

The most important part, however, of this long chapter of 64 pages is the summary prepared by Prof. Copeland of the scientific work, mostly done during the last decade, aiming at the improvement of the crop, both in the East and in Europe and the United States. The crops in the tropics are almost always grown as a mixture of varieties or even species, and it is obvious that the first step is always to separate these, whether by mass selection, which usually comes first, or by the separation of pure lines; and it is in the latter direction that practically all the economic successes have hitherto been obtained. This is the case with wheat, cotton, jute, and other crops, and more so still with rice: almost the only crop in which crossing has been the main line of work is the sugarcane, which is always reproduced in cultivation by the vegetative method. But the analysis of the separate characters of these crops has also commenced in most cases, bringing with it a world of difficulties, which show that progress along this line in the improvement of crops will be a long and intricate matter.

In the case of rice, the author asserts that the raising of improved varieties by cross fertilisation is additionally handicapped by the form of the flowers. The glumes are so thick and tightly closed until just before or even after anthesis, that natural crossing is of the rarest; and he can only point to one case in which artificial pollination has been successfully accomplished. In this case, the severity of the method, cutting right across the glumes with a sharp pair of scissors and emasculating by fine forceps, seems sufficiently drastic to defeat the ends in view. We may only remark that various scientific workers in India do not appear to have met with this difficulty in crossing rice varieties.

Space limits prevent an adequate consideration of the remaining general chapters, namely, those on climate, etc., pests and diseases, and the uses of rice. The first of these is very short, but the questions that arise are referred to in all parts of the book. As regards the second, rice in the tropics has always been spoken of as a crop which, by its extensive method of cultivation, has escaped the devastation by pests and disease so largely met with in other crops, and this is largely true. Undoubtedly, for various reasons there has been less attention paid to the crop in the tropics than to other cultivated plants; but the formidable summary which is presented in the 50 pages devoted to the subject—largely of work in Europe and the United States—is sufficient to raise doubts as to the correctness of this comfortable preconceived idea. The absence of any picture, beyond a couple of plates by Dammerman of borers in Java, is a distinct loss in this chapter.

The uses of rice, dealt with in the short final chapter of 10 pages, are briefly summarised; but, of course, a great deal more could have been said about them. The statement that the straw is "useless for fodder" will scarcely be accepted in India (as an example of a country where pasture is either non-existent or inadequate), for paddy straw is the main and often the only fodder during the greater part of the year in rice-growing tracts. It is true that this is less marked in Burma, where Indian visitors are accustomed to deplore the wasteful treatment of the straw; but here, owing to the sparse population, other sources are available for fodder and there is a larger amount of waste land than in any part of India. This sparse population is, it may be remarked, the chief reason for the export of rice from the east, for paddy is scarcely ever grown as a "money crop," any more than millets are: it is only when there is a surplus owing to an unusually good monsoon that enough can be spared to send any to the countries of the west. One last point, the use of the word "paddy" is rather strictly confined in the East to the crop and the raw unhusked product, and the additional meaning, which we have not met with before, of the space between the bunds confining the water, is to be deprecated.

C. A. B.

Science and Folly.

Foibles and Fallacies of Science: an Account of Celebrated Scientific Vagaries. By Prof. Daniel W. Hering. Pp. xiii + 294. (New York: D. Van Nostrand Co., 1924.) 2.50 dollars.

"**L**ORD, what fools these mortals be," quotes the reader as he lays down Prof. Hering's book "*Foibles and Fallacies of Science.*" Astrology, the transmutation of metals, perpetual motion, divination, prophecies, charlatanism, are some of the titles of the chapters, and they give a good idea of the contents of a book which contains much curious and interesting information.

But is the title of the book correct? The foibles and fallacies about which Prof. Hering writes are certainly not those "of science"; they are really those "of human nature." In fact, the chief interest of the book is the light it throws upon the folly of mankind, not only of the so-called uneducated masses, but also frequently of the highest intellects of the age.

