

first part consists of 200 pages, comprising the families Ranunculaceæ to Aquifoliaceæ, but, unfortunately, we have to wait for the concluding part of the work for the appearance of the introduction and key to the families. Without these the "Flora" loses some of its value and much of its interest, and it is to be hoped that the publication of the succeeding parts will take place as rapidly as may be possible.

The plan followed in the "Flora" is that adopted by Prain in his "Bengal Plants," and is a plan admirably suited for a local flora where the easy identification of the plant is the object in view. Descriptions of species are therefore omitted, and the whole flora is in the form of key. A description of the natural family is succeeded by a key to its genera. Each genus is concisely described, and a key to its species follows, and then under each species there is no further descriptive matter, but only geographical and economic information and vernacular names. In those genera represented by only a single species, a short description is given. The keys are well drawn up, and a good test of their efficacy is to be seen in the genus *Impatiens* with its seventy species, which are all clearly differentiated. It should be mentioned that Mr. Gamble was assisted by Mr. S. T. Dunn in the preparation of about the first 132 pages of this part.

*The Theory of Abstract Ethics.* By T. Whittaker. Pp. viii+126. (Cambridge: At the University Press, 1916.) Price 4s. 6d. net.

THIS book is the result of stimulus applied, as the author informs us, by Prof. Juvalta's "Old and New Problem of Morality." Though awakened from dogmatic slumber by Renouvier, Mr. Whittaker had continued, in accordance with English tradition, to try to derive the ethical law of justice from "ends" or "goods." But the *a priori* cannot be avoided; and if a metaphysical doctrine emerges that is more in harmony with the moral aspirations of mankind, we must not refuse to consider it out of a forced austerity.

The fundamentals of every moral system are liberty and justice; and abstract ethics, as distinguished from the art of life in general, is a kind of impersonal science of the conditions under which all the types are bound to live in common. In the present state of affairs, however, the author naturally expatiates into concrete ethics and politics, giving a useful summary of Kant's view. The moral law recognised within states should be extended to their mutual relations, with the aim of eternal peace, which will be possible when we have progressed to a permanently superior political society. But he did not postulate a world-state so much as a family of states each respecting each other's individuality. Finally, on the last page, the author permits himself a legitimate speculation, perhaps too friendly, in the direction of reincarnation, which is certainly one feasible way of resolving many moral problems.

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#### LETTERS TO THE EDITOR.

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#### The Method of Curves.

THE expression of the results of observations and experiments by curves became common during the first half of the nineteenth century. One of the first instances was given by Perkins (*Phil. Trans.*, 1826) in a paper on the compressibility of water.

Six years later Sir John Herschel (*Trans. Ast. Soc.*, v., 1) gave an account of the method of graphical construction on squared paper as applicable to astronomical computations and physico-mathematical inquiries.

"The dates in years and decimals are measured as abscissæ, and the angles in degrees and decimals as ordinates. The next step is to draw by the mere judgment of the eye, and with a free but careful hand, not through but among the points, a curve presenting as few and slight departures from them as possible, consistently with the character of large and graceful sinuosity, which must be maintained at all hazards.

"But since an equal trustworthiness can probably not be placed on all the observations, we must take care to distinguish those points which correspond to observations entitled to the greatest confidence, such as those which appear to have been made under peculiarly favourable circumstances, or which rest upon the average of a very great number of individual measurements. These should be marked on the chart in some special manner not liable to be mistaken, and when we draw the curve we must take care to make it pass either through or very near all those points which are thus distinguished; or at least to deviate from them with much more reluctance than from such as have no claim to our peculiar attention.

"By substituting the curve for the points we have made a nearer approach to nature, and in a great measure eliminated errors of observation."

A few years later Regnault (*Mem. Acad. Sci.*, 1847, xxi., p. 316) reduced the method to a fine art. To represent the expansion of mercury he used four copper sheets, 80 cm. square, each divided into 10,000 squares. Within these squares values were marked by a special dividing engine, one bevelled edge of the heavy base of which was graduated into 8 mm. divisions and tenths. A carriage running on a half-millimetre screw, the large head of which was divided into 50, so that 0.01 mm. could be accurately measured, carried the burin. Experimental values were marked by the intersections of lines drawn by the burin. A free curve was drawn by Regnault, which was completed and engraved by an artist. Even with these precautions a constant error was detected in the last plate.

The introduction of the copper plate and dividing engine seems to conduce to the accuracy and permanence of the record.

The method has been rendered more easy of application and possibly more accurate by the introduction of mechanically ruled paper, a good sample of which of French manufacture consists of sheets a metre square, ruled into millimetre squares, each edge of which is divided into 0.2 mm. by dots. Free hand-curves have also been more or less replaced by mechanically cut curves and flexible laths.

Notwithstanding the very general use of the method and many theoretical accounts of it (Whewell, "Nov. Org. Ren.," 1858, p. 204; Stanley Jevons, "Principles