

The first three chapters are devoted to astronomy from the earliest times to the beginning of the sixteenth century. The author has confined his account almost entirely to the East, omitting the astronomy of the Egyptians, the Chaldeans and the Chinese, owing partly to the difficulty of obtaining first-hand information and partly to the unsettled state of the interpretations which Oriental scholars put on the records which have come down to us. We hope that this omitted portion may in the future be described by as able a hand. Whole chapters are devoted to Copernicus, Tycho Brahe, Galilei, and Kepler, showing how the subject was gradually emancipated from mere speculation and emerged into a science in which observations were collected and theories tested by means of them.

Of the discoveries of Newton and his immediate successors, Mr. Berry naturally gives a full account. From this time, the subject has been divided into two parts, gravitational and descriptive. The former may be said to consist almost entirely in the complete verification of the law of the inverse square coupled with the laws of motion. In later times, the latter has been subdivided into observational, physical, and descriptive astronomy, and the author finds it necessary to adopt these subdivisions for the eighteenth and nineteenth centuries. A full chapter is devoted to Herschel as the first man to systematize observational astronomy. The description of the work of the last century is necessarily much condensed as a large number of partly isolated subjects have to be discussed; but, wherever possible, the main idea involved in every advance has been given.

ERNEST W. BROWN.

Die Mathematiker und Astronomen der Araber und ihre Werke.
(Abhandlungen zur Geschichte der mathematische Wissenschaften mit Einschluss ihrer Anwendungen. X Heft.)
Von HEINRICH SUTER. Leipzig, B. G. Teubner, 1900, ix + 278 pp.

A CATALOGUE of over five hundred names of mathematicians and astronomers does not give promise of much interest to a reader. But anyone who takes the trouble to dip into Dr. Suter's volume will be pleasantly disappointed if he merely expects to find a list of authors and writers with the titles of their works. To read through such a book is of course out of the question, even for a reviewer, and yet merely to put it on the shelf ready for a chance reference

would be doing it an injustice. Although the author has kept in mind his main idea, which is to give an outline of the work done by the Arabians and where it may be found, he has inserted many interesting details about the lives of those who labored for science during the period under consideration.

For example, a choice morsel from the autobiography of Ibn Sînâ (born 980 A. D.), who certainly did not suffer from false modesty, runs as follows: “* * * Under him (one of his teachers, el-Nâtalî) I began the Isagogus; but when it was known that I was obliged to correct him in the definitions of the categories, every one was filled with amazement. Whatever the question put to me, I solved it better than he did and when we turned to the study of logic I showed him that he did not understand the more difficult parts of it. * * * I went on then to the *Almagest*. When I got to the end of the introductory propositions and arrived at the geometrical ones, el-Nâtalî told me to go and read the book alone and then he and I would read it together and he would point out which results were correct and which incorrect. I began to study it and it soon appeared that I had to explain many of the propositions since he had not, up till then, properly understood them. * * *” However, Ibn Sînâ was somewhat of a *bon vivant* and, though he wrote several works, left no great mark on his subject.

Here and there occur names that bring back pleasant memories of the Arabian Nights, a world of fiction which seems far distant from our subject. But in those days the progress of any kind of intellectual culture was largely in the hands of the reigning prince. The astronomer expected to earn his living by making out horoscopes and casting nativities, whether he believed in them or not, just as surely as the mathematician of our own times expects to make his by teaching; and the success which might attend him probably depended much more on his luck and the ability of the ruler than on his capacity as an astronomer.

The period selected by Dr. Suter runs from 750 A. D. to 1600 A. D. which includes, according to him, everyone worth a notice. For the first hundred and fifty years of this time the Arabians were gathering together and assimilating the works of those who had gone before, chiefly from the schools of Greece and India. A succession of powerful chalifs, amongst whom we notice our old friend Hârûn-el-Rašîd, had been the means of stimulating intellectual progress along with the general rise of civilization amongst the people. They gathered around the court the ablest men

and encouraged the formation of schools. The best work was done during the next 375 years, and it was in that time that such additions as the Arabians were able to make to the subject were achieved. From 1275 on, the scientific men were chiefly employed in designing new kinds of astrolabes and quadrants and in the writing of text-books.

Interesting as Arabian science may be to the general historian it is not of very great importance to the mathematician. But the Arabians did a great service in keeping alive the works of their predecessors during a dark period in Europe. Many of the discoveries of the Greeks have been preserved in the numerous manuscripts which the Arabians left and which have escaped destruction. And not the least of their contributions was the introduction of our present number system which they obtained from India and used in preference to the cumbrous Greek and Roman methods. If for no other reason, they deserve to be remembered for this.

ERNEST W. BROWN.

NOTES.

THE eighth summer meeting of the AMERICAN MATHEMATICAL SOCIETY will be held at Cornell University, Ithaca, N. Y., beginning Monday, August 19, 1901. Members of the Society will thus be enabled to attend both the summer meeting and the meeting of the American association for the advancement of science which is held at Denver, Col., beginning August 24. In connection with the summer meeting of the Society, arrangements are being made for a colloquium. Professor E. W. BROWN has consented to give a course of six lectures on "Modern methods of dealing with the problems of dynamics and especially those of celestial mechanics, consisting mainly of the work of Poincaré in this direction." The precise title of these lectures will be announced later. A second course of lectures will also be arranged.

AT a meeting of the Cambridge philosophical society, held on November 26, 1900, the following mathematical papers were read: By Mr. T. J. F. A. BROMWICH: "Some theorems in regard to matrices."—By Mr. J. H. GRACE: "On the rational space curve of the fourth order."

THE Cracow academy of sciences, at its general meeting