

no allusion to any such theory. We wish that she had found it possible to introduce a brief notice of the analytical theory in which the circle is taken as the primary element in view of the fact that most of the properties of an important class of curves—bicircular quartics—are best discussed by expressing the equations of these curves in terms of *circular* coordinates.

It is also a matter of regret that the use of trilinear coordinates is retained, although results are usually given in terms of areal coordinates as well. The use of both systems is confusing to students, and the use of the areal system has a double advantage; firstly, the fundamental metrical formulæ are more easily proved, and secondly, the areal system is intimately connected with the tetrahedral system in solid geometry. For the latter reason, if for no other, it is very desirable that the use of trilinear coordinates should disappear from our text-books on plane geometry. In this book the proofs of two fundamental results (§§ 20, 21) are long and tedious.

The only other point we have to find fault with is that harmonic relationship and involution are introduced as particular cases of cross ratio and homography. The author herself admits (p. 160) that this view disguises the real difference between the two conceptions, and explains that while cross ratio and homography relate to different spaces, harmonic relationship and involution relate to pairs of elements in the same space. The theories are developed independently, but we should have preferred that the theory of harmonic groups and the theory of involution should have been developed before the introduction of the idea of cross ratio and homography.

The examples chosen by the author to illustrate various theorems have been very carefully selected, and should be found quite sufficient for the use of students. Among them will be found many theorems of independent importance, which could scarcely be said to come within the scope of the book. We may add that an excellent index is provided. R. L.

OUR BOOK SHELF.

Les Aurores Polaires. By Alfred Angot. Pp. 318. (Paris: Félix Alcan, 1895.)

FRANCE has made two important contributions to the knowledge of auroræ. Perhaps the first work devoted entirely to the study of auroral phenomena was the "Traité physique et historique de l'aurora boréale," by Mairan, published by the Paris Academy of Sciences in 1733. A century later a volume was published containing the results of aurora observations made on the *Recherche* during the scientific expedition to Lapland. The plates which illustrated the observations then made have been laid under tribute by M. Angot for the present volume. Since the publication, however, of the "Aurores Boréales" which resulted from the 1838-39 expedition, we have it on the authority of M. Angot that no work dealing wholly with the subject has appeared in France. This volume, therefore, stands as practically the only one in which our neighbours on the other side of the Channel can find a popular account of auroræ, written by one of their own countrymen.

M. Angot has treated the subject lightly, yet scientifically. He traces the history of aurora observations

from the time of Aristotle; describes the apparently adventitious forms assumed by the phenomena; explains the facts as to the extension, position, frequency, and periodicity of auroræ; develops the relations between auroral and terrestrial magnetism and electricity, and connects them with meteorological phenomena; and, finally, he presents the cosmical, optical, magnetic, and electrical theories put forward to account for the phenomena.

A list is appended, giving in chronological order all the auroræ seen in latitudes above 55° North from 1700 to 1890, with the names of the places at which observations were made. Eighteen rather coarse illustrations are distributed through the book. Altogether, the volume is a valuable summary of the growth of knowledge of auroræ.

A Few Chapters in Astronomy. By Claudius Kennedy, M.A. (London: Taylor and Francis, 1894.)

IN these 150 pages are discussed four or five of the numerous problems in astronomy, and these are handled in such a manner as to make them full of interest, both for the general reader and for the student. This book, unlike many others, is not written for the sole purpose of pouring condensed knowledge into the student's head, but for those who wish to sit down for half an hour or so and read for recreation, and so gain a fair understanding of some of the discussions contained in them, without going into too great detail. The points chiefly referred to, are, visual illusion affecting certain astronomical phenomena; the effect of the earth's rotation on certain moving bodies, as projectiles, paths of projectiles, Foucault's Pendulum and the Horizontal Pendulum; the causes of the tides; the moon's variation; and the parallactic inequality. In the last two chapters the text is accompanied by several figures.

As a supplement to the ordinary text-books on astronomy, this small volume will be found especially useful, as it deals with subjects not generally referred to in them, or at least only briefly mentioned.

Mechanics for Colleges and Schools: Statics. By R. T. Glazebrook, M.A., F.R.S. Pp. 180. (Cambridge University Press, 1895.)

THIS addition to the physical series of the Cambridge Natural Science Manuals will hardly add to the reputation of the assistant director of the Cavendish Laboratory. The only noteworthy feature is the prominence given to the experimental verification of statical principles; but excepting this, little can be found to distinguish the book from others of a similar type. Many of the experiments described are intended to be performed by the students, and the theoretical consequences are, when possible, deduced from experiments. This is undoubtedly the right line to go upon, but we are afraid that few of our schools or colleges possess at present sufficient apparatus for the laboratory work described. The text is clear and concise, and sufficiently illustrated; and the examples are numerous.

The Telegraphist's Guide. By James Bell, A.I.E.E. Pp. 101. (London: Electricity Office, 1895.)

TELEGRAPHISTS in the Government service have now to submit themselves to a technical examination before they can obtain promotion. Herein we have a guide in which the subjects of the new examination are considered in the order laid down by the Postmaster-General. The aspiring telegraphist will find the book a means of acquiring the knowledge he needs; and students of telegraphy not directly connected with the service, may obtain from it useful information on the practical working of telegraphic systems.