observed must be interpreted in terms of current concepts of biochemistry, and in such a rapidly developing field it is regrettable that a book published in 1964 is based on material gathered in 1961 or earlier.

A brief description of the physical characteristics of ionizing radiations and modes of energy transfer to absorbing matter precedes some 80 pages devoted to a review of radiation effects in biologically important systems. The radiolysis of water is discussed in detail, and a separate chapter is devoted to the formation of peroxides. Radiation effects in simple proteins, nucleic acids and nucleoproteins, carbohydrates, lipids, and enzymes and vitamins are considered in separate chapters. In part 2, 160 pages are devoted to the effects of radiation on the metabolism of living cells and tissues. A final chapter presents a biophysical and chemical interpretation of radiation injury in cells.

Although the present volume is more of a review, one cannot resist comparing it with Lea's classic *Actions of Radiation on Living Cells*. In Lea's treatise much emphasis was placed on the target theory. Kuzin, writing with a wealth of new concepts and experimental findings at his disposal, gives more attention to the fate and biological action of the primary products of radiation absorption.

This book will be valuable to workers in the field and to advanced students. The bibliography of 1000 items is separated into the Russian and non-Russian languages. For those with capabilities in the Russian language, references are given to the translation and the original text.

HOWARD L. ANDREWS
National Institutes of Health, Bethesda, Maryland

Nematodes: A Review and Résumé

The Physiology of Nematodes. D. L. Lee. Freeman, San Francisco, Calif., 1965. 164 pp. Illus. Paper, $2.50.

During the 13 years since publication of Von Brand's *Chemical Physiology of Endoparasitic Animals*, the thin stream of work on nematode physiology has grown to a small rivulet. Lee has written an important and timely review of our knowledge of the physiology of this neglected group. The complexion of work in nematology has changed from the narrow emphasis which in the past was placed on nematode parasites of animals, and, in addition to the familiar *Ascaris* and *Trichinella*, we are now concerned with a growing group of such plant parasites as *Heterodera, Meloidogyne,* and *Ditylenchus*. Because these parasites inhabit soil during a part of their life cycle, and it is possible to control nematodes in soil, study of the physiological aspects of the ecology of nematodes in the soil has begun. New techniques of in vitro culture of animal parasites, free-living forms, and plant parasites have opened many possibilities for studies of nematode physiology.

Lee begins with a short discussion of nematode morphology, then proceeds to feeding and digestion, metabolism and oxygen transport, osmoregulation and excretion, hatching and moulting, the nervous system and sense organs, and locomotion and behavior. He provides 161 references that guide the reader toward the most important work in the field. Unaccountably, the author fails to discuss important recent advances in techniques of nematode culture.

It was refreshing to note the close attention paid to developments in phytonematology as well as to classical parasitology. The book emphasizes our vast ignorance of the physiology of the great majority of types found in soil and the total lack of work on marine nematodes. Nematodes have attracted attention as important agents of human and animal disease. The recent addition of phytoparasitic forms still leaves the bulk of the group unstudied.

Lee's monograph shows that nematodes utilize many of the usual biochemical and physiological processes, but that they are peculiar in some respects. At least one nematode synthesizes many of the so-called "essential" amino acids. Many forms are partially anaerobic; some marine nematodes inhabit mud that is completely lacking in oxygen. Lee's *The Physiology of Nematodes* should help to attract general physiologists to the study of nematodes.

VICTOR DROPKIN
Nematology Investigations, Agricultural Research Service, U.S. Department of Agriculture

Reliability Analysis

Mathematical Theory of Reliability. Richard E. Barlow and Frank Proschan. With contributions by Larry C. Hunter. Wiley, New York, 1965. xiv + 256 pp. Illus. $11.

From sparse beginnings, reliability theory as an independent discipline has developed considerably during the last 20 years. This book attempts to provide mathematical justification for some of the practices now being used to solve reliability problems. It is my opinion that, mathematically at least, the authors have accomplished their objective. As they are careful to point out, however, statistical problems are in general not treated.

The format of the book is basically theoretical and requires a sound background in calculus and a knowledge of probability theory at the level of Feller (1957) for reading ease and appreciation. Even so, proofs of theorems are precise and not always easy to follow. Also, there is little or no discussion of the significance of the results obtained. Notation is consistent throughout and is basically identical with what has now become "standard" notation in reliability analysis. There appear to be no errors in the material presented other than an occasional misprint.

The authors derive some useful properties of probability distributions having monotone failure rates and use these in the solution of problems relating to estimation and prediction of the probability of survival for components or systems, maintenance policy, optimization procedures, and system availability. Generally speaking, system reliability is characterized either by a stochastic model (Markov Process) or by a "structure function" which attempts to describe the qualitative relationships that exist between a system and its components.

Specifically then, the book contains chapters on failure distributions, operating characteristics of maintenance policies, optimum maintenance policies, stochastic models for complex systems, redundancy optimization, qualitative relationships for multicomponent structure, and a brief discussion of pertinent reliability definitions. The useful bibliography cites most of the important contributions to reliability analysis.

Renewal theory is reviewed in the chapter on operating characteristics of maintenance policies. The renewal