

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.

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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.