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SEEDS OF FLOWERING PLANTS.

Studies in Seeds and Fruits: an Investigation with the Balance. By H. B. Guppy. Pp. xii+528. (London: Williams and Norgate, 1912.) Price 15s. net.

IN this work we find the results of Mr. Guppy's investigations on the seeds of several flowering plants. The investigations seem to have been prompted by a statement by Goebel to the effect that the biology of the ripening fruit has hitherto scarcely received attention, and a further statement by Pfeffer that the means by which the power of resistance to drying is gained and the changes which cause its loss are quite unknown.

Such subjects are investigated as the permeability and impermeability of seeds, their hygroscopicity, shrinking and swelling, their homologies, their dehiscence, the proportions of the different parts of the fruits, the relation between the number of seeds and the size and weight of the fruit, the abortion of ovules and the failure of seeds, seed coloration, the weight of the embryo, the rest period of seeds, and finally "the cosmic adaptation of the seed." It is impossible in the space of a short review to give any adequate ideas of the whole of the author's investigations.

From the beginning his "usual plan of following indications was adopted, forming crude hypotheses as [he] went along, and dropping them as soon as they had lost their usefulness. Many points, of course, remained undetermined," and Mr. Guppy only offers "a contribution to the study of a difficult but highly interesting subject." In the cases investigated it was found that all the ovules begin to respond to fertilisation; but it frequently happened, as in *Arenaria*, *Stellaria*, *Primula*, *Scilla*, and *Iris*, that only two-thirds of the original complement of ovules developed into mature seeds. In several legumes a marked constriction results from the abortion of the ovules, the degree of constriction being determined by the number of contiguous failures.

Special stress is laid on seedless fruits, where the fruit develops under the stimulus of pollination but the seeds fail. The author's results, so far as they go, are full of interest, and he fully realises that much more must be determined before it is possible to draw safe generalisations. To some readers the book will appear discursive and perhaps unconvincing, and without doubt the salient features of the work could have been expressed in fewer words; but throughout the book one sees the unprejudiced observer at work, and many of the results obtained are both interest-

ing and important. Its very discursiveness has a kind of charm, and there is an occasional incisiveness which is refreshing, as in the following:—

"Lord Avebury would regard such persistently functionless ovules as carrying us back to the time when . . . all the ovules developed into seeds. Prof. Bower holds a similar view with reference to the abortive ovules in the beak of a fruit of *Anemone nemorosa*. . . It should, however, be pointed out that this would not follow if we accept the standpoint taken by Dr. Goebel . . . that functionless organs in plants are not necessarily the vestiges of former completely developed ones, and that many more primordia are laid down than become functional."

Each chapter is supplied with a full and useful summary, and there is an excellent index. It is refreshing to find that Mr. Guppy is not content with vaguely referring to authorities, but supplies the name of the work and the volume and the page of the authors he refers to. In this last respect, as well as in some others, his methods are worthy of being adopted by more pretentious writers.

ENGINEERING SCIENCE..

Mécanique Appliquée. By Prof. John Perry. Ouvrage traduit sur la Neuvième Edition Anglaise par E. Davaux. Avec des additions et un appendice sur la mécanique des corps déformables by E. Cosserat and F. Cosserat. Tome Premier. L'Energie Mécanique. Pp. vii+398. (Paris: A. Hermann et Fils, 1913.)

THERE must surely be few text-books about which such conflicting opinions are held as this well-known book on applied mechanics by Prof. John Perry. One of these opinions, favourable to the book, is held by a majority of teachers of engineering science and by almost all engineers. The other, which is equally unfavourable, is confined to a minority of teachers—doubtless the "academic persons" to whom the author so often refers. There must be something fundamental, some conflict of principle, which can produce so wide a difference of opinion between persons equally competent to judge. We are aided in arriving at the nature of this conflict by the fact that engineers outside the colleges are almost universally in its favour; as they are, indeed, of each of the author's text-books relating to engineering subjects. Perhaps a parable may be admitted. We picture two travellers desirous of arriving at the same destination, one of them alert to have all the precise formalities of the journey carefully observed, and the other careless of by-laws, and only careful that he shall arrive at his destination by a road which, while reasonably