single lecture. Thus the publication of these papers in collected form is of great value, in spite of the fact that the publication date is more than two years past the date of the course.

DAVID T. GOLDMAN

(About the Reviewer: D. T. Goldman is a University of Maryland Ph.D., vintage 1958. After a year as a research associate in the Physics Department at the University of Pennsylvania, he went to Knolls Atomic Power Laboratory where he now specializes in nuclear and reactor theory.)

Mechanical Properties of Metals. By D. MCLEAN. Wiley, New York-London, 1962. $12.00.

The author is a member of the staff of the National Physical Laboratory, Teddington, England and has been active for some time in the study of imperfections in metals. In this book he has presented the insight that the knowledge of defect structures, obtained over the last 10 to 20 years, has provided in the understanding of the properties of metals. The scope of the book embraces many subjects which in themselves have been the topics of a number of comprehensive books. With each subject the author has presented a brief review of the observed phenomena in a well illustrated and referenced manner followed by a discussion of the relation of dislocation theory to these effects. Shortcomings in the present state of dislocation theory are also identified in these discussions, and the type of additional research needed for more complete correlation is suggested.

The initial portion of the book is devoted to a brief summary of elasticity and imperfections in pure metals. This review demonstrates the wide differences in observed properties as compared to calculated theoretical values assuming perfect crystals. Dislocations, grain boundaries, vacancies, and interstitials are described to serve as a basis for subsequent treatments of specific properties and their relation to these factors.

In a discussion of anelasticity, contributions due to thermal vibration effects, dislocations, and grain boundaries are reviewed. Plastic yielding is related to crystal type, the mechanisms of slip, and twinning which are further described in terms of dislocation sources, multiplication, and movement. Hardening effects in metals due to both strain and alloying additions are also discussed with particular emphasis on the dislocation theories that have been presented to describe the observed effects. With respect to solutes and precipitates, the effects of their spacing on dislocation movement and strength properties are reviewed.

Further treatments in this book concern the incidence, criteria, and theories presented for both brittle and ductile fracture. Mechanisms for the combination of dislocations to initiate cracks in both brittle and ductile materials are described, and brief mention is made of the adiabatic shear type of fracture. The various stages of creep are also discussed and the relation of dislocation movement to these stages is described. Further consideration is given to the effects of solutes and precipitates on creep behavior and the role of dislocations in such structures. Similarly, fatigue failure, its relation to slip bands, and the mechanisms by which dislocations can produce notches in slip, are reviewed.

Three sections of the book do not lend themselves readily to analysis by dislocation theory, primarily because the mechanisms in these phenomena are not well understood. These subjects include recovery and recrystallization, radiation damage, and stress corrosion. The author however has included them for the sake of more complete coverage of the properties of metals.

Although complete understanding of the properties of metals on an atomistic basis cannot be presented with the existing state of theory, the author has done a commendable job in summarizing the applicability of current knowledge. It is this type of basic understanding correlated with observed behavior that will eventually lead to a more complete control of material properties.

S. W. POREMBKA

(About the Reviewer: Mr. Porembka has been associated with Battelle Memorial Institute for over six years, conducting research on materials and process developments. His background also includes four years with the Bettis Atomic Power Laboratory during which time he was concerned with the development of control and fuel materials and the evaluation of spent cores. Presently, he is a Research Associate with the Advanced Materials Development Division of Battelle.