

tool at present available for the determination of stress concentration factors—but no useful purpose is served by implying that it can do what it is inherently unfitted to do.

The author addresses his book both to photoelasticians and to engineers, and the book is divided into two parts. Part 1, which occupies about one-third of the length of the book, deals with some of the fundamentals of optics which are relevant to the photoelastic method of stress analysis, with the properties of photoelastic model materials, with the preparation of models and the necessary precautions which should be observed if models are to be loaded accurately, and with the validity of the transfer of information gained from a model made of a transparent plastic to a prototype of mild steel or light alloy. This section also deals with the 'frozen stress' technique used in the analysis of three-dimensional stress problems, giving a considerable amount of practical information.

Part 2 is devoted to the discussion of information derived from photoelastic data and from theoretical and empirical work by the author and others on stress concentrations caused by notches and holes. One chapter deals with stress concentrations in screw threads, bolts and nuts, while in another, improvements in the design of components are discussed which were obtained by paying attention to geometrical details, such as the radii of fillets, after the original design had been shown to be unsatisfactory by photoelastic investigations. The final chapter of the book is devoted to the application of stress concentration factors, their use in problems where fatigue is an important consideration and the effects of size on the applicability of these factors. The book is well illustrated and is completed by an extensive bibliography which, although it does not claim to be exhaustive, should prove most useful to workers in this field.

Some of Dr. Heywood's more dogmatic statements on photoelastic equipment and methods are not likely to meet with the agreement of all photoelasticians; but he undoubtedly deserves credit for collecting together within the confines of one book a great deal of information from a wide variety of scattered sources which should prove useful to engineering designers.

E. K. FRANKL

NATURAL HISTORY OF INFECTIOUS DISEASE

Natural History of Infectious Disease

By Sir Macfarlane Burnet. Second edition. Pp. x+356. (Cambridge: At the University Press, 1953.) 22s. 6d. net.

THE author of this book is not only himself a most distinguished research worker, but also he has perfected a method of presenting in a clear, palatable and most intelligible manner the natural history of infectious diseases. He treats them as a good naturalist should, when writing on his favourite subject, with regard to their place in Nature, their likes and preferences, methods of dissemination, their social background; in fact, all which may be termed, for a better word, their 'ecology'.

It is possible to regard the middle of the twentieth century as the end of the most important social revolution in history, the virtual elimination of

infectious disease as a significant factor in human affairs. Could we be similarly assured of the abolition of war, we could feel confident of eternal peace and progress with the extinction of epidemics and a reduction of illness to mere trivialities.

Along with this has gone a steadily increasing interest in the morphology and characteristics of the responsible micro-organisms. Every animal species reproduces its kind at a far greater rate than is necessary to maintain its numbers.

Limiting factors are always present and the maintenance of a species can be regarded as the result of conflict between two opposing forces—what is known as the 'population pressure'. As an illustration the lesson of the introduced domestic mouse in Australia is cited. In certain years these creatures swarm in crops and haystacks, so that bucketfuls may be caught in a single night. Hawks, owls and cats gorge on them, while birds, like ibises, change their normal diet; and then, the plague ends suddenly. A few dead corpses litter the ground, and the numbers dwindle to below normal. Some infectious disease, such as *Streptobacillus moniliformis*, has been at work and has done what none of the predators could accomplish. How far can this lesson be applied to man? How comes it that all dwellers in insanitary cities do not die of infectious disease? New parasites creep in like the Black Death and spread from city to city with rats and fleas; syphilis sweeps through Europe with the advance of conquering armies, but cholera spreads invisibly from carriers, as it did a hundred years ago.

The evolution of infection and defence is a fascinating subject which takes us back to Metchnikoff, toiling in his laboratory with all kinds of outlandish creatures, while studying the cellular reactions and phagocytes in *Daphnia*, the water flea; and then the aggressors—bacteria and protozoa—all pass before our view. We can envisage some of the stages by which the complex life-history of the sleeping-sickness trypanosome came into being, by studying the simple life-story of closely related forms. There is one trypanosome, for example, which infects the blood of lizards and is derived from a small biting fly by the simple process of being swallowed.

The viruses are more complex and much light has been shed upon their habits and appearance by the electron microscope since the first pictures were taken by these means in 1938. The smallest particles are those of poliomyelitis. The study of viruses has also been amplified beyond computation by their cultivation on the amniotic cavity, the chorioallantoic membrane, the alimentary cavity and yolk sac of the domestic egg. It is explained, too, how much may be learned from contemplation of the many plant viruses which are of such great economic importance. This leads to a consideration of the rickettsiæ, which form a step between the virus of psittacosis and the smaller members of the group.

The processes of defence are much more involved, but by this master-hand are made readily intelligible to intelligent minds. Finally, we are given an outline of the conquest of some important diseases, such as diphtheria, influenza, tuberculosis, plague, cholera and of the epic of malaria. Yellow fever, too, makes grand and sensational reading.

Enough has been said to show that this book makes a deep appeal to the ardent searcher after knowledge, as well as providing pleasant bedside-reading for the practising physician.

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