

The Teaching of Optics in Schools

AT the annual meeting in London of the Science Masters' Association, a large body of schoolmasters met to consider the findings of the committee convened by the Council of the Physical Society to report upon various matters connected with the teaching of geometrical optics. The discussion was opened by Mr. G. N. Pingriff, of Merchant Taylors' School, a member of the committee, who gave a brief summary of the report in so far as it is concerned with teaching in schools, and confining himself chiefly to the question of signs of distances involved in lens and mirror calculations and experiments.

In most advanced work, and invariably in technical optics, it is customary to call a converging lens positive and a diverging lens negative, whereas the opposite custom is usually followed in school teaching and in nearly all school text-books: in these, the rule which has become established is that distances should be measured from the lens or mirror, and if measured in the direction of the incident light they should be considered negative. The committee had carefully considered this and a number of other conventions used by writers of various advanced text-books, and had unanimously agreed that it was desirable that all teachers should henceforward adopt one or the other of the two schemes given below. It had not been possible to reach unanimity in recommending one only, though both of the schemes advocated agree in making the focal length of a converging lens positive and hence in reversing the school system. The report also emphasised the desirability of teaching lens theory before that of curved mirrors, and of introducing the idea of the power of a lens at an early stage.

The alternative schemes recommended were: (a) to use a Cartesian frame of reference in which the positive direction is the initial direction of progress of the incident light, and (b) to measure all distances along the rays of light, giving a positive sign to paths which the light has actually traversed and a negative to distances only traversed virtually.

The opener of the discussion explained the exact implication of each of these systems and the advantages to be derived from a change from the present school usage, after which numerous other speakers gave their opinions, and in some cases experiences of work done, on one or other of the new schemes. All speakers were definitely in favour of making a change but here again there was no unanimity as to which of the alternatives should be adopted, though on the whole the majority of the speakers seemed to be in favour of the second, that is, (b) above. The advantage of this scheme which appealed to many speakers was that it leads to the same simple general formula for mirrors and lenses. On the other hand, it was recognised that the first scheme could be adopted with a less radical change of procedure, and also that it is largely used in the teaching of applied optics. The main view expressed by the different speakers was emphatically confirmed by an informal show of hands at the end of the discussion, there being a very large majority of members, all of whom were schoolmasters having practical experience of the matters under consideration, in favour of a change from the present school practice. It was pointed out that the only further requirement to enable these views to be put into practice is the supply of suitable elementary text-books. G. N. P.

School Certificate Biology

IT is probably safe to say that there has been in recent years a greater increase in the number of candidates taking biology in the School Certificate Examination than in any other subject. It is therefore not surprising that a short time ago the committee of the Science Masters' Association appointed a sub-committee to draw up a syllabus in biology which represented as far as possible the views of all its members. The preliminary draft of this syllabus appeared in the December issue of the *School Science Review*, and members were asked to communicate their criticisms to the secretary of the sub-committee. At the recent annual meeting of the Association in London, two discussions on this subject were arranged. These were well attended and the views of members on a number of debatable points were heard. The general committee of the Association now intends to invite representations of all examining boards to meet a few of its members who have drawn up the syllabus. It is hoped that the examining boards will co-operate in this respect, and in some cases revise their syllabuses in accordance with the views of those who are actually teaching the subject.

The aim of the sub-committee has been to produce a syllabus in which general biological principles are established rather than a mass of detailed facts. It is quite clear that in working to many of the existing syllabuses there is only time in teaching to work through a number of types. For this reason the number of types to be studied has been reduced, and, although individuals may be sorry that their 'pet' organism has not been included, it is absolutely essential that the syllabus should be much shorter than most of the existing ones. The experience of examiners has shown quite clearly that while candidates may be able to describe the arterial system of a frog or of a mammal or the structure of a stem, for example, in detail, their answers to general questions are very poor.

The first section of the syllabus deals entirely with general biology. No definite types are mentioned, choice of examples for illustration being left in the hands of the teacher. It is possible, if the time available for the subject is short, to use only as illustrations the types mentioned in the remainder of the syllabus, but it is hoped that a wider view will be