having been withheld by the established policy of *Metron*.

Because of the unusual character of the book—full-scale reproductions of the original articles—the page size is dictated by that of the *Transactions of the Royal Society*. Indeed, in this journal (Series B, 1922) appeared his famous paper, "On the Methodological Foundations of Theoretical Statistics," which was in the words of Fisher himself, "the first large-scale attack on the problem of estimation."

Space will not permit a rehearsal of the table of contents, which would almost be a list of the most important steps in the building of statistical methodology: design of experiment, theory of estimation, testing of hypotheses, method of maximum likelihood, fiducial probability. Statisticians all over the world will welcome the publication of this book, as it puts the most important contributions of Professor Fisher within reach, in their original familiar format.

The aim of theoretical statistics is better data, detection and elimination of biases and systematic errors, and experiments planned so as to extract the maximum amount of information per unit cost. Such achievement requires a demonstrable index of the precision attained in the experiment, and of the risks of the probable inferences that may be drawn. More important, it requires also the ability to plan the experiment ahead of time so as to attain the desired precision, but no more, in order to conserve funds for other worthy experiments. Correct planning and interpretation require use of the theory of probability, and it is largely from Fisher that scientists have learned this way of thinking, thanks to his two popular books, *Statistical Methods for Research Workers* (1925) and *Design of Experiment* (1935), known to practically all workers in agricultural science, pharmacology, toxicology, biology, and nutrition. With but little modification, the same methods are equally powerful and as necessary for realization of maximum economy and reliability in industrial experimentation, testing of materials, interlaboratory tests, testing of machines, and in physical and chemical measurements.

The use of probability in the hands of Fisher and many others has built a statistical method, and has rescued statistical work from the dry compilation and graduation of figures. Statistical data are now collected and interpreted as *intelligence*, a contribution to knowledge, and a basis for action.

A few words on statistical education may be properly placed in this review. Until recently, books on theoretical statistics were rare. To study the theory of statistics it was necessary to peruse many articles in journals, mostly difficult, and in divers notations, or to be so fortunate as to work with one of the few masters of the subject. Statistical education was thus accessible only in the higher levels of research. During the past five years, however, this situation has started to change. A number of excellent teachable books have appeared, containing authoritative exposition of theory and application, not only in the Wiley series, but from other publishers as well. Statistical education is reaching down into the graduate and undergraduate levels, to the research worker, and even to the administrator. There is no longer an excuse for runs of inefficient tests and experiments, or for runs of unwarranted inferences from experimental data.

W. Edwards Deming

Bureau of the Budget

Les Ultravirus des Maladies Humaines, 2 vols. 2nd ed. C. Levaditi and P. Lepine. Paris, France: Librairie Maloine. 1948. 1,907 pp.

Rapid and continuous progress in our knowledge of the submicroscopic forms of life was made during the decade between the appearance of *Traite des Ultravirus* and the present volumes. The most outstanding contributing factors were the developments and improvements of technique for virus research rather than the discovery of new clinical entities. The relatively compact air-driven supercentrifuge, refrigerated if desired, supplanted to a marked degree the earlier huge, cumbersome oil-driven instruments; refinements in the procedures of tissue culture and the availability of electron microscopes all played major roles.

A wealth of material and an extensive literature forced the deletion of the Rickettsiae from the present edition. Although the rickettsial diseases of man have much in common with certain virus diseases, rickettsial infections are readily distinguishable from virus infections, and the decision to limit these volumes to the human viruses was a wise one.

The authors were aided by 26 collaborators, all specialists in the areas delegated to them. There are 32 main subjects or sections. Between the initial section, entitled "General Considerations and Methods for Investigation," the contents of which are handled in a superb manner, and the final section, captioned "Laboratory Diagnostic Methods," one finds an exhaustive coverage of the important virus diseases and adequate mention of the less common maladies of virus etiology. There are 368 figures and 3 colored plates. The editing has been done with great care to ensure retention of the writer's personality in each instance. The bibliography for each section is encyclopedic. Full recognition is given to the literature in English, German, and other foreign languages. Scientists, particularly my English-speaking colleagues, might well profit by this familiarity with, and acknowledgment of, the contributions of others.

Unfortunately the authors' task is not complete. It will be necessary to publish the third edition of this monumental work promptly so as to keep abreast of progress in this field. In the meantime, the present edition should be in every laboratory and research institution where the infectious diseases are under consideration.

Malcolm H. Soule

Hygienic Laboratory
University of Michigan