colleagues. The second part of the book, of another three chapters, summarizes the measurements obtained in controlled experiments on different classes and scales of atmospheric diffusion; describes the methods now available for estimating concentrations from given sources of material in terms of meteorological data which are, or might under demand become, available; and finally, discusses a number of special problems arising in diffusion from particular sources, for example, the rise of hot effluents from chimneys, surface deposition of particulate and gaseous pollutants, agricultural and botanical problems, and radioactive sources provided by bomb or power station. The treatment is very up to date, and quite comprehensive except in regard to vertical diffusion above area sources or sinks which, for momentum, heat and water vapour, are of fundamental concern to the physical meteorologist and have been dealt with lately in a monograph by Priestley. For brevity, maintenance of line, or whatever, the author has usually chosen to state theoretical results without their derivation. That will not much inconvenience the expert, who will be not the least in gratitude for the volume. But for the less expert and particularly those primarily concerned with application, it is probably salutary to show how results are arrived at in a field in which misapplication has made many hairs stand on end in the past. In this connexion one welcomes the author's critical appraisal of all that he presents, and probably would have welcomed an even greater obtrusion of the author's views on his page.

While this book is timely it will not provide ready answers to all the meteorological problems in atmospheric pollution, not least, perhaps, because many problems are not yet sufficiently well formulated to allow of a useful answer from the meteorologist, who must probably co-operate further with the engineer to find the appropriate questions. Meanwhile, Pasquill's volume should become notable as an exposition of a science and a landmark in man's record to come to grips with the problem of avoiding the pollution of air, land and view with the products of his industry.   P. A. SHEPPARD

MORE ADVANCED STATISTICS

The Advanced Theory of Statistics
By Maurice G. Kendall and Alan Stuart. Vol. 2: Inference and Relationship. Pp. ix + 676. (London: Charles Griffin and Co., Ltd., 1961.) 132s. net.

IN the first of their projected three volumes, the authors followed much the same plan as in Dr. Kendall's original Volume 1. This second volume differs more markedly from the original Volume 2, and leaves the design of experiments and sample surveys, analysis of variance, multivariate analysis, and time series for presentation in the third.

The volume under review is concerned with many different aspects of statistical inference, with relations between statistical variates, and with distribution-free and sequential methods. Despite its price, to the statistician it is indispensable, for nowhere else can he find so comprehensive an account of the present state of the theory and the key to so high a proportion of the important references. A mathematician also will find here as full a statement of the nature of statistical estimation as he could wish;

the presentation is not designed for the scientist who wishes simply to apply statistical techniques. As with any encyclopædia of a rapidly developing subject, this book is doubtless out of date almost from the moment of publication, but it will remain a standard work of reference for many years.

Three chapters on principles of estimation show the central importance of maximum likelihood and least squares methods. Minimum χ^2 estimation, or 'minimum chi-square' as the authors misguidedly entitle it, is mentioned but without consideration of Rao's very recent investigations of the second-order superiority of maximum likelihood to any alternative. The presentation of confidence and fiducial theory in separate chapters is retained; the authors attempt no synthesis of views or full appraisal of relative merits, but give a fair and balanced account of the two schools of thought. Unfortunately, important work on fiducial distributions by Fisher and by Cornish has been published too recently for inclusion. It is perhaps surprising that the group of problems involving setting probability limits to a ratio omits to mention Fieller's use of exclusive limits. Four chapters are then given to hypothesis testing, likelihood ratio tests, and the comparison of tests.

The next large section is concerned with regression and correlation. When so much of modern theory needs to be included, the space given to intra-class, tetrachoric, and biserial correlation seems excessive. The chapter on multiple regression is typical of the authors at their best in giving a clear, systematic account of an important field of general theory. The following chapter, on functional and structural relations, is an outstandingly good presentation of a difficult subject on which much remains to be done; insistence on clear terminology, and on exact specification of the model and the error structure in the observations leads to a valuable summary of the present situation that complements the admirable chapter in Acton's book (see *Nature*, **188**, 176; 1960).

Chapters on distribution-free methods, order-statistics, and contingency tables are included; some sections of these are little more than brief guides to the literature, and not always complete (as the omission of Sampford's maximum likelihood theory of censoring and truncation bears evidence). To a reviewer unfamiliar with sequential methods, the one chapter on these appears an excellent introduction: the authors would not claim it to be more. Dismissal of decision theory in one paragraph is severe treatment for an approach to applied statistics that, despite many weaknesses, is having a profound influence, though the authors wisely comment: "That statistics is solely the science of decision-making seems to us a patent exaggeration"; perhaps Volume 3 will elaborate on this.

The statistician who is concerned with the application of statistical techniques to scientific problems may be disappointed by an underlying lack of concern with how methods are to be used. Typical is the section on Stein's ingenious trick of double-sampling for obtaining a specified confidence interval; no mention is made of the desirability and difficulty of using the information on variance in the second sample, yet this is surely important if the first sample is small. Yet to end a notice of this important and necessary book on a disapproving note would be unfair; perhaps no one but M. G. Kendall would have the courage to tackle so vast a work, and he and Stuart are achieving a great result.

D. J. FINNEY