

PREFACE

"It is indeed a pleasure to acquire knowledge and, as you go on acquiring, to put into practice what you have acquired. A greater pleasure still is when friends of congenial minds come from afar to seek you because of your attainments. But he is truly a wise and good man who feels no discomposure even when he is not noticed by men."

Confucius

In science, as in society, achievements, advances, and discoveries are the main themes of reports and publications. Details on noteworthy processes and the basis for their procedures are generally condensed into a few words or sentences discernible only by the experts. This is particularly so in the broad field of chemical modification and its application in conjugation and cross-linking of biological components. Any novice will have difficulty in perceiving the mechanism of reaction apart from utilization of this technique in his/her applications. In light of the fact that chemical cross-linking reagents have attained great practical use in industry as well as in basic research, and that an understanding of their fundamental principles of reaction is paramount to their applications, I have undertaken the challenge to put together a text that hopefully bridges the gap between scientific literature and practice. Although many reviews have been written, none has completely achieved that goal.

This book offers an explanation of the underlying mechanism of chemical modification, surveys all the bifunctional reagents used in bioconjugation and cross-linking, and provides a review of practical applications of these reagents in various areas of biochemistry, molecular biology, biotechnology, nucleic acid chemistry, immunochemistry, and diagnostic and biomedical disciplines. It is hoped that the coverage will be broad enough to stimulate intellectual curiosity in the development and application of chemical cross-linking reagents.

During the preparation of this book, a major journal, *Bioconjugate Chemistry*, published by the American Chemical Society, has appeared. This journal specifically addresses "the joining of two different molecular functions by chemical or biological means". Coverage emphasizes "the conjugation of antibodies and their fragments, nucleic acids and their analogs, liposomal components, and other biologically active molecules (receptor-binding proteins, hormones, peptides) with each other or with any molecular groups that add useful properties, including drugs, radionuclides, toxins, fluorophores, photoprobes, inhibitors, enzymes, haptens and ligands." The publication of this multidisciplinary journal further demands the understanding of the chemical basis of cross-linking. I sincerely hope that this book will also provide useful information for the readers of this periodical.

It is a miracle that this book is finished in time for publication. I wish to thank all those who, with their constant encouragement and stimulation, have helped me make this possible. My special thanks goes to Drs. Hann P. Wang and Dennis Johnson, who have taken their time to read my draft and given their invaluable suggestions, to Ms. Jody Grady for her help in obtaining many of the references, and to my wife who has not only reviewed the text but also drawn all the figures. I am also grateful to all the scientists and researchers who have contributed so much to the development and application of cross-linking reagents. Without their efforts, I would not have had anything to write about. I therefore apologize to those whose publications I failed to quote. Any mistake that may be found in the book is a result of my oversight. I welcome comments and suggestions for improvement and for correction of any error.

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