ness of the theory and its value as a working hypothesis, he is unwilling to admit his former error and to give to true scientific workers the credit which justly belongs to them.

This obvious attempt at consistency on Professor Lowell's part is rather belated, for, as a rule, inconsistencies do not bother him. His books are full of them. He is so interested in marshaling his facts and proving the point at immediate issue, that he appears to forget that at some other time, in some other place, he has arrayed the same facts differently and by them proved the exact opposite. In order to prove, for example, that certain dark lines, which appear in his drawings of Venus, really exist and form permanent markings on this planet, Lowell argues, against the evidence of other investigators, that Venus is surrounded by a very thin atmosphere, "gauze of the most attenuated character"—that the brilliancy of the planet is due to this very thinness of atmosphere. In another chapter Lowell finds the brilliancy of Jupiter and Saturn mostly due to dense cloud forms in their atmospheres. On the one hand, Venus has no clouds because she is bright, while on the other hand, Jupiter and Saturn are bright because of clouds. Again these same markings, or pseudo-markings, on the disc of Venus have been variously described by Lowell in his different papers and books.

The book contains many loose statements of scientific facts and principles, and conclusions are drawn by special pleadings and by apt illustrations rather than by any course of logical reasoning. Yet with all this, and in spite of exaggerations and obvious attempts to create popular excitement, the book gives the general reader, in an attractive form, a more or less accurate conception of the latest ideas in regard to the evolution of our world. It is a pity that the work of such a brilliant writer should be marred by his all too evident faults.

CHAS. LANE POOR

Aerial Navigation of To-day; a Popular Account of the Evolution of Aeronautics. By CHARLES C. TURNER. Philadelphia, J. B. Lippincott Co. 1910. 8vo, pp. 327. Illustrated.

This book, which is one of the few of its kind in the English language, was brought out simultaneously last autumn in this country and in England. Its English author shows his predilection in ways hereafter mentioned, but, while he has made some long balloon voyages he modestly refrains from obtruding them upon the reader, unlike most writers of books upon aeronautics, who usually emphasize the particular subject with which they are most familiar. The reviewer himself is no exception, since in his "Conquest of the Air," a smaller contemporary work, of similar scope to the one under consideration, he gives first place to his own explorations in the element that man has conquered after so long a struggle. Mr. Turner begins with a history of ballooning and the principles involved in both spherical and dirigible balloons, mechanical flight being treated in the same way. There follows a chapter on the aerial ocean, which is a compilation of observations by European aerologists, often without context or sufficient explanation. The remaining chapters discuss the applications of aerial navigation and its possibilities, especially in warfare. Rather out of place is the concluding chapter on typical flying machines and dirigible balloons. "Useful tables," a useless glossary of English and French aeronautical terms and a very inadequate bibliography occupy the remainder of the 321 pages. The book is clearly written, profusely illustrated with pictures and diagrams and gives a good idea of the past history and present status of aeronautics. The sanguine prophecies of its future development recall the extravagant and unrealized hopes which were indulged in when the balloon was invented and render the adage, "never prophesy unless you know," a particularly safe one to follow as regards this new art.

No book of the kind can be entirely free from mistakes, but it would seem that the editor of *Aeronautics,* who read the MS. and, to quote the author, "than whom there is no

better authority," should have perceived a good many errors of omission and commission.

Not even in England do authorities now maintain that Glaisher and Coxwell reached the height of 7 miles, as stated on pages 31 and 160, so that the record of 34,400 feet belongs to Berson and Süring, in Germany, and the balloon "Preussen," holding 300,000 cubic feet of gas, in which they ascended, is much larger than the French "Géant," said on page 33 to be the largest free balloon ever constructed. In the table of long balloon voyages, the distance of 872 miles traveled by Erbslöh and Clayton during the Gordon-Bennett race from St. Louis in 1907 is ignored, although shorter voyages in Europe during the same year are enumerated. There are inaccuracies also in the table of early air-ships, for the speed of the first successful dirigible balloon of Renard and Krebs was 14 miles per hour and not 7½ miles, and Santos-Dumont won the Deutsch prize, by circling the Eiffel Tower, in 1901, and not in 1898. As regards the first mechanical flights it is wrong to say on page 81 that the flights of Farman and Delagrange in 1907–8 "were being eclipsed in America by the Brothers Wright," when the latter had made longer flights several years before. The Malay kite (page 96) is not analogous to the "finbat," since it has no plane projecting at right angles from the middle. Hargrave's kite is correctly described, as is rarely the case, in having no continuous corner sticks which were added by Clayton. The Wright aeroplane does not start on a *declined* rail (page 153). Exceptions can be taken to some of the meteorological conclusions, *e. g.*, that the seasonal and daily changes of temperature are much less at an altitude of 5,000 feet than at the ground, because the contrary has been found by the Blue Hill observations. The statement that an Englishman, Archibald, first used kites to lift automatic registering instruments, on page 158, apparently contradicts one on page 94 that in 1894, for the first time, automatic recording apparatus was sent up on kites from Blue Hill. The last is correct, if instruments recording graphically and continuously, such as are now generally used to obtain observations in the upper air, are meant. Andrée, on his ill-fated north-polar voyage, had two companions, Fränkel and Strindberg, and not three, as said on page 196. It can not be admitted that a projectile fired vertically would fall back with the velocity with which it left the gun, as is asserted on page 213. If dirigible balloons are unable to "tack," like sailing ships (page 226) this is equally true of flying machines. The species of wood suitable for constructing the latter which are named on page 269, have a foreign habitat and none equal the American spruce. In the index, John Wise, the old-time balloonist, is confounded with Lieutenant Wise, the modern kite-experimenter.

The aeronautical achievements are brought down to August, 1909, after Blériot's flight across the Channel had brought home to Englishmen the possibility of aerial invasion, which furnished the psychological moment for publishing this book.

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Scientific Journals and Articles

The March number (volume 16, number 6) of the *Bulletin of the American Mathematical Society* contains: Report of the annual meeting of the society, by F. N. Cole; Report of the winter meeting of the Chicago Section, by H. E. Slaught; Report of the meeting of the American Association, by G. A. Miller; "Shorter notices": Smith's Rara Arithmetica, by L. L. Jackson; Fine and Thompson's Coordinate Geometry, by E. B. Cowley; Boutroux's Fonctions definées par les Equations différentielles du premier Ordre, by C. L. E. Moore; Worms de Romilly's Premiers Principes des Sciences mathématiques, by J. B. Shaw; Auerbach's Taschenbuch für Mathematiker und Physiker, by J. B. Shaw; Laurent's Statistique mathématique, by H. L. Rietz; Duhem's Théorie physique de Platon à Galilée, by E. B. Wilson; Clark's Slide Rule, by F. Cajori; Annuaire du Bureau des Longitudes pour l'An 1910, by E. W. Brown. "Notes on the Institut de France and the annual meeting of the Académie des Sci-