

shared by others, are included. As a work of reference the later treatise is, however, unique and invaluable. In spite of his energies in the field of pathology, taxonomy still received attention, as is testified by the volumes, "European Agaricaceæ" (1902), "British Fungi and Lichens" (1911), and "British Mildews, Rusts, and Smuts" (1913). Masee was a fellow of the Linnean Society from 1895 to 1915. He was elected an associate in 1916. In 1902 he received the Victoria Medal of Horticulture of the Royal Horticultural Society.

Masee's talent as a systematist lay perhaps mostly in his genius for recognising the affinities of a fungus and his remarkable memory. He wrote fluently and forcibly, and being full of energy and industry, was therefore an extremely rapid worker. His artistic powers were quite exceptional, and his drawings, many of which were extraordinarily beautiful, were usually executed with astonishing rapidity. His power of recalling the precise appearance of individual specimens was so great that he could with the greatest ease portray from memory a whole series of Agarics or other fungi. As to detail he was impatient, his style being always bold and vivid. Masee was a remarkable personality. Quick, shrewd, and outspoken, he was misunderstood by some. Those who knew him well understood and appreciated him, and mourn the loss of an old and valued friend.

A. D. C.

THE PROMOTION OF TECHNICAL OPTICS.

THE attention of all interested in the subject of technical optics, the importance of which we have emphasised repeatedly during the last few years, is directed to the subjoined valuable and interesting report, issued by the Board of Scientific Societies, having been approved by the Board on January 24. It will be recalled that the board was formed some time ago by the Royal Society after conferences with the learned and professional societies of the kingdom with the object of investigating scientific and technological problems arising out of the war. It is an additional testimony to the importance of the subject that this should be the first formal report issued by the board.

The committee upon whose labours the report is based was exceptionally well qualified to deal with its reference "to consider and report upon national instruction in technical optics." It comprised well-known representatives of the scientific, the industrial, and the educational aspects of optics, and included a high official of the Ministry of Munitions, which has had such good cause to realise thoroughly the disasters brought upon the nation by previous neglect.

The report is, we think advisedly at this stage, not overburdened with details, but deals with the matter in hand on broad lines, both as to the necessity for immediate action and the direction

that action should take, but we are pleased to note that the "committee is willing," and, we assume, prepared, "to give further advice with respect to . . . matters connected with subjects referred to in the report."

The necessity for immediate action is emphasised in weighty sentences, especially in regard to the numerous scientific and industrial interests involved. The report asserts that "the next few years are the years which will determine the future of the [optical] industries of the country."

The actual recommendations for action are directed towards concentration and appear to focus on two points—the provision of the "man" and of the "home"—though other matters of outstanding importance are not overlooked. The first point can be dealt with without any great delay by the appointment of a "director," as he is provisionally termed, whose initial duty will be the organisation and direction of the whole of the teaching, and who, assisted by a qualified staff, should, from the start, be able to advise "the trade in any difficulties they may encounter" until "a sufficient supply of men thoroughly trained" can be evolved. But such an appointment involves an appointing body, and this the board proposes to set up in the form of an independent "supervising representative council," which, although it is sometimes referred to as an "advisory council," obviously must have executive powers and the control of funds, and, presumably, would be a statutory body, although the report does not say so. It is strongly advocated that the council should be independent of any existing institution or governing body, as dependence would seem "to perpetuate what . . . should only be a transitional stage." Similarly, the director should not be a member of the staff or responsible to the governing body of any existing institution.

One of the dangers which the board appears to anticipate in too close a connection with, say, the Imperial College is the tendency to allocate all higher research to the favoured college. But higher research in any subject, and not least in such a subject as optics, grows naturally out of opportunities and predilections in any suitable soil, and it would be a mistake to endeavour to confine it to any one college or institution, especially if the favoured place has already many wider and diverse interests in other directions. The recent history of research in this very subject illustrates the point. We need only refer to what has been accomplished by Prof. H. Jackson at King's College, London, by the University of Sheffield, and by the Glass Research Committee of the Institute of Chemistry. Such researches are essentially strongly individualistic and not made to order, whilst, for the organised research involved in the investigation of particular industrial problems, there is the National Physical Laboratory created for this very purpose.

The other point referred to above—the provision of a "home"—is regarded by the board as of vital importance, and to be proceeded with "as soon as the preliminary work of organisation permits."

Such a home, provided not only with lecture-rooms and laboratories, but also with meeting-places for societies, traders, and students, and especially with an adequate library, "would concentrate the efforts of all who are concerned with the manufacture or use of optical instruments." We have ourselves more than once advocated such a project, and it is to be hoped that those entrusted with the administration of the large public funds which are, and will be, we hope, more in the future, devoted to similar objects, will not, as in a scheme criticised in the report, take the line of least apparent resistance and relegate the establishment of an optical institute to the dim and distant future. Such a course would be, we assert, simply disastrous. It may not be inopportune to recall that the establishment of such an institute received, only a few months ago, the cordial approval of the present Prime Minister, who was doubtless influenced by his experience as Minister of Munitions.

