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BIOLOGY OF THE TREPONEMATOSES

BIOLOGY

OF THE

TREPONEMATOSES

Based on Studies Carried Out at the International
Treponematoses Laboratory Center of
the Johns Hopkins University under the Auspices
of the World Health Organization

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Preface

This monograph is based on the results of investigations carried out at the International Treponematosi Laboratory Center, which was established in 1950 in the Department of Microbiology of the Johns Hopkins University under the joint auspices of the World Health Organization and the Johns Hopkins School of Hygiene and Public Health. WHO has stimulated the work of the Center from the very beginning, lending its support and encouragement to the studies undertaken both in the field and in the laboratory. Thus, the Center's activities have formed part of WHO's programme for the co-ordination of research in treponematosi control.

Support in the form of grants has also been received from the National Institutes of Health, United States Public Health Service, and the Whitehall Foundation Inc. of New York. Over the years, the International Health Division of the Rockefeller Foundation has given considerable financial aid to the work of the Center, and a number of other organizations and individuals have contributed lesser but nevertheless significant degrees of support; among these may be mentioned particularly the late Mr George Moffet, and the Lederle Laboratory Division, American Cyanamid Company.

Finally, the generous attitude of the Johns Hopkins University in providing facilities at a cost difficult to estimate but certainly greater than all the outside contributions combined has played no small part in making possible this series of studies.



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Introduction

Taken the world over the treponemal diseases—syphilis (venereal and endemic), yaws, and pinta—are among the major afflictions of mankind. In few countries is treponematosis a minor health problem; in many countries it is a major one.

Penicillin has rendered the control of the treponemal diseases a practical possibility for the first time; their complete elimination is now no longer a fantastic objective. But years of intelligent and patient application of present knowledge will be required to bring about in most countries even partial control.

Always, too, inherent in an interacting biological system such as that between the treponemes and man, their natural host, are opportunities for either temporary or permanent evolutionary changes to occur which could upset whatever favorable advantage man enjoys.

In the formulation of long-range plans directed to the control of the treponematoses it behoves us therefore first to make use of all the knowledge of the fundamental biology of the disease now available and secondly to press the search for new knowledge which man might need to retain his advantage over the treponeme.

For a number of years a group of investigators in association with the senior author has been studying one or another aspect of the treponemal diseases; more recently this group has served as the International Treponematosis Laboratory Center under the auspices of the World Health Organization. It is mainly the studies and observations of these investigators that are recorded here, although in attempting to present the newer knowledge of the fundamental biology of the treponematoses no work from other sources which would help complete the picture has been intentionally omitted. The monograph is arranged in three parts: Part I comprises six chapters dealing with various aspects of the fundamental biology of the treponematoses in general; Part II comprises three chapters in which a comparative study of strains of treponemes newly isolated from various parts of the world is presented; and Part III is a single chapter summarizing the principal observations presented in Part I and Part II.

In many respects our view of the treponemal diseases has changed considerably over the past few years, and it is the observations and principles underlying these changing concepts with which this monograph is

mostly concerned. In a sense, therefore, it does not supersede but rather builds upon the splendid summaries of knowledge in this field, among which are those by Chesney;² Noguchi;¹⁵ Mulzer;¹⁴ Sobernheim, Bruck, Prigge, and Laubenheimer in Kolle, Kraus & Uhlenhuth's handbook of pathogenic organisms;¹⁰ Matsumoto;^{11, 12} Bulloch,¹ and Dawson³ in the British Medical Research Council's *System of bacteriology*; Gastinel & Pulvenis;⁴ Kolle & Hetsch;⁹ various contributions to the symposium of the American Association for the Advancement of Science;¹³ Hudson's monograph on treponematoses;⁸ and the reviews of pinta by Holcomb,⁷ of endemic syphilis by Grin⁵ and of the treponematoses as a whole by Guthe & Willcox.⁶

While of necessity much knowledge of the treponematoses has been gained from a study of laboratory animals, in the background is always the important question of the extent to which such observations can be translated into terms of the disease in human beings. Recognizing that caution and good judgement must be exercised in translations of this sort, it will nevertheless be regarded as an obligation to suggest interpretations of laboratory-acquired data in the light of the clinical and epidemiological problems of the treponemal diseases.

The authors have given much thought to the selection of a suitable title for this monograph. While "Biology of the Treponematoses" is open to certain objections from a strictly semantic point of view, it is felt that it conveys better than any other alternative title considered the breadth of the studies reported therein. These are concerned not only with the infecting organism but also with many fundamental aspects of the disease processes included under the term "treponematoses", as well as their pathogenesis, their epidemiology, their immunology and their microbiology.

* * *

Throughout the period during which the senior author has been the principal investigator, he has been fortunate in having the collaboration of a succession of splendid younger investigators. References to their work appear throughout the text; but countless hours of detailed study and much background material have been contributed in such a way that it is impossible to give adequate credit individually. It is with sincere appreciation as well as with a warm sense of personal debt that acknowledgements are made to the following former or present associates: Drs George M. Saunders, Henry W. Kumm, A. A. Peat, H. M. Johnston, J. I. Rerrie and L. E. Arnold (all of the one-time Jamaica Yaws Commission); Drs William L. Fleming, Elaine Updyke, Fred C. Kluth, Charlotte McLeod, Mary Cumberland Yurchenco and Miss Nancy Brayton Kriebel (during the period prior to the outbreak of the Second World War); Drs David H. Hollander, Huan-Ying Li, Robert A. Nelson, jr., Katherine Schaeffer, Paul Hardy,

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Credit is due to the World Health Organization and in particular to Dr Thorstein Guthe, Chief of its Venereal Diseases and Treponematoses Section, and his former associate, Dr Frank W. Reynolds, for suggesting the idea of this monograph and for stimulating its preparation.

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