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University Entrance Scholarships for Science.

AT the Headmasters' Conference last December the following resolution was passed, with only four dissentients :

"That this Conference regrets the degree of specialisation which the Science Scholarship Examination papers at Oxford and Cambridge demand from candidates, and wishes

(1) that in all Science Scholarship Examination papers the General Paper should be given a definite value, and

(2) that at least some Science Scholarships could be offered for which a less specialised course of Science would be required."

Recent correspondence on this subject in the *Times* points to the existence of an educational problem, but fails to produce any satisfactory solution. Mr. Fletcher, headmaster of Charterhouse and chairman of the Headmasters' Conference, deprecates the fact that boys who cannot afford to go to the university without a scholarship, often the best material at the start, are forced prematurely into an undesirably narrow groove; and implies that thus the probable future leaders of science are being brought up as "illiterate and premature specialists". He offers no constructive suggestion to remedy the evil, but hopes that university authorities may by his very importunity be urged to take action.

In defence of Oxford, Mr. C. N. Hinshelwood, of Trinity College, points out that in the examination held by a group of nine colleges, candidates must (1) offer at least three subjects selected from chemistry, physics, zoology, botany, mathematics; (2) take a paper in which are set passages for translation from four languages; (3) do a general paper, to which a very definite value is attached. His account of the principles observed in making the awards renders it difficult to conceive how the examination could be improved.

From Cambridge, Mr. J. T. Saunders, of Christ's College, champions the educational value of science rightly taught, and directs attention to the importance of personal, as distinct from tutorial, influence in stimulating general culture.

Among other correspondents, Dr. F. A. Bather advocates that future endowers of scholarships should give the money to the schools and not to the colleges; Mr. Knight, until recently headmaster of Sexey's School, Bruton, urges that the universities should reserve a fair proportion of available scholarships for candidates who have covered a wider curriculum, as indicated in paragraph (2) of the

Conference resolution ; Prof. A. V. Hill, admitting the disease and the difficulty of curing it, politely hints that the classical pot is every whit as black as the scientific kettle ; and so on.

It is generally admitted that, especially in chemistry and physics, the papers now set are of a more advanced character than was the case, say, twenty years ago. But the improved equipment of school laboratories and the increase in the number of science masters per school render possible, nay, justify, the attainment of a higher standard of work at schools. Moreover, natural science is essentially progressive. The discoveries made during the present century have profoundly modified our ideas both in biology and in physical chemistry, and it is right that the rising generation be taught to view each subject in the light of the most recent knowledge. Probably no school permits its pupils to specialise in any direction, scientific or other, until a school certificate examination has been taken. This examination, though elementary, does at any rate ensure a certain minimum of general education ; and by the time a pupil takes it his capacity for profiting intellectually by specialisation in a particular direction ought to be fairly evident.

It must not be forgotten that all minds are not cast in the same mould, and that all do not mature at the same rate. Some there are who, about sixteen years of age, show marked ability in classical and literary subjects and yet are complete failures in natural science. Conversely, there are those who, by sheer perseverance in the uncongenial deserts of most of the compulsory subjects in the school certificate examination, at length reach the promised land and find their *métier* in one or more of the scientific subjects. Similarly, those wide interests which constitute culture make no appeal to some, be they never so temptingly put before them—a silk purse was never yet made from a sow's ear ; but why should the community be deprived of the good leather that it is capable of yielding ? The boy who is, unfortunately, gifted in only one direction should surely be allowed to pursue it to the full.

It is perhaps a counsel of perfection to urge that school curricula should be so wide as to afford to every pupil the opportunity of sampling many subjects, and thus of finding out where his true interests lie ; though the personality of the teacher often goes far towards determining this. Nevertheless, within the limits of the school certificate subjects, it should be possible to ensure logical thinking and ability to express thoughts and to describe facts in clear, concise, grammatical English ; nor ought teachers in specialised, post-certificate

subjects to permit written work to be presented in slipshod, illiterate form.

There are several ways by which the cultural outlook of specialist pupils may be enlarged : school societies—debating, literary, musical, travel, and the like—all tend to prevent excessive narrowness ; while short courses of lectures on, for example, great artists, musical composers, architecture, exploration, and so on, need make no violent inroads into the time-table, and yet serve to awaken interests the existence and quality of which can be tested in the general paper to which the Headmasters' Conference wishes a definite value assigned.

What this value should be is not easy to decide. Good essays in the general paper are known to have determined the award of science scholarships when there was little to choose between the scientific attainments of competing candidates. But can it be maintained that a candidate who is *facile primus* in the science papers should be disqualified from election by a poor performance in the general paper ?

Clause (2) of the resolution of the Headmasters' Conference presents practical difficulties. " A less specialised course of Science " presumably connotes at least two subjects of the usual three, biology, chemistry, and physics, taught in schools. Biologists are bound to have some preliminary teaching in both the other subjects ; so it would not appear unreasonable to demand of them in scholarship examinations a knowledge of the elements of chemistry and physics. It is, however, almost impossible for boys offering chemistry and physics to include biology in their *répertoire*. Physics, other than elementary, demands considerable mathematical efficiency ; hence the boy who selects physics as one of his subjects must make full use of the hours allotted to mathematics. Biology is thus crowded out of his time-table.

So long as competition exists, examiners will be prone to set questions on topics near the upper limit attainable by the candidates concerned ; though it is sometimes possible to discriminate between candidates by means of relatively easy questions, allowing wide scope in the quality of the answers. If representatives from the universities and from the Science Masters' Association could agree on reasonably high boundaries beyond which no question is to be set in scholarship examinations for, say, the next ten years, and if the universities would appoint moderators to supervise the papers proposed by college tutors for scholarship examinations in order to secure that the questions lie within the agreed limits, perhaps the Headmasters' Conference would find less to deplore.