ADVANCED IMMUNOCHEMISTRY

SECOND EDITION

ADVANCED IMMUNOCHEMISTRY

SECOND EDITION

Eugene D. Day, Ph.D.
Professor Emeritus of Immunology
Department of Microbiology and Immunology
Duke University Medical Center
Durham, North Carolina

WILEY-LISS
A JOHN WILEY & SONS, INC., PUBLICATION
New York • Chichester • Brisbane • Toronto • Singapore

Address all Inquiries to the Publisher
Alan R. Liss, Inc., 41 East 11th Street, New York, NY 10003

Library of Congress Cataloging-in-Publication Data

Day, Eugene D.
Advanced immunochemistry / Eugene D. Day.—2nd ed.
p. cm.
ISBN 0-471-56686-1—ISBN 0-471-56768-X (pbk.)
1. Immunochemistry. I. Title.
[DNLM: 1. Immunochemistry. QW 504 D273a]
QR183.6.D39 1990
616.07'9—dc20
DLC
for Library of Congress 89-70635
CIP

Cover and interior design by Virginia M. Rodgers.

PREFACE

"Scientists whose work is prospering are wrapped up in it with such obsessive absorption that they want above all to be left to cultivate their gardens. They are not more than idly curious about what goes on in other people's gardens, and their closest approximation to neighborly behavior often amounts to little more than an inclination to borrow their neighbor's garden tools—especially the physicist's'.

—In My Neighbor's Garden
Sir Peter Medawar (1984)

Let's linger a while at the fence overlooking the immunochemical garden and learn how we reached the highly cultivated stage of immunology in which we now find ourselves.

Talmage (1986) reminds us that "in the 30 years before 1948, the word 'lymphocyte' did not appear in the index of the **Journal of Immunology**". This merely punctuates the fact that Immunology has undergone its series of fundamental scientific revolutions in a very short period of time, so much so that a sizeable fraction of the living members of the American Association of Immunologists, for example, has witnessed the complete series.

Probably, a century from now, this whole period will be called an epoch by those philosophers of science who describe universally recognized scientific achievements in terms of paradigms (Kuhn, 1970). Horace Freeland Judson (1979) recalls talking with Max Delbrück about revolutions in science (they had just been discussing the Watson-Crick denouement), outlining for him how Kuhn might view things—"the epoch's ruling way of conceptualizing theories, so that the end of a scientific epoch is marked by the total breakdown of the paradigm and its replacement with another." Thus, some future philosopher of science might envision Immunology as taking a prominent place beside such other great paradigms as Darwinism, and Quantum Mechanics. Judson and Delbrück, agreeing "that 'paradigm,' as a term, was already almost thoroughly debauched as 'charisma'", questioned whether there were "only four or five revolutions in all of history of science big enough to meet the criteria". Judson quotes Delbrück as wondering, in fact, "whether there aren't hundreds. Except we don't know about them. Some few are vaunted. I don't know. I haven't read Kuhn's book.'"

If we are not careful, one such revolution that is certain to be overlooked in some future assessment of the Immunological Epoch (IE) is the immunochemical story. As the first of several chapters in the advancing saga of IE, it has already lost its romantic flavor in most circles in spite of its fundamental importance. Our attention has now turned to other episodes

and their unfolding stories which still keep us spellbound. And the final chapter of this great paradigm, still to be written, will no doubt be the one that will become recorded in philosophical history. It must be remembered, however, that Immunochemistry set the stage, defined the rules, and determined the nature and limits of specificity, cross-reactivity, complementarity, affinity, and heterogeneity, the five principles that permeate the whole of IE, even the world of that unwritten last chapter. Hopefully, the following pages will have captured enough of the essence of the first chapter of IE to make even the last chapter (as well as those in between) more meaningful. From more than 20,000 titles representing the body of immunochemistry I selected 7500 that appeared to have merit, retrieved the corresponding papers for critical examination, and found about 2200 that, in particular, encompassed much of the relevant material. Since my intention has always been to illustrate certain points, I have, of course, not been able to be encyclopedic in my coverage. Consequently, I have had to refrain from citing more than 2000 excellent and worthy papers in the final version, including a number from my own list of particular favorites, difficult though that has been. I do humbly apologize to my colleagues for any glaring omissions that have been made and truly hope they understand.

E.D.D.
Loudonville, N.Y.
March 31, 1989

References

Judson, H.F. (1979). The Eigth Day of Creation. The Makers of Revolution in Biology. Simon and Schuster (New York, 686 pp.) p.61.

Kuhn, T.S. (1970). The Structure of Scientific Revolutions. Univ. Chicago Press, Chicago, 2nd ed., 210 pp.

Medawar, P.B. (1984). The Limits of Science. Harper and Row (New York, 108 pp.) p. 72.

Talmage, D.W. (1986). The acceptance and rejection of immunological concepts. Annu Rev. Immunol. 4:1–11.

ACKNOWLEDGMENTS

There are four individuals in particular to whom I owe a debt of gratitude: my wife, Shirley, for her love and for her protective and faithful assistance in so many ways over so many years; my assistant at Duke University, Mr. Robert T. Holeman, for his professional bibliographic assistance, for his faithful transformation of my hand-written manuscript into an Apple IIe creation, and for his excellent management of my office at Duke University after I "retired" to my home in Loudonville, New York, to complete the manuscript; and my editors at Alan R. Liss, Dr. Brian Crawford and Mr. Tony Battle, who so efficiently managed the transformation of the Apple IIe product into its present form. I should also like to express my sincere thanks to the many authors and publishers, cited separately in text and references, for their generous and cooperative permission to include copyrighted material in these pages.

E.D.D.

CONTENTS