

LORIA ON HISTORY OF GEOMETRY

Il Passato e il Presente delle principali Teorie Geometriche. Storia e Bibliografia.

Quarta edizione totalmente rifatta. By Gino Loria. Padua, Casa Milani ("Cedam"), 1931. xxiv+467 pp. 60 lire.

This work has been so long and favorably known, having already passed through three editions, that in the brief space allowed under present conditions for a review it will serve our purposes if attention is called to only a few of its leading features. It is divided into two books, (1) From the beginning of geometric research to the close of the 19th century; and (2) The progress of geometry in the last thirty years. Of these, the second will prove the more interesting to most readers because the field is new and the sources of information, classified in subsections, are not so generally known as those of the period before 1901. A brief statement of the chapters in the first book will, however, serve two useful purposes; it will show to those not already familiar with the earlier editions the general nature of the work as a whole, and at the same time it reveals the foundation upon which the later structure rests. Condensing the chapter titles, we may say that the first book covers the following general topics: (1) General view of the development of geometry up to about 1850, (2) Theory of algebraic plane curves, (3) Theory of algebraic surfaces, (4) Theory of algebraic curves of double curvature, (5) Differential geometry, (6) Forms of geometric figures, curves of higher orders, analysis situs, (7) Modern geometry of space, congruences, (8) Correspondences, projections, transformations, (9) Numerative geometry, (10) Non-euclidean geometry, (11) Geometry in n -dimensional space, (12) General summary. This part of the work is almost identical with the whole of the second edition (1896) and the major portion of the third (1907).

The second book consists of three chapters with various subdivisions comprising substantially the same topics as in chapters 1-12.

What will first strike all readers is the great amount of periodical literature examined and classified. That this is confined almost entirely to Italian, English, German, and French publications is to be expected, since it is here that the largest number of original articles have appeared, and since these are the only languages familiar to most scholars. There are also references, however, to a few periodicals in the Scandinavian languages, the Dutch, and the Japanese (articles in English, French, or German). Professor Loria has examined upwards of a hundred journals and has classified the articles relating to geometry in such a way that students can find sources with a minimum of difficulty.

In the second book he begins by paying tribute to the achievements of those great leaders in the domain of geometry who passed away in this thirty-year period, with a few names belonging near the close of the preceding century. In Italy there was that "noble triad" consisting of Brioschi, Beltrami, and Cremona; there was "Cesàro, nel fiore di una meravigliosa attività scientifica"; and still later there followed Veronese, Dini, Segre, and Bianchi. Germany lost

such men as Kronecker and Weierstrass; later, Reye and Sturm, "degni eredi della tradizione geometrica steineriana"; and finally Schwarz and Klein, "dei quali è superfluo ricordare le alte benemerite scientifiche." England had hardly recovered from the death of Cayley when she was called upon to mourn the loss of that "glorious triad" of Sylvester, Salmon, and Kelvin. France, to take but one other country, was called upon in this period to witness the departure of such great analysts as Bertrand, Hermite, and Jordan; and later of Poincaré and Darboux who contributed so strikingly to all branches of mathematics.

Professor Loria then surveys rapidly the significant contributions to one or two typical geometric problems,—the Poncelet polygons and, more generally, to the problems of closure, to the imaginary in geometry, and to various fundamental concepts, all made in the border years between the last century and this. In both parts of the work the purpose has been to give to the reader a rather exhaustive list of references instead of furnishing him with digests of the contents of the articles mentioned. For this list the student will be thankful.

One feature of the work is of particular interest to American scholars. Altogether there are somewhat more than a hundred names of members of the American Mathematical Society in the lists of authors of monographs to which reference is made. Substantially all of these articles are mentioned only in Book II; that is, these contributors to the single field of higher geometry outnumber all those of equal productive ability in this country, in the entire field of advanced mathematics, prior to the twentieth century.

In the earlier part of the work no serious attempt has been made to list the latest discoveries with respect to Babylonian, Sumerian, and Egyptian mathematics.

The most disagreeable duty of any reviewer is to call attention to errata, unless these concern matters of fact. Professor Loria mentions only three of this type, and no large number would be apt to enter into a book that is chiefly bibliographical. The misprints, however, are very numerous, and for purposes of reference the book is made less valuable thereby. It suffices to mention only a few of these errors to show the necessity for care in quoting authorities. For example, we have such proper names as Mange, Ronse Ball, Zeuthon, Sanguli, G. A. Scott for C. A. Scott, Snider for Snyder, and Kanser for Kasner; such mistakes in French accents as are seen in *découverte*, *problèmes*, *lumière*, and *théorie* and *theorie*; and such slips in spelling as *téhorème*, *moyns* for *moyen*, *system*, *mahtematics*, *Edinburg*, *spharischen*, *entwichelungen*, *Dreiek*, *Steinerion*, *Malh. for Math.*, and *Kurcen for Kurven*. Besides all these there are many errors in dates, such as (Fermat) 1655 for 1665; (van Schooten) 1661 for May 29, 1660; (Halley) 1724 for 1742; (Clairaut) 1715 for 1713; (D'Alembert) 1716 for 1717; (Laplace) 1743 for 1749, and others like 1808 for 1908, and 1821 for 1921.

I have occasionally called attention to the unusually large number of misprints in French and Italian works, apparently due to the fact that proof-reading is looked upon as the printer's concern rather than the author's. It is unfortunate.

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