Space does not permit us to dwell in detail on other valuable suggestions in the report, but there is one of great importance which may be mentioned in conclusion. We refer to the provision of suitable optical text-books, the translation, in the first instance, of suitable foreign books, and to the abstracting of important publications on technical optics.

NATIONAL INSTRUCTION IN TECHNICAL OPTICS.¹

SEVERAL attempts have been made during recent years to provide systematic training in technical optics, and a scheme prepared by the London County Council will be referred to in this report. But, before discussing the details of any proposals, it is advisable to form a clear conception of the requirements of the optical trade, and of the organisation of the teaching best adapted to promote the interests of that trade without regard to existing conditions, which no doubt will place some difficulties in the way of the immediate adoption of a thorough-going and satisfactory scheme.

It is necessary at the outset to emphasise one point which is of vital importance. If a perfect organisation for instruction and research in optics could instantaneously be called into being, some years would necessarily elapse before the trade would appreciably benefit by it, because that trade requires above everything a sufficient supply of men thoroughly trained in the scientific principles underlying the proper construction of optical appliances. Such men are not obtainable at the present moment; they will have to be trained, and this requires time. But the next few years are the years which will determine the future of the industries of the country. To avoid a delay which might prove fatal, it is essential that provision should be made at once to give the trade such assistance and advice as will ultimately be supplied by the body of trained men which, it is hoped, will be available in a few years.

This leads us to our first recommendation. Whatever scheme be adopted, it is essential that it should include the appointment of a highly qualified scientific man, who will be charged with the organisation and direction of the whole of the teaching. This man, to whom we shall refer as the "director"—whatever

title he may subsequently receive—ought to be appointed at once. Among the duties specially assigned to him in the preliminary period should be that of advising the trade in any difficulties they may encounter. A sufficient staff should be assigned to him for the purpose. The director should not be attached exclusively to any of the existing institutions.

A further need, which is urgent, is the supply of standard text-books dealing with those parts of optics which at present are greatly neglected in this country; this includes practically the whole of geometrical optics and a large part of technical optics. In our opinion, the quickest and most effective manner of dealing with this requirement is by publishing translations of existing foreign books and abstracts of important papers on the subject.

In defining the range of teaching to be provided, and forming an estimate of the number and type of the students who may avail themselves of the opportunities offered, we must keep in mind that the use of a knowledge of optics is not confined to those intending to enter the optical trade. The Army, the Navy, the Patent Office, and other Government departments employ optical experts. We are informed that the Royal Naval College habitually sends some of its ablest young officers to an optical firm, to be instructed in the principles and designs of range-finders, gun-sights, and other optical instruments. Medical men, bacteriologists, surveyors, and nautical men would also, in many cases, welcome instruction in special branches of optics. We may here refer to the School of Economics, an institution mainly devoted, as its name implies, to a highly specialised branch of knowledge, which derives its practical importance from its connection with matters affecting the welfare of the country. In these respects, it presents a certain analogy with the proposed school of optics. Experience in this case shows that the instruction given has attracted, from much wider circles than was originally contemplated, students desiring instruction in special departments of economics. It is, therefore, well not to take too narrow a view, but to look upon the practical application of optics as being one of the many points of contact between the industries and pure science. Any advance in its study will hence react beneficially on the advance of the science on which it is based.

We therefore look forward to the establishment of an optical institute which would concentrate the efforts of all who are concerned with the manufacture or use of optical instruments. It would bring together the several optical societies, which might find a home within its building; it would be the centre for the co-operation of the trade with students and teachers; it should contain a library with periodicals and books on optics.

The general direction of the courses of study should—as is the case in the scheme of the London County Council—be vested in an Advisory Council on which the trade, as well as the optical and learned societies, is represented. It has already been insisted upon that there should be a principal or director who is highly qualified on both the theoretical and the practical side, and who would be responsible to the Advisory Council. Full courses of instruction, in both day and evening classes, will be required. The day departments would consist mainly of youths between the ages of fifteen and twenty, who would receive general and technical instruction, including mathematics, physics, chemistry, and practical optical work.

The evening work would be adapted to the requirements—

- (1) Of students engaged in the trade during the daytime;
- (2) Of advanced students, some of whom would have

¹ Report approved by the Board of Scientific Societies of a Sub-Committee consisting of Mr. Conrad Beck, Mr. F. J. Cheshire, Mr. E. B. Knobel, Sir Philip Magnus, Prof. H. Jackson, and Prof. A. Schuster (chairman).