

OUR BOOK SHELF.

Tafeln zur Theoretischen Astronomie. By Julius Bauschinger. Pp. 148. (Leipzig: Wilhelm Engelmann, 1901.) Price 12s. net.

MOST astronomers are familiar with the very excellent volume entitled "Formeln und Hülftafeln für Geographische Ortsbestimmungen," by Prof. Th. Albrecht; this work contains in a small compass most of the formulæ and tables required for geodetic work, and the very clear descriptions of the processes involved make the volume a veritable *vade mecum* for those employed on such work.

The volume before us does for "theoretical astronomy," that is astronomy dealing with the determination of the positions and orbits of bodies in space, what the above-mentioned book does for geodetic work, and the main attempt of the compiler has been to bring together in a compact and complete form all that is required by the computer, rendering it unnecessary for him to seek aid from other books. In this class of work the computer has generally to consult more than one volume in which suitable tables for his calculations occur, such as, for instance, the valuable work of von Oppolzer, and in some cases the tables are not of the most convenient form.

The present volume, therefore, serves a most useful purpose, and the arrangement of the tables leaves, so far as can be seen without actually working out a problem, little to be further desired. The tables, which are forty-five in number, are arranged under six sub-heads. The first of these divisions is devoted to such objects as conversion of time into divisions of arc, mean time into sidereal time, &c., and *vice versa*. The next is for the determination of the true anomaly from the time and *vice versa*, for elliptic, parabolic and hyperbolic motion, and here three methods for the solution of Kepler's equation are given; two of them are based on Tietzen's solution and are purely computational, while the third is after the graphical method of Waterston and Dubois and is accompanied by two loose charts.

The third set of tables deals with the part of the problem relating to the determination of the first approximate orbit, in which both Euler's and Lambert's equations are required; while this is followed by tables which serve for the computation of special perturbations and improvement of the elements determined by the first approximation.

The fifth part gives the means for calculating precession, nutation, aberration and parallax, and contains a list of the chief observatories of the world and their co-ordinates, with data for parallax determination.

The sixth and last section is formed of miscellaneous tables which are of general use in work of this kind; thus we have formulæ and tables for interpolation, differentiation and integration, mechanical differentiation, &c., concluding, amongst others, with mathematical, astronomical and geodetic constants.

All the tables which depend on astronomical constants have been recalculated and based on the Paris Conference constants, while each table is clearly explained and in most cases accompanied by an example worked out step by step.

This book of tables will, with very little doubt, be of considerable service both to the experienced computer and to the student who is working out orbits for the first time. Great praise is due to the compiler who has performed this laborious task with so much care and with such success.

An Elementary Treatise on Alternating Currents. By W. G. Rhodes, M.Sc. (Vict.). Pp. xii + 211. (London: Longmans, Green and Co., 1902.) Price 7s. 6d. net.

MR. RHODES' treatise on alternating currents can hardly be regarded as particularly elementary, since he certainly assumes in his readers a preliminary acquaintance with

the principles of the subject. We are inclined to think that although the mathematical parts are good, the treatment on the electrical side, especially in the simpler parts, leaves a good deal to be desired. Thus on p. 23 the quantity $2\pi nL$ is defined as the reactance, whereas a few pages further on (p. 31) this name is used for the fuller expression including self-induction and capacity, without any explanation as to why the same term is used in both cases; the same observations apply to the definition of impedance. One may be pardoned for laying stress on such faults as these, since the subject is at best a difficult one, and without a perfectly sound knowledge of the fundamental ideas, the student will never make much progress.

The author has aimed at using the calculus as little as possible, and, where its employment is inevitable, has given the solution of an equation in the text and the working in the appendix. Many of the problems are solved by vector algebra, to an explanation of the principles of which a short chapter is devoted. The design of transformers and the theory of the synchronous motor and polyphase currents are treated at some length. It is to be noted that although hysteresis is of necessity considered, it is nowhere adequately explained. Another omission is that no description is given of any method of determining the wave form of an alternating current or P.D., although there is a chapter on the subject of alternating measurements. We do not doubt that the book will be found very useful, but its value would be greatly increased by a more careful attention to thoroughness and completeness. M. S.

Cyanide Practice. By Alfred James, Member of the Institution of Mining and Metallurgy, F.G.S., F.C.S. Pp. xii + 174. (London: E. and F. N. Spon, Ltd.; New York: Engineering and Mining Journal Incorporated. Not dated.) Price 15s. net.

ALTHOUGH there are now a number of books in which some information on the cyanide process can be found, a full and satisfactory description of it has not yet been written, and can hardly be expected until more experience has been gained. Meanwhile, no instalment of the complete account can be more interesting and important than that giving a record of the experience and views of Mr. Alfred James.

Mr. James was the pioneer of the process in South Africa in 1888, and to him belongs the credit of adapting it to the treatment of auriferous tailings at a time when cyanide was in some danger of being set aside for the time owing to the difficulties encountered in the treatment of virgin ores with its aid. When a good start had been made, and the value of cyanide solutions demonstrated, a host of workers took up the task and a vast industry was created on the foundations laid by Mr. James; but the part he played in promoting the prosperity of the Witwatersrand gold mines will always be remembered with gratitude by metallurgists.

As might be expected, the book is full of good things, details of construction of vats and extractor boxes useful to the general manager, hints on extraction and precipitation designed to aid the millman, and hitherto unpublished researches on bromocyanide which will be read with avidity by the chemist. The method of arrangement, however, leaves something to be desired. Some sections consist of papers read at various institutions which have been reprinted almost without change and without much effort to make them part of a coherent whole. The imperfections of the index render it difficult to refer to any particular point, and the only way to avoid missing important details is to make oneself familiar with the whole book, which is, fortunately, tersely written and by no means long. Difficult as it may be, however, to take full advantage of Mr. James' work, no one concerned in the cyanide process can afford to do without the volume which he has produced.