

vidual workers with one another and with the results attained in the most exact researches. This leads up to a consideration of the conclusions that can be drawn from the work, or of the additional experiments that must be made before any conclusions can be drawn.

It is to be feared that those teachers who most need the stimulus and the criticisms of this book will be the last to read it; but many younger teachers, who have already tasted of the tree of knowledge, will find in the book fresh inspiration for the study of chemical discovery, and guidance as to its application in the daily routine of the school.

T. M. L.

Cocoa and Chocolate.

Cocoa and Chocolate: Their History from Plantation to Consumer, by Arthur W. Knapp. Pp. xii+210. (London: Chapman and Hall, Ltd., 1920.) 12s. 6d. net.

MR. A. B. WALKLEY has recently explained in his inimitable fashion how the whole future of the drama and dramatic art in England depends on the withdrawal of the rule that chocolates must not be sold in theatres after 8 p.m. A commodity which has such a profound, if indirect, influence on an important phase of English culture merits serious treatment, and it was clearly time that the history of cocoa and chocolate should be written, and written in a popular fashion.

When, about 1735, Linnæus coined for the cacao tree the picturesque name of *Theobroma cacao*, the English chocolate-making industry had been in existence about seven years. It made slow progress in its early days, and 100 years after its inception the imports of cacao beans amounted to only 450 tons per annum. Since then, and especially in the last ten years, the rise has been remarkable, the imports of the raw material for home consumption in 1919 being over 64,000 tons. In addition, there are considerable imports of foreign-made cocoa and chocolate. The chocolate-maker has, therefore, no reason to complain of the descent of chocolate from its lofty estate as a food of the "gods" to the more humble condition of the flapper's confection.

Mr. Knapp is connected with an enterprise which not only makes everything that can be made from cacao beans, but also owns plantations of cacao trees. He has had, therefore, unique opportunities of making himself acquainted with every branch of the industry, and he has clearly not only utilised these opportunities to the full, but also has thought to some purpose about the

numerous unsolved problems connected with cacao-planting and the preparation of the beans for the market. There must be few planters whose ideas on the shading of cacao trees, the fermentation of the beans and the characteristics of a good cacao will not be clarified by a perusal of Mr. Knapp's pages.

Though chocolate is regarded by the ordinary person as a luxury, it has always had a band of devotees, who regard it as an important food-stuff. Mr. Knapp is one of these enthusiasts, and he provides the inevitable table, comparing the "fuel value" of chocolate with those of some ordinary foods. He omits, however, all reference to price per calorie, which would bring out the interesting fact that even plain chocolate is an expensive food, and that when consumed in the form of those super-confections which, if one may judge from the contents of chocolate-shop windows, constitute the bulk of the chocolate consumed to-day, it is a very expensive food—in fact, as the plain man believes, a luxury. The author of so interesting a book as this may, however, be forgiven a trifling obsession of this kind. It is a book which should be in the hands of all officials of tropical agricultural departments (for whose experimental work Mr. Knapp expresses much admiration) and of all cacao planters, and it is so simply and clearly written that it might even be read by the chocolate consumer if there were in this country any adequate machinery for making the existence of interesting technical literature known to the general public. The illustrations are numerous, good and well selected.

T. A. H.

Our Bookshelf.

An Introduction to Combinatory Analysis. By Major P. A. MacMahon. Pp. viii+71. (Cambridge: At the University Press, 1920.) 7s. 6d. net.

In this little book Major P. A. MacMahon has given a short introduction to his two volumes on combinatory analysis which were published in 1915-16. The theories of combination, permutation, arrangement, order, and distribution which are dealt with in those volumes present technical difficulties; it is, therefore, a great advantage that such an introduction should exist, for the gradual development of the subject by easy stages will prove interesting to the reader and whet his appetite for the larger tomes which await him.

In the first chapter the elementary theory of symmetric functions is introduced, and on it the theory of distributions is afterwards based. The author treats in turn the simplest problems of the distribution of objects into boxes, one object