

Preface

There is growing interest in glycoscience, which is known to be one of the most important research areas in the medical and life sciences. It is now clear that glycans are implicated in various diseases such as cancer, immune diseases, infectious diseases, muscle-degenerative diseases, neurodegenerative diseases, and diabetes. Glycans also play a pivotal role in fertilization, growth and development, regeneration, and the aging process. Moreover, glycans are likely targets for the discovery of biomarkers, vaccines, and drugs for cancer and inflammatory diseases.

For these reasons, scientists in every field of research have realized that the application of glycoscience contributes to the development of their research projects. They also have a feeling, however, that glycoscience is technically difficult because of the heterogeneity and complexity of glycans. It is evident that many researchers from different disciplines who are not familiar with the specialized techniques used in glycoscience require detailed advice.

Newly developed analytical techniques—namely, the development of mass spectrometry, capillary electrophoresis, and high-performance liquid chromatography—and the accumulated resources of cloned glycosyltransferase genes, lectins, chemically and/or enzymatically synthesized compounds, bioinformatics, and KO mice or gene-targeting animals have opened new avenues for glycoscience.

The Japan Consortium for Glycobiology and Glycotechnology (JCGG) published the Japanese monograph entitled *Glycoscience: A Door to Open the Future* in 2006 written by more than 150 glycoscientists to summarize recent advances in this field in Japan and to offer readers a broad introduction to glycoscience. This present book is the English version but is largely modified and updated. Many of the contributors are experts in their respective fields and have made an effort to present their material in a manner that is understandable to those with general knowledge but with a different background in the biological sciences. The book is presented in three ways: 1) as a “cookbook” with which researchers will be able to prepare the solutions described and follow “recipes” to complete their experiments without needing to consult original research papers; 2) by “concept,” which will allow researchers to search out the discipline, research equipment, research device, or methodology required; and 3) as a “table” providing an overview of the research data, among other information. For those who wish to delve into these topics, we included several references at the end of each chapter for further reading. This book will therefore be of interest to many scientists both in glycoscience and in the broader fields of biology, chemistry, and medicine, as well as to postdoctoral fellows, students, and young scientists.

I would like to take this opportunity to introduce the JCGG which was launched 5 years ago (Yoshitaka Nagai, JCGG president, professor emeritus, The University of Tokyo). The organization of this consortium is slightly different from that of the Consortium for Functional Glycomics (CFG) in the United States. Instead of receiving official support from the Japanese government for its operation, scientists took the initiative for creating and supporting the consortium by using their existing government research grants. Scientists who have been funded by different ministries of the Japanese government, such as the Ministry of Education, Culture, Sports, Science and Technology

(MEXT); the Japan Society for the Promotion of Science (JSPS); the Japan Science and Technology Agency (JST); the Ministry of Economy, Trade and Industry (METI); the New Energy and Industrial Technology Development Organization (NEDO); and the Ministry of Health, Labour and Welfare, are involved in this effort. They have joined together to form this consortium and to provide support through their individual research grants.

The JCGG aims to facilitate the exchange of scientific information; the sharing of resources, equipment, and facilities; the fostering of young scientists; and the construction of a database and infrastructures, among other goals. It also aims to launch national research centers in Japan, such as a Systems Glycobiology Center, where glycobiology can merge with such areas as nanotechnology, bioinformatics, and chemical biology to pursue the goals mentioned above, including medical applications. The JCGG holds an annual symposium in which more than 600 people usually participate.

On behalf of the editors, I gratefully acknowledge all those who contributed to this volume despite their busy schedules. Special thanks are due to Mr. Keiichi Yoshida, the secretary general of JCGG, for his skillful assistance in editing. I also thank Kinpodo, Kyoto, who published the original Japanese version, for agreeing to publication of the English version.

Thanks also go to the editorial staff members at Springer Japan, for their constant support, patience regarding the deadline for the manuscript, and skill in directing the production of this book.

I hope this publication will provide an impetus for future research.

On behalf of the editors,

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