discussions, and physical philosophy is delightfully in evidence throughout involved physical discussions. Tables of numerical data help at times to increase the effective reality of the work. One thing, however, continental authors disregard to their serious detriment, and that is exercises for the student. When exercises are well selected they double the educational value of any book. Schaefer has the teacher's instincts and could easily have furnished excellent exercises.

It would be only too easy to stretch this review to great lengths, mentioning such clear-cut analysis as that of Boltzmann's "ergodische" systems with its unusual frankness in pointing out that there are no such systems (p. 439), of the total separation of Liouville's theorem and the equipartition of energy, etc., of the discussion of anomalies (Schwankungen) and its bearing on the work of Perrin and his followers. But there are too many details to cite, and we had best not begin. Let the book be widely read.

EDWIN B. WILSON.

The Elements of Non-Euclidean Geometry. By D. M. Y. Sommerville. Chicago, The Open Court Publishing Company; and London, G. Bell and Sons, 1919.* xvi + 274 pp.

The printing of a second edition of this book, as well as the fact that it now, for the first time, appears as a publication of the Open Court Publishing Company, speaks well for the attention it has received from mathematical readers.

A careful comparison of the two editions shows no changes. The very few typographical errors and the somewhat more frequent unintended slips in the text remain. For instance, on p. 10, l. 20, a parenthesis is still lacking; likewise an "s" on p. 22, l. 1. There remains (p. 54) this remarkable series of statements:—"A triangle has therefore four circumcircles. ⋯ There cannot be more than one real circumcentre" [and may, of course, be none]. "This point, which we may call *the* circumcentre, ⋯ may be real, at infinity, or ideal." On p. 204, line 19, R is still called the earth's radius, although the radius of the earth's orbit is clearly meant.

It is to be sincerely hoped that the popularity of the book may before long require still another printing, and that a careful revision may then make it as accurate as it is interesting.

EDWARD S. ALLEN.

Annuaire du Bureau des Longitudes pour 1921. Publié par le Bureau des Longitudes. Paris, Gauthier-Villars, 1921. 7 + 710 + 130 pp.

Before 1904, each issue of the Annuaire contained all the information which the Bureau considered necessary for publication. Owing to the number of pages, which had gradually increased, it was then divided and certain articles in which there was little or no annual change were given only in alternate years. The volume has now grown again to a size which is near its maximum for convenient handling and one finds references which include the previous four volumes. Its chief annual feature is the full

* Originally published in 1914 by G. Bell and Sons, and reviewed in this BULLETIN, vol. 21, May, 1915, by J. L. Coolidge.