and healthy growth, it must be fed by a continuing supply of new scientific facts. The choice of Whitney was propitious. During the thirty-two years in which he was director, he built up a research organisation which has earned world-wide fame and has become the Mecca to which large numbers of university graduates have turned their eyes and hopes. As a research director he was unsurpassed; he was able to draw to himself men of the highest scientific calibre and he allowed them the widest latitude. His boundless enthusiasm was contagious and inspiring to all his staff. His recognition of individual achievement was immediate and unreserved. His leadership was of an unusually broad gauge and generous type.

Though trained as a chemist, Whitney's interest penetrated every branch of natural science, and he was able to adapt himself to the practical application of other physical sciences. In the electrical field his versatility found vast scope. His clarity of vision, his gift of concise exposition, his innate friendliness, his faith in men and science were all qualities that contributed towards the making of a great research leader.

In the early days when his research staff was small, Whitney was able to conduct individual research; and it was his experiments which led to the invention of the metallized carbon filament, the first big advance in incandescent lamp efficiency beyond the point reached by Edison. Soon, however, as his staff grew, the demands on his time as director restricted his own research achievements, so that the names associated with the fruits of the research conducted under his direction are those of his associates: that of Langmuir with the gas-filled lamp and other notable achievements, which earned for him the Nobel Prize; that of Coolidge with the development of ductile tungsten and the X-ray tube that bears his name; that of Hull with the thyratron—to mention only a few. One outstanding individual achievement must, however, be mentioned—that associated with fever therapy, which in 1937 brought the award of Chevalier of the Legion of Honour.

Although teaching ceased to be a vocation with Whitney forty-five years ago when he left the Massachusetts Institute of Technology and turned to industrial research, it has always been blended with his work.

The author of the present volume considered that a conventional biography would not be in keeping with Whitney's character. He therefore uses, with interesting and enjoyable effect, a dual form of narration. Linked to, and supplementing, the biographical details there is a record of conversations and typical Whitney writings, so that much of the book is autobiographical in character. In the conversations and writings he tells something of his life and activities—sometimes with typically Whitney humour, sometimes with deep seriousness but generally with an instructive and inspiring message. Composed of sheer delight is the suggested reply to the New York school-girl's request, "Kindly send me some booklets and a little sample of electricity if you can spare it".

As is reflected in the honours and awards bestowed upon him, Whitney's scientific and industrial achievements have been widely recognized, and while the present volume reveals many of the human traits, it is perhaps only those of us who have been privileged to know him personally over a long period who can assess his greatness.

A. P. M. FLEMING

ECONOMY IN SAMPLING

Sequential Analysis of Statistical Data

Applications. Prepared by the Statistical Research Group, Columbia University, for the Applied Mathematics Panel, National Defense Research Committee, Office of Scientific Research and Development. (SRG Report 255.) Pp. xxix + 287. (New York: Columbia University Press; London: Oxford University Press, 1945.) 42s. net.

THE object of sequential sampling is to reduce the size of the sample which must be drawn to reach a decision about a population within specified limits of error. The classical sampling method is to draw a sample of predetermined size and to examine each member after the complete sample has been obtained. The sequential method performs the operation, so to speak, in reverse by choosing the sample one by one until a point is reached at which the decision can be taken within predetermined limits of error. The sample size is thus not an assigned number but varies from one sample to another, according to the way in which the observations run.

The saving in sample-size imported by the sequential technique varies according to the specified limits of permissible error; but it is nearly always substantial, is often in the neighbourhood of 50 per cent and sometimes may be considerably greater. The method was developed mainly in the United States and Great Britain during the War in connexion with the inspection of mass-produced munitions. It is now off the secret list, and the volume under notice assembles within one cover revised versions of seven reports on the subject prepared by the Statistical Research Group at Columbia University for the Applied Mathematics Panel of the National Defense Research Committee.

After an introductory section, the second report deals with sequential tests for the simple case wherein each member of the sample, after inspection, is assigned to one of two classes, good and bad; such a case arises, for example, where a component has to pass through a gauge to be acceptable. Methods are given for computing or constructing graphically the necessary inspection chart, the operating characteristic (OC) curve of the sequential process, the average sample number (ASN) curve and the average outgoing quality (AOQ) curve. Tables are provided for practical work. Succeeding sections extend the method, first to the case of a double dichotomy and then to the case where the quality under consideration is continuous, for example, the mean and the variance.

An appendix to the last section of this volume gives a brief account of the derivation of the fundamental formulae, but does not attempt to cover the theoretical side, which has been dealt with elsewhere by Wald, Barnard and others.

These reports are in the main for the practical man. As such they are very good. The exposition is clear, there is an abundance of well-chosen examples and diagrams, and the whole work bears evidence of having been through a process of examination and criticism by men who were actually carrying out the methods in practice. One could have wished for a lower price, seeing that the reports are duplicated copies of typescript, and for larger type in some of the tables, but the text is not difficult to read. The publication of this work will be welcomed by statisticians and engineers.

M. G. KENDALL