

THURSDAY, JUNE 10, 1915.

SCHOOL SCIENCE.

Elements of General Science. By Dr. O. W. Caldwell and W. L. Eikenberry. Pp. xiv+308. (London: Ginn and Co., n.d.) Price 4s. 6d.

IN every school in this country there is found a small percentage of boys or girls who have a decided bent towards experiment of a thoughtful character coupled with a thirst for knowledge of natural phenomena. The science master who knows his business will speedily recognise such a boy and apply the appropriate treatment, which usually consists in the suggestion of extra problems to be worked out in the laboratory, and of extra reading, selected to fit the need of the moment and create further needs for future satisfaction. Guided, but not overhelped, these boys will soon be fit for enlistment as recruits to the army of scientific investigators. When framing the syllabus of the general science course of the school, there is no need to provide for the training of specialists. There is need, and very great need, to provide a course of science work for the average boy and girl which will (1) be in touch with everyday experience, (2) deal with matters of wide interest and importance, (3) give some appreciation of what scientific experiment means and of what scientific synthesis is capable. At the end of the course, if the pupil wishes to know more and has acquired some power of satisfying that wish by his own efforts, if his attitude towards the opinions and labours of specialists is one of rational respect, the work may be pronounced a success.

The authors of the school-book under review have clearly had in mind the needs (1) and (2) stated above, as they have throughout dealt with live topics of major importance. The contents table of the book shows a richness in the quantity and quality of the topics—beginning with air and the barometer, and concluding with heredity and environment—which makes the ordinary syllabus of an English school appear poverty-stricken by comparison. Unfortunately, the third requisite for a satisfactory school course is not fulfilled—there is nothing in this book which teaches the meaning of experiment, and consequently little hope that it will educe an appreciation of scientific method. The material accomplishments of applied science will not fail to be acknowledged; but of the human interest of investigation (apart from its results) and of the beauty of a universe lawful to its core, there is no revelation in these pages.

Prof. C. H. Judd, of the University of

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Chicago, in an "Introduction" to the book, speaks of the "inhibition of science" in school organisation. Have we not in England also experienced some disappointment with the results of school science? A comparison of American and English methods suggests that their merits and defects are complementary, that while America still hustles her pupils through a pemmican meal of dogmatic information, England keeps hers practising the goose-step of "determining the density of the given solid." In neither country is there sufficient *real* experimenting, and proper correlation with mathematics, geography, workshop practice, and art is too often to seek English teachers might gain by pondering the valuable content of the lessons in this book; while we venture to hope that more regard for heuristic principles, even at some sacrifice of information-getting, may help to remove "the inhibition of science" of which Prof. Judd complains.

G. F. D.

PRACTICAL PLANT PHYSIOLOGY.

Ernährungsphysiologisches Praktikum der höheren Pflanzen. By Prof. V. Grafe. Pp. x+494. (Berlin: P. Parey, 1914.) Price 17 marks.

THE books dealing with the practical side of advanced plant physiology are so few in number that any addition to them is very welcome. As the title indicates, Prof. Grafe's work deals only with the metabolic side of plant physiology, the phenomena included under the term irritability being excluded from the scope of the work. The book differs from all previous works on practical plant physiology in its size—it is a quarto volume of nearly five hundred pages—and also in its purpose, since it is designed mainly as a help in research work, rather than for teaching purposes as are the well-known works of Darwin and Acton, Detmer, and Ganong.

The author is well known for his chemical work in plant physiology, so, as we should expect, the biochemical aspect of the subject is the one that is most elaborated. He states in his preface that the book has arisen in response to the need for a guide in his own chemico-physiological practical work, and that it is meant to stand midway between such practical books as those already mentioned and Abderhalden's "Handbuch der Biochemischen Arbeitsmethoden." The work, however, is more than a mere practical book, for under many of the sections we find, besides a description of the methods to be used, also a statement of the results obtained by such methods.

The book deals first with the swelling of the seed and the effect of external conditions on ger-

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