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Account of the Prevalence and Distribution of the Disease

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# THE CAUSES OF TUBERCULOSIS

TOGETHER WITH SOME ACCOUNT OF  
THE PREVALENCE AND DISTRIBUTION  
OF THE DISEASE

BY

LOUIS COBBETT, M.D., F.R.C.S.

University Lecturer in Pathology, Cambridge

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at the University Press

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## EDITOR'S PREFACE

IN view of the increasing importance of the study of public hygiene and the recognition by doctors, teachers, administrators and members of Public Health and Hygiene Committees alike that the *salus populi* must rest, in part at least, upon a scientific basis, the Syndics of the Cambridge University Press have decided to publish a series of volumes dealing with the various subjects connected with Public Health.

The books included in the Series present in a useful and handy form the knowledge now available in many branches of the subject. They are written by experts, and the authors are occupied, or have been occupied, either in investigations connected with the various themes or in their application and administration. They include the latest scientific and practical information offered in a manner which is not too technical. The bibliographies contain references to the literature of each subject which will ensure their utility to the specialist.

It has been the desire of the editors to arrange that the books should appeal to various classes of readers: and it is hoped that they will be useful to the medical profession at home and abroad, to bacteriologists and laboratory students, to municipal engineers and architects, to medical officers of health and sanitary inspectors and to teachers and administrators.

Many of the volumes will contain material which will be suggestive and instructive to members of Public Health and Hygiene Committees; and it is intended that they shall seek to influence the large body of educated and intelligent public opinion interested in the problems of public health.

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## AUTHOR'S PREFACE

THIS book is addressed mainly to those who are interested in the stamping out of tuberculosis. It makes no attempt to deal with the disease from its clinical aspect which has already been treated abundantly by many eminent writers.

The outlook of the author has been that of the experimental pathologist, and it is from this point of view mainly that the problem has been approached. This outlook, though it limits the field, has the compensating advantage that it opens up that aspect of it which is, perhaps, the least familiar.

It is hoped that the book will meet a demand for information on many points about which the author is frequently questioned. For, though notable advances have been made since the subject of the relation of animal to human tuberculosis was first brought prominently forward by Koch's adverse pronouncement at the London Congress in 1901, the researches which have led to these advances are, for the most part, buried in Blue Books or hidden in other official publications. It is, indeed, one of the principal objects of this book to bring together in a handy form these researches, and particularly those of the late Royal Commission on Tuberculosis and the Local Government Board in this country, the Department of Health of the City of New York and the Imperial Board of Health in Berlin.

The greater part of the book will be found to deal with the tubercle bacillus and its varieties, or "types," as they are more generally called. It treats of their distribution, cultural characters and comparative virulence for a number of animal species. In particular the sharpness of characterization of these types and their stability under conditions which, if any, might be supposed to conduce to modification, that is to say

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the evidence of their existence as distinct varieties, is inquired into at some length.

Such questions may appear to some to be merely of academic interest. But it is not so. In reality their solution is necessary before a true opinion can be formed of the relative importance of the different sources of infection in human tuberculosis, and they play a practical rôle in the campaign for the eradication of the disease.

This book is addressed, as we have said already, to those who are interested in the stamping out of tuberculosis. And, consequently, it is intended both for those who are and those who are not members of the medical profession. The language has therefore been kept simple and as free as possible from technical difficulties; at the same time it has seemed desirable, in the interest of those who are following, or about to follow, lines of research similar to those dealt with here, to review much original work in considerable detail. It is feared that this survey, extended as it is over many pages, may prove tedious; and for this reason some of it has been printed in small type. Such parts may be passed over without interfering with the thread of the argument. But, indeed, the main defence of a detailed treatment lies in the fact that it should enable the reader to arrive at his own conclusion; and the author is more concerned that he may be held to have presented the evidence fully, clearly, impartially and with criticism which is just, than that he should be pronounced to have dealt with the subject in an agreeable manner.

The earlier chapters of the book deal with the magnitude of the evil imposed by the tubercle bacillus upon mankind, and with its age and sex distribution in town and country. The changes in this distribution, which have been so remarkable a feature of the history of human tuberculosis in the last half century, are described, and attention called particularly to the great diminution of mortality which has occurred among women at certain periods of life. The causes of the wonderful decline in the mortality from tuberculosis which has occurred in these, and to only a lesser extent in all other, classes of the population is briefly touched upon; and evidence is assembled



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in the hope of giving credence to the vision which has already gladdened the eyes of some seers that at a day, not too far distant, the world may become rid of this incubus, or at least that tuberculosis shall have ceased to exact an exorbitant tribute and have become reduced to the status of one of the less common diseases.

The part played by personal contagion in the spread of the disease, and the relative importance of individual predisposition and opportunity for infection, or as we may say of "soil and seed," about which such curious fluctuations of opinion have occurred in the past is considered in Chapters IV and v.

On this ancient controversy it is hoped that a new point will be found to have been brought to bear, namely the influence of the *quantity* of bacilli in the infecting dose. This, though recognized, more or less clearly, by certain writers, has, in the main, been strangely neglected hitherto, and evidence of an experimental kind is here brought forward, it is believed for the first time, to establish its importance.

Next follows a consideration of the *portals* through which tubercle bacilli enter the body most commonly, about which erroneous opinions, quite recently, have prevailed in high places. The practical bearing of this question on the decision whether pulmonary discharges or contaminated milk are most to be guarded against is sufficient justification for dealing with this question at large.

The chapters which follow deal with the bacillus itself and its various types, as already indicated, and with the means which are available for their identification.

Chapters XVIII to XXIII treat of tuberculosis in animals. The remarkable difference in histological response to invasion by tubercle bacilli presented by different species is pointed out; but the chief interest is devoted to types of bacilli found in instances of naturally acquired tuberculosis in each animal species, and in the relative susceptibility of that species to infection with each of the three types as shown by artificial experiment. As will be seen, it is not always the type which is most virulent for a given species that is responsible for the majority of instances in it of naturally acquired disease.

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Human tuberculosis is treated in Chapters xxiv and xxv from the same standpoint, but at greater length as its importance demands. Each kind of tuberculous disease is dealt with separately, and special attention is given to lupus, concerning which so many problems of interest arise.

Lastly, in the concluding chapter is summarized the evidence as to the comparative distribution of the three types of tubercle bacilli in various animal species and the part, if any, played by each in the various kinds of tuberculosis in man.

Such is the programme of the book. How far the author has succeeded in carrying it out it must be left to his critics to judge; he himself is not unaware of numerous shortcomings, and he would beg his judges to bear in mind the difficulties of the task. On one point especially he would ask indulgence, namely on the classification of atypical tubercle bacilli. For this the time was not fully ripe; fresh facts were coming to light while the book was being put together, so that place for some of them has had to be found in an appendix. This circumstance was however not without its recompense for it conveyed a stimulating sense of the fact that one was dealing with a living and developing problem.

In conclusion, the author hopes that this book may receive a welcome from those who have at heart the victory over disease. And he will feel that he has not laboured in vain if it should lead, in some degree, to a more general interest in the fundamental problems concerning that disease which, without exaggeration, may be described as the commonest, most fatal and, perhaps, as the saddest of those which oppress mankind.

The author's thanks are due to many helpers, and especially to Dr A. Stanley Griffith and to Lieut. C. F. Fox, whose intimate knowledge of the Reports of the Royal Commission has proved invaluable.

L. C.

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