

cepted theory of work-hardening. What exists is very speculative and has been partly responsible for the low repute in which the theory has come to be held by the more practically-minded metallurgist and engineer. Nevertheless, the author does show clearly how dislocations can explain the low yield strength of crystals in principle, and he presents many of the elementary processes involving dislocations which certainly must play a part in any theory of work-hardening—for example, multiplication of dislocations, formation of jogs by intersecting dislocations, and the role of partial and sessile dislocations in impeding the movement of other dislocations.

In spite of the fact that the theory is presented in a deductive manner from basic postulates, the general method of presentation is nonmathematical and pictorial. The many excellent three-dimensional perspective line diagrams are one of the outstanding features of the book. Enough mathematics is introduced so that the quantitative aspects of the theory are not slighted, but the thread of the argument is geometrical and visual rather than algebraic. The presentation of the difficult and complicated subject of partial dislocations is a really masterful job in which three-dimensional visualization is called upon to a high degree.

In spite of the lucidity and succinctness of the presentation, the book is not easy reading. To be really of value it must be studied like a textbook, and to this end there are excellent sets of problems at the end of each chapter. These problems are often introduced to encourage the reader to fill in gaps in the argument, or to extend the argument beyond where it is carried in the text. Although study of the book requires a minimum of formal mathematical background, the reader will find an aptitude for three-dimensional visualization almost indispensable for following the argument. The specialist who is already familiar with the field will find the presentation fresh and interesting and well worth following in detail even though he is familiar with the principal results and conclusions. The argument is carried through to cover the most modern advances, even such results as the elastic strains due to dislocations in elastically anisotropic crystals being treated.

The book begins with a presentation of the simplest geometrical concept of dislocations in terms of partially slipped crystals, then goes on to introduce the idea of the Burgers circuit and the most general type of dislocation. This is followed by a discussion of the motion of dislocations in climb and glide, the forces on dislocations, and the phenomena associated with the multiplication and intersection of dislocations. The excellent chapter on the geometry of partial dislocations is followed by a discussion of the stress fields associated with dislocations and their interaction. All this constitutes Part I and the bulk of the book. Part II contains a rather brief chapter on F. C. Frank's theory of crystal growth on spiral dislocations, and the remainder of the part is occupied with a quite extensive treatment of the dislocation theory of grain boundaries

including some rather new results on the theory of the migration of boundaries under external stresses.

The selection of material for this book is such that I believe it will remain a valuable text and introduction to the subject for many years after the theory has outgrown its present immaturity. In a field which is evolving so rapidly, this is no mean achievement. Furthermore, the book should serve as an excellent stimulus to the wider understanding and use of dislocation concepts among practical metallurgists and other applied scientists concerned with the mechanical properties of crystals.

The Physics of Experimental Method. By H. J. J. Braddick. 404 pp. John Wiley and Sons, Inc., New York, 1954. \$7.00. *Reviewed by E. A. Lynton, Rutgers University.*

For many years Strong has been for the experimental physicist what Fanny Farmer is for the housewife, and it is difficult to see a need for any other cook book, except perhaps those describing very specialized techniques. The first reaction to Dr. Braddick's book might, therefore, be somewhat raised eyebrows. However, a brief glance inside its covers is enough to show that here indeed is a book very different from Strong's, supplementing rather than supplanting it.

The most marked difference is Dr. Braddick's great emphasis on the fundamental physical principles of measurement. He devotes one fourth of the book to the treatment of experimental results, the reduction of observations, the statistical analysis of errors, and the problems of kinematic design. To this he adds a thorough and excellent discussion of the natural limits of measurement.

The book contains in addition a long and, to my knowledge, uniquely complete description of materials of construction. Here again, seeking always to emphasize physical principles, the author discusses the fundamental way in which physical measurements depend on the choice and proper use of various key materials in the construction of instruments and apparatus. This, of course, is additional to a description of the properties and the correct handling of these materials.

These sections alone would justify the publication of the book, and should be required reading for any graduate student about to start his own experimental work. Equally valuable, though more conventional, is most of the book's discussion of vacuum techniques, electrical measurements, electronics, optics and photography, and of some techniques of nuclear physics. This last section reflects Dr. Braddick's own interest in cosmic rays, and is overly specialized. All other parts, however, comprise both in selection and in scope just about what every prospective experimenter should know.

Here, in short, is a real and comprehensive textbook of experimental method which can be most highly recommended to all experimenters, above all to those just beginning to do research. In fact, I can think of no better required reading for the experimental part of a comprehensive examination.