several telescopes with apertures of 120 to 200 inches each.

In attempting to answer such questions, the reviewer believes that, at the present time, most of our knowledge of the universe rests upon results obtained with large ground-based optical and radio telescopes; also that the range of important problems that can be studied with such existing telescopes is enormous. Hence, it is reasonable to conclude that ground-based telescopes will continue to play an important role in astronomy for hundreds of years, and that their improvement must continue along with the development of the more spectacular types of space telescopes, or of telescopes that may some day be built on the moon.

It is much more difficult to make specific recommendations, and the reviewer is undoubtedly "sticking his neck out" in making the following proposals:

1. The construction of one very large reflector with an aperture of 400 or 500 inches can probably be justified, even now, in the light of existing technological knowledge and in the light of existing problems requiring solution.

2. The construction of special-purpose telescopes of appropriate size should be encouraged. The US Naval Observatory project for an astrometric reflector of fairly large size is a step in this direction. There should be other special-purpose telescopes, for example, one for the determination of accurate optical stellar radial velocities, one that will be treated as a precision measuring instrument devoid of many systematic and accidental errors that arise when one and the same telescope is used for many different types of observations.

Small Particle Statistics. An Account of Statistical Methods for the Investigation of Finely Divided Materials (2nd ed.). By G. Herdan, with a Guide to Experimental Design by M. L. Smith, W. H. Hardwick, and P. Connor. 418 pp. Academic Press Inc., New York, 1960. $14.50. *Reviewed by E. J. Öpik, University of Maryland.*

THE universe is built into a discontinuous assemblage of material particles, from atomic nuclei to stars. The size distribution of the nonquantized particles, or those above atomic dimensions, is a common ground for diverse disciplines, such as astronomy, geophysics, chemistry, biology, medicine, agriculture, technology of various materials, and above all physics, which encompasses all of them. Statistics provides the common instrument of representation and interpretation. Although the book does not mention meteors (which are small enough), or asteroids, planets, and stars (which, of course, are too big), and the names of only two astronomers appear in the author index of this monographic study, the reviewer finds himself here on familiar ground, with theoretical methods he has used himself, and with experimental data directly applicable to astrophysical problems. This may serve as a measure of the usefulness of the book to all those concerned with populations of particles (not necessarily small), whatever part of the universe they are interested in. Monographic literature on the subject is virtually nonexistent; Herdan's treatise thus fills an important gap and is an answer to urgent demand.

It is written with the utmost consideration for the unprepared reader, of whom little previous knowledge of mathematics is required. The formulae of statistics and their use are explained clearly and often in more detail than is necessary for workers in the exact branches of natural science. A considerable portion of the book is dedicated to giving an equivalent of an easy textbook on conventional statistics, theory of errors, and linear correlation. The mathematically, although not practically, more sophisticated notion of nonlinear correlation is, however, nowhere mentioned—a common though unfortunate practice since Pearson's time. Nature's correlations are nonlinear as a rule; the linear approximation usually works, but sometimes it may fail altogether.

Great care is also taken in describing and evaluating the absolute and relative methods of measuring and counting particle diameters: by direct microscopic measurements, by sedimentation, by permeability to liquid flow, and by optical extinction. However, in the treatment of the optical methods, the different processes of extinction by reflection, diffraction, and absorption are not considered; here the application of astrophysical theory could have helped to remove some basic uncertainties.

Consideration of meteor statistics could have enriched the subject by a new type of frequency function, without a maximum and with a monotonous increment of numbers for decreasing size, which can be schematized by a power law. This may be a more universal law of size distribution than the Gaussian or pseudo-Gaussian distributions analyzed in the book, with a diameter of maximum frequency, as is the case with terrestrial samples influenced by various natural selection factors.

The book is a unique and valuable contribution to the methodology of the study of particle sizes and their distributions and can be recommended as indispensable to all those concerned with the statistics and physical properties of particulate matter.

The Theory of Brillouin Zones and Electronic States in Crystals. By H. Jones. 268 pp. (North-Holland, Amsterdam) Interscience Publishers, Inc., New York, 1960. $9.50. *Reviewed by Nicholas Chako, Queens College.*

THIS is an extremely interesting and valuable book on the theory of electron energy states in crystals. The material is presented clearly and requires only a limited background in mathematics. It provides an account of the theory and methods which are of general validity rather than a detailed analysis of specific topics requiring long and complicated calculations. The subject matter is developed along the theory of Brillouin