are of the medusoid type. An excellent discussion of extinct medusoid forms is given by Harrington and Moore, and this seems to be the first occasion on which this information has been brought together and systematized.

Boschma has given a satisfactory account of *Milleporina* and *Stylasterina*. The Stromatoporoidea by Lecompte are placed under Hydrozoa, although admittedly their position here is not firmly established; that they are coelenterates appears acceptable. Bayer has given an exceptionally clear introductory account of the alcyonarian or octocorallian anthozoans, illustrated with original figures, and the account has been worthily completed by Eugenia Montanaro-Gallitelli, also with numerous original figures.

The rugose corals by Dorothy Hill probably presents as good a classification of these difficult forms as has been published, even if perhaps not final; the account is well illustrated. The stony or scleractinian corals by Wells begins with a long introduction that is often not very clear and seems to multiply technical terms; the well-illustrated systematic account of the stony corals practically follows that of Vaughan and Wells (1943). The book concludes with an account of the tabulate corals by Hill and Stumm.

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Handbuch der Physik. vol. 1, *Mathematical Methods*. S. Flugge, Ed. Springer-Verlag, Berlin, 1956. 364 pp. Illus. DM. 72.

The first volume of the new *Handbuch* contains five articles. The first three were prepared by J. Lense and deal with the principles of analysis, ordinary differential equations, and theory of complex functions (90 pages), partial differential equations (30 pages), elliptic functions (27 pages). The last two articles are by J. Meixner and F. Schlögl. They deal with the special functions of mathematical physics (71 pages) and boundary-value problems (135 pages), respectively. There are short bibliographies and, in addition to the subject index in German, there is an English index.

A comparison of the wealth of the material treated in the articles with the space that was available shows that only a compendiumlike treatment of the subject was possible. I approached the volume in a somewhat skeptical spirit. I was doubtful whether an adequate treatment of the material is at all possible, whether it is desirable for the physicist to learn mathematics from a compressed treatment, as the present one has to be, and, if not, whether a mere statement of mathematical results without proofs or examples is at all helpful. Certainly, one must fear that it invites misunderstandings and errors.

On the whole, these apprehensions were not justified. Most of the material is clearly presented; even where proofs are omitted, the statement of the theorems is clear so that misunderstandings are not likely to arise. Whether a physicist who faces a mathematical problem with which he has no familiarity can advantageously use this book remains doubtful. However, there may be many instances in which this "Nachschlagewerk" will help him recall developments which he once knew but on which his memory is vague, and in some cases it may carry him beyond the limits of his previous knowledge. The book is well worth possessing, and I often found it more stimulating and striking than some of the standard textbooks.

The amount of material presented or reviewed is truly surprising. The first article reviews the standard material of elementary analysis, including the basic theorems on complex functions. It contains short tables of the properties of elementary transcendentals, their derivatives and integrals. It also gives some more esoteric facts concerning the convergence of power series on the circle of convergence, describes the properties of gamma functions and a few transformations in the complex plane, and ends up with a brief discussion of ordinary differential equations. The second article, on partial differential equations, gives the theory of characteristics and, hence, of linear first-order differential equations rather completely. It also defines the complete integral of a first-order equation—a theory that is very important for the understanding of the Hamilton-Jacobi equation but is nearly universally forgotten. The third article, on elliptic functions, is perhaps the most elegant and, considering its length, remarkably complete.

The treatment of the special functions of mathematical physics also goes much beyond the material usually considered. It defines and describes hypergeometric series and the limiting cases, such as Bessel functions and spherical harmonics. It then proceeds to a rather extensive theory of linear second-order ordinary differential equations, the coefficients of which are rational functions of the independent variable. The hypergeometric functions are reviewed again as solutions of differential equations of this type. The next two sections of this article, referring to addition and multiplication theorems as well as to difference equations involving the hypergeometric functions, will be new for most readers. The last section treats the same functions from a somewhat more modern point of view.

The last article, on boundary-value problems, is the only one which contains parts that I feel compelled to criticize. The treatment of the spectral theory of self-adjoint operators is antiquated in its methods and many of the statements are misleading. At places there is a pretense of proofs, which is worse than no proof at all; at other places the theorems, without proofs, are inaccurately formulated. It is regrettable that this happens with the spectral theory, the basis of quantum mechanics. Few easily readable treatments of this subject are available, and a real opportunity was missed to acquaint the theoretical physicist with a subject of great concern to him. The rest of the article is, on the other hand, modern and stimulating. It contains a discussion of variational calculus and several examples of integral and differential operators. It ends with a discussion of Green's functions and the various D functions used in modern quantum field theories.

On the whole, the book appears to be useful and sets a fine standard for the rest of the *Handbuch*. The minor inadequacies are no doubt at least partially due to lack of space in a very condensed volume.

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Electrochemical Affinity. Studies in electrochemical thermodynamics and kinetics. Pierre Van Rysselberghe. Hermann, Paris, 1955. 109 pp. F. 1250.

Recent books on the thermodynamics of irreversible processes (De Groot, Denbigh, Prigogine) do not contain detailed treatments of electrode reactions. The monograph by Pierre Van Rysselberghe fills this gap very satisfactorily. As the author points out, this book can be regarded as an extension of the work on the chemical affinity he wrote in collaboration with De Donder (1936).

The book is divided in five chapters covering the following topics: galvanic and electrolytic cells, reversible and irreversible electrode processes, simultaneous half-reactions at the same electrode, the Tafel equation and some aspects of electrochemical kinetics, and thermoelectricity. The approach is original and, in many instances, cannot be found elsewhere. Recent developments in the thermodynamics of irreversible processes, particularly the concept of entropy production and Onsager's reciprocity relations are fully exploited. They provide a rational basis for the study of electrode reactions in general, and they are especi-