All branches of science—at least all the older branches—have suffered from the pseudo-scientific and the charlatan; in fact, one could judge of the extent to which a branch of science comes into contact with human life by the extent of the foibles and fallacies which have grown about it. It is an instructive study

to try to work out the psychology of the makers of one type of fallacy, and as the weather has always been a favourite subject for the pseudo-scientific, we may usefully give a little thought to considering the ways of the weather prophets who figure so largely in Prof. Hering's book.

We need not devote much attention to the astrologer, for weather was not a speciality of his; it was only an incidental. It is in the compilers of almanacs that we first meet with the professional weather forecaster. The first of these predicting almanacs appears to have been Old Moore's, which claims 1700 as the date of its birth and is, we believe, still going strong. Similar almanacs are published in most countries, from which it would appear that there are still people who find these weather forecasts interesting and probably useful. That it is not only unintelligent people who put their trust in such forecasts is clear from the remarks one has frequently heard about the weather columns and diagrams which have appeared since the War in one of our contemporaries devoted to country pursuits, travel and sport. How can we explain this except by that peculiar trait of the human mind which makes us remember those things which fit in with our preconceived ideas and ignore those which would prove us wrong? Every success of a forecaster in whom we believe is remembered, and as we take no particular notice of the failures, our impression—perfectly conscientious—is one of unbroken or nearly unbroken success. Unfortunately, the same process produces an impression of a series of failures on the part of the official forecaster, for no other reason than that, because we are British, we distrust everything official, note his failures, and take his successes as a matter of course.

What, however, are we to say about the makers of the forecasts? Surely they check their forecasts and must be painfully aware of many dismal failures? Any one who has had much to do with this class of weather prophet must have been struck by their great sincerity. There is no money to be made out of weather forecasting, so charlatanism is no solution of the problem. The explanation, and we speak from much experience, is that these men have as a rule evolved a most complicated system on which they base their forecasts, and these systems are never in their final form. Hence, after every failure they re-examine the grounds on which they made their forecast, and then find that if they had only taken so and so into account, or put less stress on something else, they would have got a perfect forecast. The examination, instead of making them mistrust their system, rather makes them realise how perfect it is if only it is accurately applied.

Prof. Hering also devotes several pages to rain-making and rain-makers, and describes the chief methods employed, but he does not mention the method, evolved as a result of the visit of the British Association to Australia, of electrifying the upper atmosphere by means of kites and balloons, which was offered to the Australian Government by a gentleman with a very appropriate name. Here again we meet with a remarkable amount of credulity; for in most cases the rain-maker thoroughly believes in his method and is sure it will work if only tried on a sufficiently large scale. There is, however, one clever man who makes a very good living out of rain-making. Mr. Hatfield is prepared to go anywhere and make rain on the principle of payment by results. If Mr. Hatfield makes no rain, he asks for no pay; while if he does make rain, he only asks for payment at the moderate rate of 3000 dollars an inch. His rain-making equipment consists of a huge tank 20 feet high, in which he brews a mystic chemical mixture which he says "opens up the clouds." Mr. Hatfield has been extensively employed on these terms in the United States, apparently to the mutual satisfaction of every one concerned. It is difficult to see anything wrong with this, viewed as a business transaction.

If we have estimated the character and motives of the pseudo-scientific weather prophet correctly, he is not such a bad fellow after all, and probably the same could be said of most of those responsible for the other foibles and fallacies described in the book, but we doubt whether Prof. Hering would agree with us, for he is somewhat hard on scientific folly. G. C. S.

Cambridge Biographies.

Alumni Cantabrigienses: a Biographical List of all known Students, Graduates, and Holders of Office at the University of Cambridge, from the Earliest Times to 1900. Compiled by Dr. John Venn and J. A. Venn. Part 1 (in 4 vols.). *From the Earliest Times to 1751.* Vol. 3: *Kaile—Ryves.* Pp. v + 504. (Cambridge: At the University Press, 1924.) 150s. net.

THE death of Dr. John Venn since the preface to Volume II. of this monumental work was written allows the reviewer to pay tribute to his magnificent services to Cambridge history and at the same time to emphasise the value of his son's contribution, not merely to the present volume, but also to the whole work. On him alone will now fall the duty of completing the Appendix, including the corrections and additions to the first three volumes. Isaac Newton apart, the present volume (Kaile—Ryves) does not include the names of many well known to science.