

**IMMUNE SERA: A CONCISE EXPOSITION OF  
OUR PRESENT KNOWLEDGE, CONCERNING  
THE CONSTITUTION AND MODE OF  
ACTION OF ANTITOXINS, AGGLUTININS,  
HAEMOLYSINS, BACTERIOLYSINS,  
PRECIPITINS, CYTOTOXINS, AND OPSONINS**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649611409

Immune Sera: A Concise Exposition of Our Present Knowledge, Concerning the Constitution and Mode of Action of Antitoxins, Agglutinins, Haemolysins, Bacteriolysins, Precipitins, Cytotoxins, and Opsonins by Charles Frederick Bolduan

Except for use in any review, the reproduction or utilisation of this work in whole or in part in any form by any electronic, mechanical or other means, now known or hereafter invented, including xerography, photocopying and recording, or in any information storage or retrieval system, is forbidden without the permission of the publisher, Trieste Publishing Pty Ltd, PO Box 1576 Collingwood, Victoria 3066 Australia.

All rights reserved.

Edited by Trieste Publishing Pty Ltd.  
Cover @ 2017

This book is sold subject to the condition that it shall not, by way of trade or otherwise, be lent, re-sold, hired out, or otherwise circulated without the publisher's prior consent in any form or binding or cover other than that in which it is published and without a similar condition including this condition being imposed on the subsequent purchaser.

[www.triestepublishing.com](http://www.triestepublishing.com)

**CHARLES FREDERICK BOLDUAN**

**IMMUNE SERA: A CONCISE EXPOSITION OF  
OUR PRESENT KNOWLEDGE, CONCERNING  
THE CONSTITUTION AND MODE OF  
ACTION OF ANTITOXINS, AGGLUTININS,  
HAEMOLYSINS, BACTERIOLYSINS,  
PRECIPITINS, CYTOTOXINS, AND OPSONINS**



**WORKS BY**  
**CHARLES F. BOLDUAN, M.D.**  
PUBLISHED BY  
**JOHN WILEY & SONS**

**Immune Sera.**

Antitoxins, Agglutinins, Hemolysins, Bacteriolysins, Precipitins, Cytotoxins, and Opsonins. New edition, rewritten. By Charles F. Bolduan, M.D. 12mo, viii + 154 pages. Cloth, \$1.50.

**TRANSLATIONS.**

**The Suppression of Tuberculosis.**

Together with Observations concerning Phthisiogenesis in Man and Animals, and Suggestions concerning the Hygiene of Cow Stables and the Production of Milk for Infant Feeding, with Special Reference to Tuberculosis. By Professor E. von Behring, University of Marburg. Authorized Translation by Charles F. Bolduan, M.D. 12mo, vi + 86 pages. Cloth, \$1.00.

**Manual of Serum Diagnosis.**

By Doctor O. Rostoski, University of Wurzburg. Authorized Translation by Charles F. Bolduan, M.D. 12mo, vi + 86 pages. Cloth, \$1.00.

**Collected Studies on Immunity.**

By Professor Paul Ehrlich. Translated by Charles F. Bolduan, M.D. 8vo, xi + 586 pages. Cloth, \$6.00.

# IMMUNE SERA

A CONCISE EXPOSITION OF OUR PRESENT KNOWLEDGE  
CONCERNING THE CONSTITUTION AND  
MODE OF ACTION OF

ANTITOXINS, AGGLUTININS, HÆMOLYSINS,  
BACTERIOLYSINS, PRECIPITINS,  
CYTOTOXINS, AND  
OPSONINS

BY

DR. CHARLES FREDERICK BOLDUAN

*Bacteriologist, Research Laboratory, Department of Health,  
City of New York*

*SECOND EDITION, REWRITTEN*

FIRST THOUSAND

NEW YORK  
JOHN WILEY & SONS  
LONDON; CHAPMAN & HALL, LIMITED

1907

PL

COPYRIGHT, 1907,

By CHARLES FREDERICK BOLDUAN

The Scientific Press  
Robert Drummond and Company  
New York

G181  
B68  
1907

## PREFACE

---

THIS book has its origin in a monograph by Professor Wassermann, a translation of which was published by the author in 1904 under the title "Immune Sera." While much of the material contained in that book will be found in the present volume, it has been deemed necessary to discuss more fully the original topics, and to widen the scope of the book by adding chapters on snake venoms and their antisera, agglutinins, opsonins, and serum sickness. The author gratefully acknowledges his indebtedness to Dr. W. H. Park for valuable suggestions in the preparation of the book.

