

## SHORTER NOTICES

*Storia delle Matematiche.* By Gino Loria. Volume I. Antichità; Medio Evo; Rinascimento. Torino, 1929. 497 pp.

This book is one that in an English translation would be very useful and welcome to teachers of mathematics, both in universities and in secondary schools. Its value to mathematicians will depend largely on their personal interest in the history and development of the subject; and the second volume, which will begin with the 16th century, will doubtless offer considerably more of interest to them. The present volume is in any case not just "another history of mathematics," for it is written in an original, individual, and vivid style which, combined with its general accuracy in matters of fact, assures it a place of its own in the literature of the subject.

There are 15 chapters, as follows: I, Ancient Mediterranean civilizations, pages 21-56; II, Greek mathematics in combinations with philosophy, 57-85; III, The law-givers of geometry [Euclid, Archimedes, Apollonius], 87-126; IV, The autumn of Greek geometry, 127-150; V, The mathematical work of the Greek astronomers and surveyors, 151-178; VI, The art of calculation and the science of number among the Greeks, 179-218; VII, "S.P.Q.R.," 219-235; VIII, Mathematics in Europe during the Dark Ages, 237-259; IX, The Chinese enigma, 261-295; X, At the foot of the Himalayas, 297-326; XI, The miracle of the Arabs, 327-377; XII, The Renaissance in Italy; Leonardo Fibonacci, 379-410; XIII, The Renaissance beyond the Alps, 411-441; XIV, Geometry in the service of painting, 443-454; XV, First manifestations of syncopated algebra, 455-487; Index of names, 489-497. Each chapter is followed by a bibliography of the most important original sources used in its preparation.

Opinions as to the best division of the limited space available in a book of this kind will necessarily vary with the individual taste and judgment of the author, but surely all will agree that one third of the space of such a volume as this is properly devoted to the Greeks. The Arabs occupy a somewhat larger proportionate share of the remainder than is usual in histories of mathematics, and this is also natural in view of the fact that the most recent researches have brought to light many new and valuable contributions made by the followers of Mahomet. For this reason this chapter is perhaps the most interesting in the book. The chapter on Leonardo of Pisa (Fibonacci) contains 26 pages, and it is interesting enough to justify the use of so much space, even apart from the fact that Leonardo is the first European writer to set out in orderly form the chief mathematical attainments of the middle ages, especially those of the Arabs, and that he appears as a star of the first magnitude shining among the lesser lights of his time in Europe.

Loria points out the great merit of the work of Levi Ben Gerson and of other Hebrews, who have perhaps been inadequately treated by most writers on the history of mathematics. To be sure, the author goes too far when he suggests calling the Sine Law of plane trigonometry "Theorem of Levi

Ben Gerson" for it was known to Albiruni\* and doubtless to other Arabs before his time. The accounts of Regiomontanus and Pacioli which conclude the volume are excellent.

Unfortunately, the quality of the paper and binding is inferior; and there are a number of misprints, among which the following are perhaps worth mentioning: p. 44, in the first equation  $x-1$  should be  $2x-1$ ; p. 124, l. 19, "semidiameters" should be "conjugate semidiameters"; p. 130, l. 14,  $a+b+c$  should be  $a+2b+c$ ; p. 136, l. 13, Thucydides' date should be "a. C."; p. 309, l. 16, "Brahmagupta" should be "Bhascara"; and p. 469, l. 4, "inscribed circle" should be "circumscribed circle."

It is to be hoped that the second volume will soon be published. As will have appeared from what has been said, it is the opinion of the reviewer that this first volume is a valuable addition to the available histories of mathematics, both for its lively and clear style and for its essential reliability in the synopses of the work of the writers cited.

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*Sophus Lie's Gesammelte Abhandlungen (Samlede Avhandlingar)*. Edited by Friedrich Engel and Poul Heegaard. Volume IV. *Abhandlungen zur Theorie der Differentialgleichungen, zweite Abteilung (Avhandlingar til Differentialligningernes Teori, anden Afdeling)*, edited by Friedrich Engel. Leipzig, B. G. Teubner, and Oslo, H. Aschehoug, 1929. xii+684 pp.

The three volumes of Lie's collected memoirs which have already appeared have been reviewed briefly in this Bulletin in the order of their publication, as follows: volume III in vol. 29 (1923), pp. 367-369; volume V in vol. 31 (1925), pp. 559-560; volume VI in vol. 34 (1928), pp. 369-370. The published memoirs of Lie are being gathered together in six volumes while a seventh is to be devoted to the principal works found among his literary remains. The memoirs on geometry are to go into volumes I and II, volume I being the next one promised; the memoirs on differential equations have appeared in volumes III and IV, the latter being the one now before us; while the memoirs on transformation groups are contained in the previously published volumes V and VI.

More than half of the fourth volume (pp. 1-264, with pp. 470-589 of the notes) is required for Lie's great memoirs of 1874-1877, published in the eighth, ninth and eleventh volumes of the *Mathematische Annalen*. These consist of a reworked and in some parts greatly extended presentation of the contents of fifteen earlier papers which are reproduced in volume III of the *Gesammelte Abhandlungen*.

The present volume IV contains altogether a total of eleven papers, printed on pages 1-448, while the notes and remarks (bound in a separate volume) appear on pages 449-684. Besides the three great memoirs already mentioned two other extensive papers are reproduced here, namely, the memoirs of 1895 and 1898 in the *Leipziger Berichte*. The editorial work continues to be done with such patience and care and skill as can be prompted only by devotion to a labor of love.

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\* *Die trigonometrischen Lehren des persischen Astronomen . . . . Al-Biruni*, by Carl Schoy. Hannover, 1927, p. 53.