SCIENCE

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SCIENCE IN COLLEGE ENTRANCE EXAMINATIONS.

THE advancement of science is so intimately related to the study of science in schools and colleges that the recent efforts to improve and unify college entrance requirements deserve consideration. At the meeting of the National Educational Association in 1895 a committee of ten was appointed, in which secondary and higher education were equally represented, and this committee has prepared tables (published in *The School Review*) giving the subjects required in sixty selected colleges and universities.

Courses leading to the degrees of A.B., Ph.B. and B.S. are considered separately. The multiplication of degrees seems to be needless. In the great universities of Germany and Great Britain the same degrees are given for classical, literary, historical, philosophical and scientific studies, and there is no good reason why the confused American system should not be simplified, as has been done at Johns Hopkins, Columbia and Stanford Universities, by giving only the degrees of A.B. and Ph.D. for suitable courses of liberal study. With our present elective system a degree may represent a given amount of culture, but it

is absurd to devise degrees for each kind of information. We may regard the Ph.B. degree as already antiquated, but we must for the present consider the courses leading to the degrees of A.B. and B.S.

It appears that of fifty-six institutions, eighteen, including, we regret to say, several leading universities, neither require nor allow entrance examinations in science. To offer courses leading to the degree of B.S., and not encourage the preliminary study of science, seems unreasonable. Under such conditions it is not surprising that the degree should be commonly regarded as of less value than the A.B. Strange as it may appear, seven leading scientific and technical schools unite in requiring history for admission, but only three allow any science, and of these the Sheffield Scientific School of Yale University only asks for botany. These schools all want modern languages, and propose to examine students on Chamisso, Schiller, Corneille and George Sand, but do not recognize the importance of reading scientific texts in French and German.

Among the colleges requiring or permitting entrance examination in science, 32 propose physics, 24 chemistry, 22 biological subjects, and 16 physiographic subjects. These figures, however, refer to the three degrees; only 21 institutions offer examinations in science for the course in arts. It must be remembered that even these scant requirements relate, in many cases, to the superficial memorizing of a text-book. Those universities that recognize a proper preparation in physical and natural science deserve to be enumerated; they are Harvard, Johns Hopkins, Chicago and Stanford Universities and the State Universities of Michigan, Wisconsin, Minnesota, Illinois, Colorado, California, Nebraska and Indiana. While we regret that our roll of honor is so short, we regard the names on it with satisfaction. Harvard has always led in educational progress; Johns Hopkins, Chicago and Stanford have planned their courses and not inherited them; the great State universities have developed in touch with the public schools and the needs of the people.

While the present state of affairs is very bad, the outlook is not at all discouraging. Every change is in the direction of increased recognition of the sciences. Since the report of the N. E. A. Committee was prepared, Columbia has joined Harvard and Johns Hopkins, leaving Pennsylvania, Princeton and Yale in the rear. Further the causes of the present discrimination against the sciences are fortunately such as can be and are being removed. One of these is the difficulty of teaching science adequately in the high school and in the private preparatory school. There has been a lack of proper teachers, proper text-books and proper laboratory equipment. But in all these respects there has recently been great improvement; and it seems likely that the school will lead the way, forcing the college to accept the preparation of which the community approves. If the boy likes to study science better than Latin grammer, and if the Latin of the school is unprofitable to the great majority of boys who never go to college, it would seem to be only a question of time when facts will take the place of argument and compel all colleges to acknowledge preparatory study in science.

A second obstacle has been the lack of agreement among educators and men of science as to what science should be taught in the school and how it should be taught. Even the quasi official report of the member representing science on the Committee of the N. E. A. states that physiography is not a fundamental disciplinary study, calls the study of natural history sham biology, and says that neither physiography nor biology can be studied without previous training in physics and chemistry. But we think that partial points of view will supplement each other as the subject is discussed in journals and in meetings such as that of the department of Natural Science Instruction of the N. E. A., and that of the recently organized New York State Science Teachers' Association. We believe that courses can be arranged extending from the kindergarten to the college that will not only supply the student with information of enduring practical value, but will also give him a training and a culture not otherwise attainable.

The most serious obstacle in the way of science in college entrance examinations is, however, tradition, and this is an obstacle that consumes itself. For centuries the classics were a necessity and there was no science. A certain amount of conservatism is always desirable; we want growth rather than revolution. It is probable, however, that there are some college presidents who do not know that at Cambridge University most of the students take the B. A. degree without studying a word of Latin or Greek at the University. We believe that the survival of the fittest is the best method of development. We do not ask that science be required in entrance examinations neither do we wish to see classical studies excluded, but we think it reasonable that science and classics should be treated with equal fairness.

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*THE AIM OF PHYSICAL CHEMISTRY.**

A PAPER bearing the above title was read by Prof. Nernst at the opening of the new laboratory for physical chemistry and electro-chemistry at the University of Göttingen, on the second of June last. This is the third chair that Germany has devoted to the study of that region, which lies intermediate between physics and chemistry. First, in point of time must be mentioned that of Landolt in Berlin, while the laboratory of Ostwald, in Leipsic, is more directly connected with the newer developments in that field which has been systematized into a distinct science largely by Ostwald himself. Indeed, much of the best work of Arrhenius and Nernst was done while they were associated with Ostwald, so that the title 'Leipsic school,' has come to have a definite significance. It is now well known that Leipsic will soon be provided with a physico-chemical building and equipment which, in point of completeness, will have no rival.

The new structure in Göttingen has been erected to meet the growing demands of physical chemistry in that university, under the guidance of Prof. Nernst. At the formal opening there were present such men as Arrhenius, Beckmann, Borschers, van't Hoff and others. Ostwald and Landolt were prevented from attending. The following are some of the more important points which were brought out by Nernst on that occasion.

To-day we are furnished with new evidence that an intimate reunion is being effected between two branches of science

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