are rather widely spaced in consequence. In fact the volume is more ponderous than might be expected in comparison with other logarithm books, notwithstanding that the adopted interval of ten decimal seconds is much smaller than that of ten ordinary seconds of arc. This is made plain if we compare the dimensions and weights of the following well-known logarithmic tables (*bound*):

NAME.	LENGTH.	BREADTH.	THICKNESS.	WEIGHT.
	mm.	mm.	mm.	grams.
Gauss 5-fig.	241	159	14	395
Bruhns 7-fig.	257	175	30	1139
French 8-fig.	370	298	48	3813
Vega 10-fig.	341	238	36	2660

Negative characteristics are given throughout for the logarithms of the trigonometric functions, when the corresponding numbers are less than unity. This departure from the usual custom of increasing the logarithms by 10 can hardly be regarded as an improvement. The greatest possible care has been taken to secure the accuracy of the tables; and in this respect they may be greatly commended. The actual numbers have been copied from the great manuscript tables of Prony, which are preserved in the archives of the Paris observatory. The typographical work, which is excellent, was executed at the *Imprimerie Nationale*.

HAROLD JACOBY.

SPHERICAL AND PRACTICAL ASTRONOMY.

An Introduction to Spherical and Practical Astronomy. By DASCOM GREENE, Professor in the Rensselaer Polytechnic Institute, Troy. Boston, Ginn & Co., 1891. 8vo, pp. viii. + 158.

PROFESSOR GREENE has written this work to supply the needs of those students who wish to begin the study of spherical and practical astronomy, and have but very little time to give to such study. The work is a stepping stone to Doolittle's and Chauvenet's books. The author deals only with "those practical methods which can be carried out by the use of portable instruments," and in describing those methods he is very brief, frequently altogether too brief.

The order of subjects is as follows: definitions; spherical problems; conversion of time; hour angles; the transit instru-

ment; the sextant; finding time by observation, which includes time by transit observations, by equal altitudes and by single altitudes; finding differences of longitude, which includes the methods by the electric telegraph, by transportation of chronometers and by moon culminations; finding the latitude of a place by a circumpolar star, by a meridian altitude, by a zenith instrument, by a prime vertical instrument, by a single altitude and the corresponding time, and by circummeridian altitudes; finding the azimuth of a given line, by the elongation of a circumpolar star, by observing a body (*sic*) at a given instant, by observing a body at a given altitude, and by observing a body at equal altitudes.

These subjects are discussed in the first 95 pages. Then follows a very short (20 pages) treatment of the figure and dimensions of the earth, in which the author gives some of the fundamental formulæ of the spheroid, the elements of the spheroid as determined by measurement, the polyconic projection, spherical excess of triangles on the earth's surface, and geodetic determinations of latitudes, longitudes, and azimuths. The book has an appendix (pp. 115–150) on the method of least squares—and three tables on (I.) the correction for refraction, (II.) equation of equal altitudes of the sun, and (III.) for computing the reduction to the meridian. The simple mention of the contents will show how inadequate the treatment must be. It seems to the writer that it is far better to use always a book that encourages the student to study thoroughly a given subject rather than one that tempts him to be satisfied with very brief statements. In a work of this kind the discussion of the method of least squares is hardly appropriate.

The equations are not numbered consecutively throughout the book but the numbering begins anew with each chapter. In the discussion of equatorial interval no account is taken of the formula used when the declinations are 80° and over. On page 48 in the third paragraph there is a confusion of index correction with index error. In (1) on page 147 the rule should show that both the measured sum *and* each of the measured magnitudes should be adjusted.

For a work on practical astronomy it seems to me that the examples given are too few and insufficient, as in the chapter on the transit instrument. However, the author's idea seems to be that the instructor should supply such details. To colleges and technical schools where spherical and practical astronomy are given but little time, this work may prove quite acceptable as a basis of study.

J. K. Rees.