

matrix an expression he calls its determinoid. This is, in fact, a sum of maximum determinants, taken from the matrix, with a rule of sign for each. There can be no doubt of the value of the theory of matrices, and that a good book on the subject is a desideratum. Whether the notion of a determinoid is likely to be anything like so valuable is a doubtful question, and we confess that we would rather have had a treatise on matrices alone. The present volume ends with a chapter on the solution of any system of linear equations, and to read this first of all is perhaps the best way to become favourably impressed by the treatise. The earlier chapters seem rather diffuse, and contain a large number of new technical terms, some of which, like "corranged," are not at all attractive. The next volume will contain applications to algebra and geometry, besides a discussion of matrix equations of the second degree. When this appears it will be easier to form a judgment on the work as a whole; meanwhile, we can see that it contains a great deal of valuable matter expressed in one consistent notation.

G. B. M.

OUR BOOKSHELF.

Brands Used by the Chief Camel-owning Tribes of Kordofan. (A Supplement to "The Tribes of Northern and Central Kordofan.") By H. A. MacMichael. Pp. viii + 40 + xvii plates. (Cambridge University Press, 1913.) Price 6s. net.

NEARLY thirty years ago Robertson Smith lamented that no good collection of *wasms* (the tribal marks with which every Arab tribe brands its cattle) had been made, and now Mr. MacMichael has published as a pendant to his history of the Arab tribes of Kordofan a collection of the marks used by these tribes as camel brands. The utility of such a work to the members of the Sudan Civil Service is too obvious to need accentuation, but there is also a good deal of scientific interest attaching to it, although the writer's experience in the Sudan makes him regard it as improbable that the high hopes cherished by Robertson Smith will be realised, that such collections will enable us to trace the ancient history of the people.

No doubt each tribe, or each section of a nomad tribe, once had a distinctive brand, but it seems that in many cases this has been lost, or at least has fallen into disuse. The brands themselves are for the most part named after common objects, such as *bersham*, the "cross-hilt of a sword," and *bab*, "a door," while others derive their names from the part of the camel which is branded; thus, *bakkai*, derived from the word meaning "to weep," is applied to a linear vertical mark below the eye, because it is here that tears trickle down. Generally the brand is highly conventional and

unlike the object it represents, but in a few cases, though simplified, it retains all the essentials of the original, as, *e.g.*, the *rigl el ghorab*, a "crow's-foot," used by some of the negroid "Arabs" of the northern hills.

Rainfall Reservoirs and Water Supply. By Sir A. R. Binnie. Pp. xi + 157. (London: Constable and Co., Ltd., 1913.) Price 8s. 6d. net.

IN the application of exact meteorological observations to practical life, the utilisation of rainfall records by the waterworks engineer takes a foremost place. Rainfall is moreover among the most important of the natural resources of a country, and it is fitting that Sir Alexander Binnie should put together the results of his wide experience in a book which will impress the townsman with this fact in its more direct association with his daily life, in addition to giving to the engineer a survey of the problem with which he is faced, and of the methods of dealing with it.

The first chapter treats of the measurement of rainfall and the variation in amount from year to year and place to place; diagrams are given to show how the total fall increases as the ground rises, and emphasis is laid upon the fact that in a region with a prevailing wind direction the maximum rainfall frequently occurs on the lee side of the high ground. Another diagram illustrates the approach of the average annual rainfall to a normal value as the number of years increases; thus one year may be 50 per cent. above or 40 per cent. below the normal, but the average of ten years is not likely to differ by more than 10 per cent. in either direction from the normal value.

The next chapter deals with the flow from the ground, floods, and evaporation, about which our knowledge is very deficient owing to the scarcity of trustworthy records. Subsequent chapters are devoted to the methods of calculating the available supply, the construction of reservoirs, and the arrangements for conveying the water from the source and distributing it to the users. There is much that is technical naturally in these chapters, but the subject is treated in such a way that even the details are made interesting, and their importance for safety or economy is clearly shown.

E. G.

Planetologia. By Ingegnere Emilio Cortese. Pp. vii + 387. (Milan: Ulrico Hoepli, 1913.) Price 3 lire.

IN view of the fact that nearly 300 pages are taken up with terrestrial phenomena, and only eighty pages are devoted to the remaining members of the solar system, the title "Planetologia" scarcely seems suitable for the present book. Perhaps the author could not think of a more suitable title.

The book contains an exposition of some of the main physical properties of the earth's crust, the age of the earth, its past geological history, the theories of tides, earthquakes, volcanoes, the origin of the earth's atmosphere, and the principal