

ematicians in a branch of pure mathematics which becomes the more fascinating the more it is studied," and thus accomplish the author's object.\*

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CORNELL UNIVERSITY,  
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### SHORTER NOTICES.

*Traité de Nomographie.* Par MAURICE D'OCAGNE. Paris, Gauthier-Villars, 1899. ix + 480 pp.

GIVEN a function of several variables, to read off its approximate values for all values of the variables, by simple inspection of a diagram drawn once for all—such is the general problem the investigation of which has led to this attractive volume. The diagram is often provided with travelling parts. The whole apparatus is called an *abacus*.

The problem is primarily a practical one. The technical arts force upon us relations or laws. So soon as a law is of frequent occurrence, its abacus is desirable. Even where great accuracy is required, an abacus is useful for getting a first approximation: for instance in the calculation of annuities (Abaque de M. Prévot), or in the solution of Kepler's equation

$$a - e \sin a = \mu$$

(abaque de M. d'Ocagne).

The scientific question as to what laws are capable of such exhibition is reserved for the final chapter. The rest of the book consists of classified instances. These instances are of quite surprising range and power. Practically a new subject is sprung upon us, claiming to be useful in so many directions that it would strain the faculty of an institute of technology to review the book in full detail. Thus we find an abacus (again by M. Prévot) used in the construction of the chromatic harp, an abacus of the penetration of light from a lighthouse (M. Allard), of the march of troops (M. Goedseels), of the deviation of the compass for an assigned ship (M. Lallemand), of the gauging of yachts (M. Chancel). These few random instances will serve to indicate the possibilities of the abacus in abolishing needless arithmetic. But the applications to the classic problem of

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\* P. vi.