

formulas are given, one due to Greenwell and the other to Aldis; an example is given of the use of the former, which is here worked out, giving a thickness of 1.19 inches; if the reviser had worked out the same example by the second formula here given, he would have obtained a thickness of 1.98 inches, yet no hint is given to tell the student that the two formulas do not agree, or to help him in any way to reconcile so grave a discrepancy.

It is also a pity that so many of the illustrations are mere sketches, and badly executed at that. As an example Fig. 104, which is intended to be the plan of a horizontal winding engine, may be quoted; an intelligent boy of twelve who had seen a winding engine would probably in his drawing indicate that there are such things as valves and valve-rods.

It has been thought advisable to direct attention to the points in which this little book falls short of the standard to which it might so easily be raised, because, as already stated, it has evidently a very decided sphere of usefulness, and in a work of this kind addressed to the beginner it is pre-eminently necessary that he shall receive no wrong impressions and shall be left with nothing to unlearn when he advances to the higher stages of the subject.

Essays on French Science.

Discours et mélanges. Par Émile Picard. Pp. v+292. (Paris: Gauthier-Villars, 1922.) 10 francs.

THIS volume contains discourses, short essays, and obituary notices of some distinguished French men of science. It may be warmly recommended, more especially on account of the obituary notices, which do not confine themselves—as is too frequently the case—with an account of the work done, but tell us something of early surroundings, education, and temperament, and thus bring out the personality as well as the results achieved. It is not only that the account gains in interest thereby, but the information allows us to judge more adequately of the individual influence exerted on contemporary science.

Pierre Duhem's work is recognised in this country by every one familiar with thermodynamics, but the personal touches which M. Picard's account supplies give us just what is wanted to appreciate the full value of the man. Poincaré is better known to us, perhaps Darboux also, but we shall find here something new about them as well as about others with whose work M. Picard deals. The notice of Lord Kelvin is excellent.

The author does not always confine himself to those branches of science which he has himself enriched by valuable contributions. As secretary of the Academy of Sciences he has to undertake the duty of explaining the ground for the award of prizes, some of which. Like

that founded by Mr. Osiris, include a wide range of subjects. We thus find short discourses on "French Aviation in 1909," and even on "Antityphoid Vaccination." A lecture on the diminution in the birth-rate was no doubt inspired by the atmosphere of the war, and some of the other writings are even a more direct outcome of the anxieties of the time at which they were written. Here it is perhaps allowable to make one criticism. In the essay on "Les Sciences mathématiques en France," M. Picard shows so much knowledge of scientific history in other countries and such fair appreciation of the international aspect of science, that one regrets the inclusion of an article that originally appeared in the *Revue des Deux Mondes*: "L'histoire des sciences et les prétentions de la science allemande." There is no doubt much in it that is true, but it is not written in the dispassionate and eminently fair spirit which pervades the rest of the book and it strikes a discordant note.

Graphical Methods in Crystallography.

Graphical and Tabular Methods in Crystallography as the Foundation of a New System of Practice: With a Multiple Tangent Table and a 5-Figure Table of Natural Cotangents. By T. V. Barker. Pp. xvi+152. (London: T. Murby and Co., 1922.) 14s. net.

IT has been anticipated for some time that Mr. Barker would publish an account of the graphical and tabular methods in crystallography which he has been teaching at Oxford, and that his book would include a description of the form of two-circle goniometry and its special application to crystallochemical analysis, which he recommends as the result of his studies in Russia under the late Prof. Fedorov. The present volume only very partially fulfils these expectations, crystallochemical analysis being reserved for a further publication. So far as it goes, however, the book is a valuable presentation of extant graphical methods, and it concludes with a most useful table of multiple tangents.

The main purposes of the monograph are "to provide the researcher with a select collection of exact graphical methods, which personal experience has proved to be both accurate and time-saving; to discuss the relation of these methods to formal processes of computation; and, finally, to outline a new system of practice." The methods described involve the use of both the stereographic and gnomonic projections, and are a mixture of the well-known ones due to Penfield, Hutchinson, V. Goldschmidt, and Fedorov. A crystallographic protractor is described and recommended, which in itself is a happy combination of the features of the Penfield, Fedorov, and Hutchinson protractors.