

I cannot close these remarks without expressing a bit of scepticism upon one point. The preface begins with these words: "The present treatise is intended as an aid to the study of geometry in school as well as at the university." It does not seem possible to me, even with the most generous concessions as to the superior abilities of the German schoolboy, to think of Hesse's book as a text for a beginner in analytic geometry. To be sure it requires no prerequisites other than those which the beginner in this subject is likely to have, but it does require a mathematician of some maturity to read it appreciatively. Certainly the contrast between this book and our present-day textbooks for beginners is great.

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*A Bibliography of the Works of Sir Isaac Newton Together with a List of Books illustrating his Works, with Notes*, by GEORGE J. GRAY. Cambridge, Bowes and Bowes, 1907. 8vo. viii + 80 pp. 1 plate. Second edition, revised and enlarged.

It is now some twenty years since Mr. Gray issued the first edition of this work, but as only a hundred and twenty copies were then printed it was never generally known to scholars, save by name. In a way this has not been without its good results, since the very fact of its rarity has led to the preparation of this new and enlarged edition, containing information now published for the first time.

The work contains four hundred and twelve titles arranged under ten heads: Collected editions of works, the Principia, Optics and optical lectures, Fluxions, Arithmetica universalis, Minor works, Chronological, theological and miscellaneous works, Reports on coinage, Works edited by Newton, Memoirs. The bibliography is preceded by an analytic table of contents, and followed by an index of names. There is also a reproduction of Mackensie's drawing of Roubiliac's statue in Trinity College, from Le Keux's engraving.

Only one who has worked in the bibliography of mathematics can appreciate fully the extent of Mr. Gray's labors and sympathize with his errors and omissions. Such a work is easily conceived and can be pursued with little difficulty to a vaguely defined point, after which titles and editions become exceedingly elusive. It is like collecting portraits of Newton; the first fifty can be found with little trouble; the second fifty

are to be had if one will give the time and money ; the third fifty come very slowly, and the collector is increasingly conscious that some will always elude his grasp.

It is therefore no adverse criticism of Mr. Gray's labors to call attention to a few omissions, and to say that any bibliographer can easily suggest others. It is rather with the desire to help future editors that the following supplementary notes are added : Of the *Mathematical Principles* (No. 26) there was also an edition in 1846 ; of *Frost's Principia* (No. 37) the edition of 1880 might be mentioned definitely ; Addison's *Defense*, in *Fontenelle's Plurality of Worlds* (No. 41), also appeared in 1801 ; *Martin's Philosophia Britannica* (No. 115) also appeared at London in editions from 1759 to 1787 ; there was a second edition of *Snell's Newton und die mechanische Naturwissenschaft* (No. 151) in 1858 ; there was also an edition of *Voltaire's Elémens de la philosophie de Neuton* in his *Oeuvres*, Neuchâtel, 1772 ; there was an edition of the *Lectiones opticae* (cf. No. 180) published in London in 1729 ; mention might be made of *Alagrotti's Dialoghi sopra l'ottica Neutoniana*, in his *Opere* of 1778-84, volume II, pages 1-292 (cf. Nos. 194-197) ; mention might also be made, after No. 218, of A. Johnson's article on Newton's use of the slit and lens in the *Transactions of the Royal Society of Canada*, 1892, volume IX (3), page 49 ; *Lecchi's* edition of the *Arithmetica universalis* (No. 280) appeared in 1752, and since the dedication is also dated 1752 this, instead of 1732, is probably the date of the first edition ; after No. 372 it would be well to insert a cross reference to the *Vita* by *Castillioneus* mentioned in No. 2, and similarly after No. 378 to *Chittenden's Life* in the 1846 edition of the *Principia* (cf. No. 26), and after No. 379 to *Davis's Life* (27 pages) in the London edition of 1819 of the *Mathematical principles* ; there was also an edition of *Frisi's Elogio* (No. 393) in 1829-30 ; the omitted date of *Paulian's Treaty of Peace between Descartes and Newton* is 1763 ; to the biography might be added a ten-page folio without date, *Vita d'Isacco Newton scritta da Giovanni Batista Giramonti*, but there are probably dozens of brochures of a similar nature. It would also seem proper to add *Charles Taylor's Geometry of Kepler and Newton*, published in the *Transactions of the Cambridge Philosophical Society* in 1900, volume XVIII, pages 197-219. Of course *G. Kowalewski's Abhandlungen über die Quadratur der Kurven*, Leipzig, 1908, appeared too late for insertion, although by its reference to Newton it might

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.

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*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