river flood and protect certain areas in time of the inundation; while no less important are the river-training works to restrict the erosive action of the river on its banks at points where it may damage existing distributing works and towns or villages.

The information so brought together should be of much interest to irrigation engineers, and would have been valuable to a wider circle if fuller material had been provided for those not personally conversant with the Punjab. The case of the gradual destruction of the town of Dera Ghazi Khan on the west bank of the Indus by the gradual erosion of its right bank furnishes an interesting case of river action by the annual flood, and is illustrated by a series of ten plans showing the disposition of the river at this point from 1882 to the present time.

Elsewhere general statements and descriptions are in the majority, and we should have welcomed more quantitative treatment of some of the interesting points which are raised. The regimen of a part of a river cannot be properly understood without some knowledge of the whole, and the lack of this is especially apparent in the first chapter, where a general map of the basin, some information regarding its size, form, relief, structure, &c., would have given a valuable setting to the study of the utilisation of its water which follows. The subjects of rainfall and discharge are dealt with in two brief paragraphs, while we look in vain for maps showing the distribution of the rainfall or diagrams explaining the variations of discharge at different points and at different seasons. A number of plans and diagrams illustrate the report, but in only one case is the scale of the former indicated on it, though in some other cases it can be found from the text. References to other works on the Indus would have been a useful addition.   H. G. L.

ELEMENTARY STATISTICS.

An Introduction to the Theory of Statistics. By G. Udny Yule. Pp. xiii+376. (London: C. Griffin and Co., Ltd., 1911.) Price 10s. 6d. net.

OF all the works a man may set himself to write, the most difficult must surely be an elementary text-book on statistics. The writer of a text-book on almost any scientific subject has to face the difficulties resulting from a recent rapid development of the science of which he is writing, but in statistics he has the further difficulty that many practical methods have been reached by mathematical analysis that is unsuitable for an elementary text-book. Nor is this all, for the subject appeals to so many diverse interests that points simple or useful to one student are merely troublesome or inconsequent to another.

Mr. Yule has made an attempt to explain some of the methods used in practice, without demanding much mathematical knowledge of his readers. This course explains the advantages as well as the limitations of his work, for it has enabled him on one hand to display his natural facility of explanation, and, on the other, it has debarred him from giving more than a sketch of some of the most important parts of the subject; it has even led him to avoid

giving certain formulae and methods that are of almost everyday use.

The book is divided into three parts, the first of which deals with the theory of attributes. We confess that this type of statistical work does not greatly appeal to us, for while good may be done with these methods by a statistician of Mr. Yule's ability, we are doubtful if the notation and formulae he gives are of real help to a student. To most minds statistical errors in reasoning, for instance, are best explained arithmetically, and many of Mr. Yule's examples in part i. will help his readers more than his algebra or letterpress. The second part deals with the theory of variables, "ideal frequency distributions," averages, standard deviations, and correlation coefficients. There is a chapter on partial correlation which should be helpful to many readers, but we wish room had also been found for an account of some of the most recently discovered methods of calculating correlation coefficients. The last part of the book deals with the theory of sampling, and is mainly concerned with probable errors.

Possibly because of the mathematical work involved, Mr. Yule does not deal with the fitting of curves to statistical data, but a student who has proceeded so far as to study partial correlations and the correlation surface should, we think, have some idea how to do this. The gap will perhaps be filled in a future edition, and revision in some other respects will, we think, also be wanted. For instance, on p. 38 a formula is given for measuring the degree of association, and if it is applied to the example of imbecility and deaf-mutism on p. 34, the value is 0·9, indicating a high degree of association. On p. 213, instead of giving the ordinary formula for working out coefficients of correlation from fourfold tables, Mr. Yule gives a simple expression which he implies can be used in some cases. Unfortunately, in the particular case mentioned above to which a student might be tempted to apply it, the value, instead of being about 0·9, is only 0·02, and gives quite a wrong impression. It was, we think, a great mistake to give the formula on p. 213, as it is open to considerable criticism.

Another example of a case where readers might be misled occurs on p. 67, where a student might easily misunderstand Mr. Yule's discussion of isotropic distributions, and think that they affected the calculation of a coefficient of contingency.

While we are very ready to admit that, within the limitations he has placed on himself, Mr. Yule has given much that is of interest and value, we also feel that there is much in his work which lends itself to criticism—more, in fact, than one would expect to see in an elementary text-book. The two cases that we have given above are merely examples of this, but although we have felt it necessary to criticise, it is a pleasure to add that we have been much interested in reading Mr. Yule's work, and have throughout appreciated his numerous arithmetical examples and the trouble that must have been taken to arrange the book in so clear a form and to supply it with such excellent diagrams.