NEW YORK, *Sept. 1, 1907.*





## CONTENTS

	PAGE
Antitoxins . . . . .	1
HISTORICAL . . . . .	1
PRESENT METHOD OF PRODUCING DIPHTHERIA ANTI- TOXIN . . . . .	2
PRODUCTION OF DIPHTHERIA TOXIN . . . . .	2
IMMUNIZING THE ANIMALS . . . . .	3
COLLECTING THE SERUM . . . . .	4
TESTING THE STRENGTH OF THE SERUM . . . . .	5
EHRlich's THEORY FOR PRODUCTION . . . . .	6
TOXINS, TOXOIDS . . . . .	6
RECEPTORS . . . . .	9
WEIGERT'S OVERPRODUCTION THEORY . . . . .	10
EXPERIMENTAL EVIDENCE FOR EHRlich's THEORY . . . . .	13
ANTIGENS OR HAPTINS . . . . .	16
NATURE OF ANTITOXINS IN GENERAL . . . . .	17
TOXINS AND OTHER POISONOUS CELL DERIVATIVES IN GENERAL . . . . .	19
RELATIONS BETWEEN TOXIN AND ANTITOXIN . . . . .	21
" L <sub>0</sub> " and " L <sub>1</sub> " . . . . .	23
PARTIAL SATURATION METHOD OF STUDYING TOXINS — TOXONS, TOXOIDS . . . . .	23
EHRlich's " POISON SPECTRA " . . . . .	24
VIEWS OF ARRHENIUS, BORDET, AND OTHERS . . . . .	28
Agglutinins . . . . .	30
THE PHENOMENON . . . . .	30
PURPOSE OF AGGLUTINATION . . . . .	33
HISTORICAL . . . . .	33
PFAUNDLER'S REACTION (THREAD REACTION) . . . . .	35

	PAGE
NATURE OF THE AGGLUTININS . . . . .	35
NATURE OF THE AGGLUTINATION REACTION . . . . .	36
AGGLUTINOIDS . . . . .	38
GROUP AGGLUTININS — . . . . .	39
ABSORPTION METHODS FOR DIFFERENTIATING BETWEEN A MIXED AND A SINGLE INFECTION . . . . .	41
FORMATION OF AGGLUTININS ACCORDING TO THE SIDE- CHAIN THEORY, RECEPTORS OF FIRST, SECOND, AND THIRD ORDER . . . . .	43
Bacteriolysins and Hæmolysins . . . . .	47
HISTORICAL . . . . .	47
PFEIFFER'S PHENOMENON . . . . .	48
HÆMOLYSIS . . . . .	49
NATURE OF HÆMOLYTIC SERA . . . . .	51
THE EXCITING AGENT . . . . .	54
RÉSUMÉ . . . . .	54
ANALOGY BETWEEN THE BACTERIOLYTIC AND HÆMO- LYTIC PROCESSES . . . . .	54
EHRlich AND MORGENROTH ON THE NATURE OF HÆMO- LYSIS . . . . .	56
THEIR THREE CLASSIC EXPERIMENTS . . . . .	57
NOMENCLATURE . . . . .	60
ROLE OF THE IMMUNE BODY . . . . .	62
ON WHAT THE SPECIFICITY DEPENDS . . . . .	63
DIFFERENCE BETWEEN A SPECIFIC SERUM AND A NOR- MAL ONE . . . . .	64
DIVERGING VIEWS OF EHRlich AND BORDET . . . . .	64
THE SIDE-CHAIN THEORY APPLIED TO THESE BODIES . . . . .	65
MULTIPLICITY OF COMPLEMENTS . . . . .	67
THE BORDET-GENGOU PHENOMENON; NEISSER- SACHS BLOOD TEST . . . . .	68
NORMAL SERUM, ITS HÆMOLYTIC AND BACTERIOLYTIC ACTION . . . . .	70
ACTIVE AND INACTIVE NORMAL SERUM . . . . .	72