

Preface

In studying the chemical aspects of bioluminescence, comprehensive reviews of practical use were scarce in the past except on luminous bacteria. This is a considerable inconvenience and disadvantage to researchers. In fact, I have been frequently frustrated myself by the need to search for old articles published 30–40 years ago to find data on some basic properties of bioluminescent substances, such as the absorption spectra and luminescence activities of luciferins. In the absence of any compendium of the substances and reactions involved in bioluminescence, researchers will have to spend their precious time delving through the literature in order to find the needed information. Such a situation may discourage new investigators who are interested in the chemical study of bioluminescence, and might hamper them from actually taking up a project. Upon consideration of these matters, I decided to write this book.

The present book describes all the significant studies and findings on the chemistry of the more than 30 different bioluminescent systems presently known, accompanied by over 1000 selected references. It includes descriptions of the purification and properties of bioluminescent compounds, such as luciferins, luciferases and photoproteins, and the mechanisms of luminescence reactions. To make the book more useful than a mere review volume and to save researchers time in looking into original references, I have included a considerable amount of original experimental methods, data and graphs. In addition, I have included some new data and experimental methods unavailable elsewhere. I hope this volume will be useful to researchers and students, and it will be my greatest pleasure if this book contributes

to the finding of new luciferin structures and new luminescence mechanisms.

I am grateful to J. Woodland Hastings, Satoshi Inouye and Yoshihiro Ohmiya who kindly read a draft version of this book and provided me with valuable suggestions and advice. I also would like to express my sincere thanks to Steven Haddock, John Brinegar and Sachi Shimomura for their help in correcting my English, and Sook Cheng Lim for editing this book.

I have been extremely fortunate to be able to continue my research on bioluminescence for 50 years without interruption. It was made possible with the help of many people and the continued support from the National Science Foundation; I am particularly indebted to Toshio Goto, Yoshito Kishi, Benjamin Kaminer and J. Woodland Hastings for their kind help. All my work has stemmed, however, from the initiatives taken by my three mentors: the late Professors Shungo Yasunaga (Nagasaki University), Yoshimasa Hirata (Nagoya University) and Frank H. Johnson (Princeton University). Yasunaga, in 1955, advised me to shift my specialty from pharmacy to chemistry and he arranged for me to work at Hirata's organic chemistry lab; Hirata gave me the very difficult problem of crystallizing *Cypridina* luciferin, which eventually rewarded me with the experience and knowledge necessary as a researcher; and Johnson, in 1961, gave me the subject of *Aequorea* and helped me for 20 years in solving the problems of aequorin and other bioluminescent substances.

With my great respect, I dedicate this book to the memory of my three mentors.

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