry, however, that it should maintain a research association which would operate on a scale, not determined by the limited resources of the industry in the past, but rather by the position of high responsibility of the industry. The basic research of such a research association would provide the material on which the development departments of individual firms would build, to the benefit both of the manufacturing industries and of education. It must be remarked, however, that the Services, industry and education each has a responsibility towards the scientific instrument industry. Nothing could be more helpful to the instrument industry than insistent demands made upon it from outside. These demands should include the provision of all types of instruments, adequately to equip British industry with the scientific tools of control and research, and to give to scientific education an added practical value which will ensure that suitably trained personnel is available for applied science. Insistence should also be made on the early development within the industry of special instruments for special purposes, and of new types of instruments, to allow of full advantage being taken of new advances in scientific knowledge.

The handbook issued by the Scientific Instrument Manufacturers' Association shows that the whole range of scientific instruments is covered by the industry. The long and distinguished history of the industry provides a strong foundation for the hope that it will serve the generations of the new era well, and the achievements of the industry in the War give an earnest that it can meet the most insistent demands made upon it. The future prosperity of the nation demands that it shall, in fact, so do.

INITIATION INTO MODERN LOGIC

A Modern Elementary Logic

By Prof. L. Susan Stebbing. Pp. viii+214. (London: Methuen and Co. Ltd., 1943.) 8*s*. 6*d*.

THE author's aim was to provide a text-book primarily for first-year students reading logic at the universities. But the reason for that in the content and emphasis of her book which differentiates it from the usual manuals, and to which the appellation of modern in its title directs attention, may not be immediately apparent to one unacquainted with the change of orientation and the nature of the work resulting therefrom which mark the advancement of the subject since the earliest years of this century.

The source of the difference may be indicated very summarily in this way. The scope, purpose and content of the discipline traditionally associated with the names of Aristotle and Mill were determined in the main by the conception of logic as being a study of thinking (that is, of judging and inferring), or an analysis and criticism of thought, principally concerned to elicit the principles by which validity was secured for those processes. In contrast with this view, contemporary formal or mathematical logicians set aside the thinker and his thinking as irrelevant, substituting as the proper 'data' of logic the field of all possible propositions and the relations connecting them. Much as the geometer is said to take for his subject-matter lines, planes, solids, their various characters and relationships, and not his thinking about these, so the logician is invited to regard as his proper subject-matter propositions and their relations one to another, in abstraction from his