

SHORTER NOTICES.

Guida allo Studio della Storia delle Matematiche. By GINO LORIA. Milano, Hoepli, 1916. Pp. xvi + 228. Price 3 lire.

No one can pick up such little volumes as those of the *Sammlung Götschen*, *Sammlung Schubert*, Teubner's *Aus Natur und Geisteswelt* and *Mathematische Bibliothek*, and the *Manuali Hoepli* without a feeling somewhat akin to envy. That economic conditions are, or at least have been until now, such as to allow the sale of many of these works for a few cents abroad, while in this country it is practically impossible to publish similar manuals, always seems unfortunate from the standpoint of scholarship, even if excusable from that of labor. So when we see a book like Professor Loria's selling for less than sixty cents, we must all feel regret that it can be accessible only to students who are familiar with the Italian language.

It is now nearly nine years since Professor Loria expressed, at the fourth International Congress of Mathematicians, his belief in the advisability of placing before students a guide for their study of the history of mathematics. His well-known interest in the subject, his contributions to its literature, his courses in the University of Genoa, and his editorial experience, all have tended to fit him for writing such a work, and he is entitled to the thanks of all mathematicians for the care he has shown in its preparation.

The "Guida" is divided into two parts, the first relating to the preparation for research, and the second to aids in research itself. Under the former title are considered the questions of historic method in general, of the bibliography of the history of mathematics, and of the material to be found in periodical literature. In the second part Professor Loria considers the material to be found outside the general histories, not only that which may be characterized under the head of guides to original sources, such as works on the reading of manuscripts, but such bibliographical and biographical works as bear upon the subject in hand. The topics include Greek, Roman, and Oriental biography and bibliography; biography of modern mathematicians in various countries; collections of

works of great mathematicians; catalogue material; reviews such as those in the *Jahrbuch über die Fortschritte der Mathematik*; and the method of using all this material.

Under each of these heads is given a list of books relating to the subject, often with a valuable note concerning an important work, so that the student is assisted in weighing the value of any book that he is likely to consult.

It will at once be seen that here is an aid to the study of the history of mathematics that will be serviceable to all students of the subject and that will save a large amount of dictating and directing on the part of those who give instruction. Whether or not the bibliography is as good as one could wish, it is still a decided help and as such it should be received. It is now nearly seventy-five years since such a work was first attempted in a small way, by De Morgan, but this effort was buried in the *British Almanac and Companion* for 1843, so that it is rarely seen to-day; and after all, there is little comparison between the two publications.

One of the simplest tasks of a reviewer is to pick flaws in such a work. The mass of material is now so great that it is almost impossible for a single writer to digest it all, especially in the case of monographs and articles hidden in the reports of associations and in periodicals not directly concerned with the history of mathematics. In considering the question of completeness this reviewer first went to his card catalogue and then to his bibliographical notes to see what was on his own shelves that was not listed. It was soon apparent that Professor Loria had simply made a selection, although the basis of this selection was not always apparent. Naturally the Italian writers are more fully considered than those of other countries, but numerous names are missing, presumably because they represent articles which originally appeared in periodicals to which a general reference is made. But whether all these periodicals are named, it is difficult to say, there being only an index of names of authors. There seems to be no reference to the *Comptes rendus* (Paris), for example, although this publication has numerous articles of a historical nature, and so it is possible that Italian references of the same kind are wanting.

