In Chapter VI we find various extensions of previous results to certain hermitian non-bounded matrices. Some of Carleman's results are interpreted from the point of view of matrices. A relationship with the Stieltjes-Hamburger moment problem is briefly indicated.

In the Appendix the author gives a rather brief sketch of his own investigations in the spectrum theory of the almost-periodic functions of H. Bohr.

From the above enumeration, which is necessarily rather incomplete, it is seen that the book in question contains interesting and important material which is partly new or is treated from an original point of view. When reading the book one can not help feeling, however, that the author endeavored to put too much material in too restricted a space. The result is that the author has not completely succeeded in writing an "introduction" to a great theory, which could be used to advantage by a "beginner." As to a well informed and experienced reader, it might happen that the latter will feel better off when he turns to the original memoirs, including some by the author himself (not to speak of papers of J. v. Neumann, which have appeared simultaneously with the publication of the book). One point deserves to be mentioned separately. There are found in the book about three dozen new terms introduced by the author; here are some of the most striking ones: "Hellysche Fortpflanzungssatz," "quadratically convergent vectors," "infinitesimale und integrale Integrabilitätsbedingungen," "statistisch sinnvolle Matrizen," "wasserstoffähnliche Spektra," "Carleman's Feldtheorie," "Stabilität des reducierten Spektrums," "Hellinger function-pairs of the first and second kind," etc. Not all, and even not most, of these new terms correspond to actually new notions, and many of them do not serve to describe the situation in the best way. For instance a Hellinger function-pair of the second kind simply means a pair of functions $\rho(\mu)$, $\sigma(\mu)$, continuous, bounded and not decreasing on $-\infty<\mu<\infty$ and approaching 0 as $\mu\rightarrow-\infty$. If, however, the introduction of a new term is unavoidable, it seems desirable that its definition should be stated in precise expressions, which in many cases has not been done in this book. The fact that not one of the theorems or definitions is underscored or separated from the body of the text will also contribute somewhat to the discomfort of the reader, particularly of a beginner. The bibliography of the subject is given "en bloc" at the end of the book, without explicit references in the text; this is not always convenient. Finally, misprints and slips of the pen are not infrequent.

J. TAMARKIN

A Course of Geometrical Analysis. By Haridas Bagchi. Calcutta, Chuckervertty, Chatterji and Company, 1926. iv+562 pp.

This rather long book on elementary differential geometry is written by a Premchand Roychand Scholar and Lecturer in Mathematics in Calcutta University. It gives evidence of wide reading and of much thought and study. While for the most part the topics and the treatment follow classic lines, there are many discussions evidently original with the writer. It is apparently intended as a textbook, for there are frequent references to the student and suggestions offered to him. It is, however, curious in arrangement, widely discursive in treatment and remarkably uneven in difficulty; it does not seem to us so well adapted for one beginning the subject as the familiar French, German and

American texts. The author is of the English School, as appears both from his references, chiefly to Forsyth, and from his methods of proof. He is interested more in geodesics than in any other topic, as may be seen from his devotion of over one hundred pages to the subject. Towards the end of the book there is occasional use of vector methods. There are a number of discussions of problems of algebra and mechanics, some extraordinarily elementary.

In other texts with which we are familiar, the general theory of curves is studied before the special "organic" curves of surfaces, that is to say the minimal lines, the asymptotic lines and the lines of curvature; then some simple surfaces, for example surfaces of revolution, are studied before the general theory. In this book it is not so; an idea of the arrangement is given by the titles of the first six of the eight chapters: I. Organic Curves of a Surface, II. Genesis of the Fundamental Magnitudes, III. Choice of Parameters and Geodesic Parallels, IV. General Theory of Geodesics, V. Surface of Revolution, VI. General Theory of Curves.

The book is remarkably free from errors and misprints.

J. K. WHITTEMORE

Leçons sur les Systèmes d'Équations aux Dérivées Partielles. By Maurice Janet. Paris, Gauthier-Villars, 1929. viii+122 pp.

This book (volume IV of the interesting new collection "Cahiers scientifiques" edited by G. Julia) is a welcome introduction to the general theory of systems of partial differential equations. In the preface the author proposes two standpoints from which the subject might have been treated, the analytical one and that of mathematical physics. Only the former of these two points of view is given consideration in the book. It deals with analytic functions of complex variables and can be characterized as being purely local, while the latter is interested primarily in real variables and prescribes in advance the domains in which the solutions in question have to be determined. That such a classification is somewhat artificial is clearly shown by several recent investigations where the fusion of the Cauchy and Dirichlet problems has been used to great advantage. It also led the author to exclude from consideration many an important problem of the general theory of partial differential equations. Such an exclusion, however, was wise lest the number of pages should increase beyond a reasonable limit. Anyhow, the author has succeeded in giving an interesting and easily accessible exposition of the Cauchy problem for general systems of partial differential equations in any number of unknown functions. A large number of examples and exercises help the reader considerably in mastering the subject, whose main difficulty is of algebraic rather than of a purely analytic nature. At the end of the book we find a "Bibliographie sommaire" which contains several references to the author's own work (7 out of a total of 15). The fundamental work of N. Günther who, together with Ch. Riquier, should be considered as a main contributor to the subject, deserves more than a reference to a Comptes Rendus note and a short footnote (1) on page 119, where the important doctor's thesis of Günther* figures under the heading "nombreux travaux en langue russe."

J. TAMARKIN

* *On the theory of characteristics of systems of partial differential equations,* St. Petersburg, 1913, xiv+378 pp. (in Russian).