impose some order on what would otherwise be a very mixed bag of cytolytic agents. The important generalisation that now seems to be emerging is that cytolytic toxins are either enzymes attacking membrane lipids, or are non-enzymic surface-active molecules that have a detergent-like effect on the lipid bilayer. Although proteins are important components of cell membranes, it seems that none of the cytolytic toxins is a protease. This is in accord with the Singer and Nicholson model of membranes, now classical, in which proteins are assigned to a non-structural role.

Bernheimer contributes a rather short chapter (but with 126 references) on the 14 presently-known sulphhydryl-activated (oxygen-labile) haemolysins, of which streptolysin-O is the best-studied. They are all produced by gram-positive organisms and share certain features such as lethality, neutralisation by antitoxin and inhibition by cholesterol. However, their exact mode of action at the molecular level has remained elusive.

The closing chapter is an account by Okamoto of the antitumour activity of streptolysin S, both in experimental animals and in man, in which he has played a leading investigative role since 1940. A good case is made for the apparent superiority of streptolysin S over other toxins in causing regression of experimental tumours. However, the results in cancer patients are harder to interpret because of their mainly anecdotal nature and the absence of rigorously-controlled clinical trials.

To sum up, this book is not a compendium of bacterial toxins as a whole, but a selection of up-to-date and very readable essays on the toxins in respect of which real advances have been made in recent years. It is a book to be read in its entirety, both for the generalisations that are now emerging in bacterial toxinoology, and for the lucid coverage of the particular toxins selected. If our knowledge of bacterial pathogenicity is to progress, then a full understanding of the roles of the toxins and of their modes of action at the molecular level must be developed. Only four bacterial toxins (choleragenoid, diphtheria toxin, \textit{Cl. perfringens} $\alpha$-toxin and staphylococcal $\beta$-toxin) have been characterised to this extent but one senses a new mood of optimism in tackling some of the others. While the individual toxins have their individual fascination, it is also satisfying to see general patterns emerging. After reading this book, anyone working with an uncharacterised toxin will find it difficult to avoid asking the following questions. Is toxinogeny phage-determined? Is the toxin an enzyme or a detergent-like molecule? Does the toxin, like diphtheria and cholera toxins, have a "division of labour" in the molecule, i.e., a B-piece for binding and an A-piece carrying the toxophore group? Can the toxin be used as a specific reagent for probing membrane architecture or blocking a specific metabolic process?

Once a pattern has become established in a science, progress tends to be rapid because there is then a framework into which new information can be fitted. Bernheimer and his colleagues are therefore to be congratulated on this timely collection of essays that illuminate an important area of medical microbiology. At today's prices, £13.80 does not seem unreasonable for a book of this type.

A. C. WARDLAW

**Scrapie in the mouse**


Although the literature on scrapie runs into hundreds of publications it is only recently, as the author points out, that some of the fundamental features of the disease have become clear. Before 1961 assays of the causative agent were almost impossible and research into scrapie was in its mediaeval phase. The modern phase began with the discovery of the susceptibility of mice, providing an assay method in a relatively cheap laboratory animal. Even now, it takes up to a year before the results of an experiment are known, but the pace of research has quickened and it seems likely that within the next 5–10 years many of the fascinating mysteries of scrapie will be unravelled and the nature of the infectious agent and its mode of replication at last understood. The increasing pace of research is reflected in the fact that this review, covering the literature up to the end of 1973, is already just a little out of date; in
the old days, a mere three years between writing and publication would barely have been noticed.

The author, one of the leading lights in the modern phase of scrapie research, and a member of the powerful research group at the Institute for Research on Animal Diseases, Compton, has written a useful survey of the present state of the art and shows us how today's biochemists, geneticists and cell biologists are tackling the problems. Scientists who work with scrapie need to be imaginative and optimistic, yet prepared for long waits and set-backs; seers, but at the same time stoics. Theirs is a difficult path, and they are to be admired for their dogged pursuit of truth through the scrapie labyrinths.

Understanding scrapie will be of more than academic interest. Scrapie remains an important disease of sheep, and man also is infected by closely similar transmissible agents, causing kuru and Creutzfeld-Jacob disease. Both are rare but both are fatal, and when we understand the pathogenesis of scrapie these, too, will be understood. Doubtless we shall then also be in a better position to understand the origins of various other chronic diseases of man.

C. A. MIMS

Epidemiology and infections

Dr Gordon Smith has given us a very broad and useful survey of epidemiology and infections. He has successfully avoided the miasma of generalities and definitions that dismay and discourage the occasional reader of epidemiology texts, and has instead concentrated on the solid meat of examples and phenomena. Undaunted by the prodigious area to be covered, he has made his short book eminently readable, and given a well balanced survey of a fascinating subject. The writing is at times hurried, and one can always point out omissions and errors, but this reviewer learnt about several interesting epidemiological happenings, and hopes that this book will have a wider readership.

C. A. MIMS

Essentials of bacterial and viral genetics

This is a very readable book, covering, as the title claims, the essentials of microbial genetics though an undergraduate in microbiology would certainly have to consult more detailed texts. It is commendable for its historical approach and also for devoting two chapters to mutations, a subject vital to the study of genetics. The mention of industrial applications is useful, as well as the reference to genetic engineering.

The first chapter summarises the laws of genetics, and this is followed by a chapter on the structure and replication of DNA, and by one on protein synthesis and control mechanisms. The two chapters on mutation are next. The last third of the book deals with the genetic mechanisms of bacteria, the properties and genetics of bacteriophages, plasmids (it was pleasing to see the retention of the term "episome"), and briefly with eucaryotic organisms, including fungi, algae, protozoa, higher plants and man. A valiant attempt is made to provide a limited bibliography for each chapter. This is a good, digestible introduction to the subject.

L. O. Butler

Microbial response to mild stress

This small book is one of the series "Patterns of progress" published under the general editorship of Dr J. Gordon Cook. A "mild stress" is defined in this book as being one that results in some or no loss of microbial viability, and damage that may be partly or completely