

without protest, to exhibit the attractive style in which the subject matter of the present volume has been presented. The fact that the author sometimes expresses general views which may possibly be challenged may tend to awaken interest and discussions on the part of the readers.

The number of chapters has been increased from 15 to 16 while the number of sections has been extended from 63 to 74. An "Einleitung" has been added, in which prehistoric group theory and the derivation of the group concept from permutations is considered. The heading of the last section has been changed from "Anwendung der Substitutionsgruppen" to "Die Kleinsche Gleichungstheorie," but besides the correction of slight errors and the addition of a foot-note no changes were made in this section. In the list of authors the name of *Owen Jones* appears under the letter *O* instead of under the letter *J*. The developments relating to abelian groups have been greatly extended but the ϕ -subgroups did not receive any attention. As in the first edition so in the present one the applications are especially stressed in accord with the expressed purpose of the valuable series of which the present volume is a worthy part.

G. A. MILLER

Das Rechnen der Naturvölker. By E. Fettweis. Leipzig, B. G. Teubner, 1927. iv+96 pp. Price 5 marks.

This is a compilation of the number words used by many savage races. Gestures for numbers and some of the extremely simple calculations which these races make, are also described. An extensive bibliography of nearly 300 titles is given. It does not include L. L. Conant's *Number Concept*, New York, 1896, though the author makes a second-hand allusion to Conant, (p. 54); and it has few titles in common with the bibliography prepared from the mathematical standpoint by David Eugene Smith, (*History of Mathematics*, vol. 1, p. 14). The work seems likely to be of more interest to the ethnologist, the linguist and, perhaps, the psychologist, than to the mathematician.

J. W. A. YOUNG

Ptolémée, Composition Mathématique, traduite pour la première fois du grec en français par M. Halma (avec le texte grec): et suivie des notes de M. Delambre. Paris, J. Hermann, Volumes 1, 2. Réimpression facsimilé. Price 210 fr.

The edition of Ptolemy's *Almagest*, in Greek and French, printed in parallel columns, which was prepared in 1813-16 by the noted French scholar l'Abbé Halma and supplied with notes by the astronomer Delambre, is generally regarded as the best in existence. Before that time a translation from Greek into Latin had appeared at Basel which was based on a less careful scrutiny of different manuscript texts. Halma made a searching comparison of manuscripts in the libraries in Paris, Venice, Florence and the Vatican. Now, more than a century after the first appearance of Halma's edition, a facsimile reimpression is placed within the reach of readers of our time. It is well that Ptolemy should be available to

modern students in a modern language, for Ptolemy's *Almagest* is the text from which astronomers have drawn knowledge and inspiration for over a thousand years, a longer period of authority than that of any other astronomical author.

The first volume of Halma's edition begins with an elaborate Preface in French which is an historical and critical account of Ptolemy's great book, emphasizing its value to the modern astronomer. This part, though rich in detail, might have been profitably rewritten so as to embody later studies due to Paul Tannery and others. An historical result so very recent that it could not have been included even in a revision, unless written since 1926, is the demonstration that the precession of the equinoxes was known before the time of Hipparchus to the Babylonian astronomer Kidinnu.

Of special historical interest to mathematicians is Ptolemy's spherical trigonometry which he develops more fully than plane trigonometry. In his computation of a table of "chords" he establishes the theorem on the inscribed quadrilateral, that the product of its diagonals is equal to the sum of the products of the opposite sides. A simple and elegant geometric construction (*Ptolemy I*, p. 27), which yields simultaneously the sides of a regular inscribed pentagon and decagon is known to modern engineers, but is not given in elementary texts on geometry because of the comparatively greater difficulty of the proof.

FLORIAN CAJORI

Sieben- und mehrstellige Tafeln der Kreis- und Hyperbelfunktionen und deren Produkte sowie der Gammafunktion, nebst einem Anhang: Interpolations- und sonstige Formeln. By Keiichi Hayashi. Berlin, Julius Springer, 1926. vi+283 pp.

A review of these tables by T. H. Gronwall has already appeared in this Bulletin (vol. 32 (1926), p. 718). Dr. Gronwall's review concerned the contents and scope of the tables; the present review relates to their accuracy.

Wishing to construct a table of two functions auxiliary to the hyperbolic functions, and having read Dr. Gronwall's review, I decided that these tables would facilitate the compilation. Accordingly I procured a volume and used it. A computation formula was used which checked not only the computed values but also the consistency of the tabular values from which they were obtained, and the results have been rather disconcerting.

The first error encountered was in $\sinh x$, $x = .0783$ to $x = .0799$, in which a column of 7's should be a column of 8's. This however is quite probably a proof-reader's error and such errors may easily be corrected by the publisher. But in $\sinh .548$ and $\cosh .548$ the tabulated values are each too large by 0.000005 and the chances of this being an error in proof-reading are small. The chances are diminished by the fact that the same kind of thing occurs in eight other places, and for $x = .782$ and $.923$ the corresponding error is carried into e^x ; $\cosh .872$ and $\sinh .872$ are each in error by 0.0000091618! Such errors could hardly arise from bad proof reading and one wonders what method of systematic checking would fail to reveal them.