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The mathematical theory of infectious diseases and its applications. 2nd edition.

Author(s) : [BAILEY, N. T. J.](#)

Book : [The mathematical theory of infectious diseases and its applications. 2nd edition](#). xvi + 413 pp.

Abstract : This second edition is really a new book incorporating Dr Bailey's monograph on the theory of epidemics. More than half the book is new and the scope is indicated by the more general title.

The purpose of the book is to give fairly wide coverage of mathematical models for the modelling the spread of infectious disease and to present some illustrative

Part I deals with general orientation and includes a short historical review, to which the models are based, a discussion of the role of mathematical models and the effects of computer developments on estimation and simulation. Part II, which is general theory, forms more than half the book. It gives an account of a number of models, their properties and how parameters may be estimated. Part III, after the detection of infectiousness, considers the problem of describing the spread of measles outbreaks in families, and of estimating the latent, infectious and incubation periods of this disease. Next, REVELLE, LYNN and FELDMANN'S work on modelling the epidemiological dynamics of tuberculosis is presented. This model makes it possible to examine the implications of various BCG vaccination strategies. It is followed by a summary of recent work on building up a detailed epidemiological model of malaria transmission, a study of how yaws and chickenpox interact, and Russian work on the spread of measles. Chapter 20 starts with BERNOULLI'S work on variolation and goes on to discuss the problem of balancing side-effects with benefits in immunization programmes. In the concluding chapter Dr Bailey draws together the strands of the book and discusses some of the most promising future developments.

The importance of models in analysis is easily overlooked but to use a mean and standard deviation, or correlation tacitly assumes a stochastic model of the data. The processes of the spread and control of infectious diseases require more complex models. The general reader, passing over the mathematics, will find a stimulating description of some realistic models and their applications in chapters 16 to 20. The models discussed in these chapters are more complex than those discussed in Part II and many will be daunted by the mathematical difficulties associated with the analysis of even the simplest model. One might question the relevance of such general theory and try to go directly from the basic formulation of a practical model by simulation. But an analysis of simple models provides insight into more complicated ones, and neglect of simple models result in lengthy simulations which only establish obvious stochastic properties. Work in this field requires the combined application of medical, mathematical and computational skills. One aspect of this, as the author says, is the need to train epidemiologists and health administrators in the concepts and potential of mathematical modelling.

Workers in this field will greatly welcome this up-to-date and integrated presentation by one of the foremost research workers on the modelling of disease processes. [See *Trop. Dis. Bull.*, 1975, v. 72, pp. 475-488.] *R. G. Carpenter.*

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