The English bibliography is naturally less complete than that of Italy and France. For example, there is no mention of the following works: Anderson, edition of the Arenarius

(London, 1784); Harris, *Lexicon Technicum* (London, 1716); Wallis, the English edition of his algebra (London, 1685) which, while not as complete as the Latin, is more accessible to most readers; Raphson, *History of Fluxions* (London, 1715), a valuable work in spite of its bias; Woodhouse, on *Isoperimetrical Problems* (Cambridge, 1810), a helpful work on the history of the calculus of variations; Hutton, *Tracts on Mathematical Subjects* (London, 1812), worthy of mention as well as his dictionary; Taylor, translation of Bhaskara's *Lilavati* (London, 1816); Rigaud, on the first publication of the *Principia* (Oxford, 1838); Dacier, the English edition of his life of Pythagoras (London, 1707); Stewart and Minto, *Life and Writings of John Napier* (Perth, 1787); Trail, *Life and Writings of Robert Simson* (Bath, 1812); Bruce, *Memoir of Charles Hutton* (Newcastle, 1823), and many similar works. It may, of course, be said that such a name as Hutton is not international; but for English and American students, at least, many titles like the above would be needed. There are also four rather remarkable articles prepared for encyclopedias but often found printed separately, namely, Playfair's *General View of the Progress of Mathematical and Physical Science* (Edinburgh, 1816); Peacock's article on Arithmetic (London, 1825), justly held as one of the most scholarly treatments of the history of arithmetic in the English language, and his report on the recent progress of analysis (London, 1834); and John Herschel, *Mathematics* (Edinburgh, 1830), with some good historical material.

In French there are less frequent omissions, and yet a number of important works, some of them doubtless reprints, are wanting. Such, for example, are Biot's *Analyse des Ouvrages originaux de Napier relatifs à l'Invention des Logarithmes* (Paris, 1835); De Coste, *La Vie du R. P. Marin Mersenne* (Paris, 1649); Baillet, *La Vie de M. Descartes* (Paris, 1691, with an English edition in 1693); Dupin, *Essai historique sur Monge* (Paris, 1819); Savérien, *Dictionnaire universel de Mathématiques* (Paris, 1789), with considerable historical material; Bertrand's *Rapport sur les Progrès de l'Analyse* (Paris, 1867); and numerous minor works like those of Boyer (1900) and Bioche (1914).

There are also missing such works as Voss, *De quatuor Artibus* (Amsterdam, 1650), containing a *chronologia mathematicorum* not to be despised; Ramus, *Scholæ Mathematicæ*,

with considerable historical matter; Weidler, *De Characteribus Numerorum* (Wittembergæ, s.a.); Biering, *Historia Problematis Cubi duplicandi* (Copenhagen, 1844); Brugsch, *Numerorum apud veteres Ægyptios Demoticorum Doctrina* (Berlin, 1849); and Budaeus, *De Asse et Partibus eius Libri V* (Paris, 1514, and various other editions), works of no great value, except the last one, but still important enough to make it worth the while of students to consult them.

Such a list of omissions could, of course, be greatly amplified, and no doubt M. Eneström will see that this is done when the publication of *Bibliotheca Mathematica* is resumed. It would be possible also to mention several unimportant misprints, but this matter, too, may well be left for the careful if sometimes caustic pen of the Stockholm critic. The omissions are not mentioned by way of criticism, because no book of this size can be expected to give more than a limited selection from all the works upon the subject, even from the rather important ones; but they are given simply for the purpose of calling attention to the fact that students must not feel that the list given by Professor Loria is exhaustive. The book is merely a guide which points the general way, and the student must expect to supplement it at every step of his progress. Looked at in such a spirit, the book is a very welcome addition to our literature.

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Fundamental Conceptions of Modern Mathematics—Variables and Quantities. By ROBERT P. RICHARDSON and EDWARD H. LANDIS. The Open Court Publishing Company, Chicago and London, 1916.

THE volume under review contains Part I: on Variables and Quantities, and a portion of Part X: on Functional Relations, of the division on Algebraic Mathematics of the treatise entitled *Fundamental Conceptions of Modern Mathematics*. No mention is made of other divisions of the treatise, but twelve additional parts of the first division are announced. A synopsis of these later parts is given at the end of the present volume and the authors invite "suggestions toward improving the present redaction of these later parts" as well as "comments in criticism of Part I." Some of the topics which are to be treated in the later parts are domains and ranges; limits, bounds, and appanages; symbols, signs, and sigla; differentiation; integration, etc.