

deserve a place. In the index the reference after Durkik should be 252 instead of 352. In addition to the errors in the first edition of the Principia, mentioned in Nos. 6 and 7, it may also be noted that the woodcut on page 22 is upside down, in some copies at least, as in one owned by Professor Hallock. The book is clearly printed and well indexed. It is needless to add that it deserves a place in every mathematical library.

DAVID EUGENE SMITH.

A Scrap-Book of Elementary Mathematics. Notes, Recreations, Essays. By WILLIAM F. WHITE. Chicago, The Open Court Publishing Company, 1908. 8vo. 1 plate. 248 pp.

It is the right of every author to ask that reviewers judge his book only by the standard that it professes. If it pretends to be an exhaustive treatise, then the critic may justly claim that it falls short of what its readers have a right to expect if it contains more than the allowable maximum of errors or if the author displays ignorance of the work of his chief predecessors. If, on the other hand, it pretends to little, then it is proper to lower this standard, reserving the right to criticise the writer for not using his talents to better purpose. These or similar thoughts will probably occur to more than one reviewer who lays down Dr. White's readable little book after spending the short time necessary to enjoy its contents. Pretending, as its name implies, to be merely a scrap-book, and written only for high-school pupils or for tyros in the teaching profession, it is by its very nature immune to serious criticism. Given a few well-known histories of mathematics and books of recreations in the same domain, such a work is easily constructed. If it has errors, these are attributable to the source material; if the bibliography is meagre, the nature of the book does not warrant one that is more extensive; if the selection is not the absolute best, the readers to whom the book appeals are all the more pleased; if the arrangement shows little system, this is only what may be expected of a "Scrap-book of mathematics."

Some idea of the scope of the work may be obtained from the following list of certain of the topics treated: Numeration of large numbers, Numerical curiosities, Tests of divisibility, Miscellaneous notes on number, Numbers arising from measurement, Compound interest, Arithmetic in the renaissance, Geometric puzzles, Magic squares, Alice in the wonderland of

mathematics. These and others have been treated briefly and in a style that will entertain and somewhat instruct those for whom the book was written, so that the work will serve its purpose as a not unworthy addition to a high school library. That it contains little that is not found in such books as Ball's *Mathematical Recreations*, Lucas's *Théorie des nombres*, and a few other less valuable works, is not a serious objection to such a publication.

As to the errors in the book, these are chiefly, and by the nature of the case, historical. They arise from the fact that Dr. White has not always depended upon authorities of recognized standing to-day. For example, the date of Paciolo's *Suma* is given as "1494 (some say ten years earlier.)" Now we know perfectly well that the first edition of this famous work appeared in 1494, at Venice, and we know when the book was written, so that all element of uncertainty has long since been removed. Under the use of the period as a decimal separatrix, mention may now be made of the Pellos arithmetic of 1492, although when Dr. White's manuscript was prepared this use was unknown. That Avicenna, or Ibn Sinâ, was the first writer on arithmetic to use the Hindu numerals is impossible, for he wrote nearly two centuries after Al Khowarizmi had made them known in Bagdad. It would hardly be expected that Cardan, writing about 1550, could be taken as a present authority on the introduction of the Hindu numerals in Europe; indeed we now know that Fibonacci was by no means the earliest one to know them in Italy, as he asserted. As to the lack of a suitable notation for computation among the Greeks, it should also be said that Dr. White's assertion is now felt to be too sweeping, and that the Greeks really got along very well with little practical use of the abacus. That 'million' first appeared in print in Paciolo's work (1494) is not correct; it is found in the Treviso arithmetic of 1478, in Borghi's work of 1484, and in the Pellos book of 1492. The word was already old when printing was invented, and appears in English in Pier's *Plowman* as early as c. 1375, coming from such Italian writers as Marco Polo. That Parley, in 1596, was the author of the classic "Thirty days hath September" has long since been disproved. It appeared in English at least six years earlier, and was printed in Latin as early as 1488. It is mediaeval. The statement about the sine is not exact. Hultsch has shown that the Greeks also used the half chord, and

Gherardo of Cremona probably used the word *sinus* before Plato of Tivoli. As to the symbol for infinity ascribed to Wallis, a rather hasty examination of his Opera fails to show that he used the one mentioned, but he may have done so.

It is perhaps justifiable to revert to one point of criticism already mentioned, and to inquire whether Dr. White has used his talents to their best advantage in planning and executing such a work. There is an undoubted need for a good book on mathematical recreations arranged more systematically than any that has yet appeared; one that shall place the material in somewhat the order that a teacher or pupil may use it, and that shall rather carefully exhaust the available material in the large number of works on the subject. To write with no extensive knowledge of the best modern works on the subject, such as Ahrens's and Schubert's, and of such noteworthy older works as those of Bachet and Ozanam is to render impossible the accomplishment of such a labor.

It must be repeated, however, that the author makes no pretense to this sort of work, and it is only fair to say that he has given us a very readable book for a summer afternoon.

DAVID EUGENE SMITH.

Royal Society of London Catalogue of Scientific Papers 1800–1900. Subject Index, Volume I, Pure Mathematics. Cambridge, at the University Press, 1908. lviii + 666 pp. Price \$6.75.

THIS is the first volume of a subject index which is to be published as "separate index-volumes for each of the seventeen sciences of the Schedules of the International Catalogue, viz., mathematics, mechanics, physics, chemistry, astronomy, meteorology, mineralogy, geology, geography, palaeontology, biology, botany, zoology, anatomy, anthropology, physiology, and bacteriology." The object is to bring this Index into close relation with the International Catalogue of Scientific Literature by adopting the same general method of classification and by indexing the papers of the whole of the nineteenth century, while the International Catalogue is devoted to the literature following this period. The present Index has also close contact with the well known Catalogue of Authors which is being issued by the Royal Society, and of which twelve large volumes (1800–1883) have been published, while those covering the period from 1884 to 1900 are in preparation.