

Preface

The origins of liposome research can be traced to the work of Alec Bangham and colleagues in the mid 1960s. The description of lecithin dispersions as containing "spherulites composed of concentric lamellae" (A. D. Bangham and R. W. Horne, *J. Mol. Biol.* **8**, 660, 1964) was followed by the observation that "the diffusion of univalent cations and anions out of spontaneously formed liquid crystals of lecithin is remarkably similar to the diffusion of such ions across biological membranes" (A. D. Bangham, M. M. Standish, and J. C. Watkins, *J. Mol. Biol.* **13**, 238, 1965). Following the early studies on the biophysical characterization of multilamellar and unilamellar liposomes, investigators began to utilize liposomes as a well-defined model to understand the structure and function of biological membranes. It was also recognized by pioneers including Gregory Gregoriadis and Demetrios Papahadjopoulos that liposomes could be used as drug delivery vehicles. It is gratifying that their efforts and the work of those inspired by them have led to the development of liposomal formulations of doxorubicin, daunorubicin and amphotericin B now utilized in the clinic.

The first chapter of this volume is a tribute to Alec Bangham. The rest of the volume focuses on therapeutic applications of liposomes, and comprises sections on liposomal anti-cancer agents, liposomal antibacterial, antifungal and antiviral agents, miscellaneous liposomal therapies, and electron microscopy of liposomes. I hope that these chapters will facilitate the work of graduate students, post-doctoral fellows, as well as established scientists entering liposome research or shifting their focus in the field. The previous volumes in this series have covered additional aspects of liposomology: Preparation and physicochemical characterization of liposomes (volume 367), the use of liposomes in biochemistry and in molecular cell biology (volume 372), liposomes in immunology, diagnostics, gene delivery and gene therapy (volume 373), antibody- or ligand-targeted liposomes, environment-sensitive liposomes, liposomal oligonucleotides, and liposomes *in vivo* (volume 387).

The areas represented in this volume are not exhaustive, but represent the major therapeutic applications of liposomes. I have tried to identify the experts in each area of liposome research, particularly those who have contributed to the field over some time. It is unfortunate that I was unable to convince some prominent investigators to contribute to the volume. Some invited contributors were not able to prepare their chapters, despite generous extensions of time. In some cases I may have inadvertently overlooked some experts in a particular

area, and to these individuals, I extend my apologies. Their primary contributions to the field will, nevertheless, not go unnoticed in the citations in these volumes and in the hearts and minds of the many investigators in liposome research.

I wish to express my gratitude to all the colleagues who graciously contributed to these volumes. I also thank Shirley Light of Academic Press for her encouragement and initiation of this project and Cindy Minor of Elsevier Science and Christine Brandt of Kolam USA for their help and patience during the preparation of this volume. I am especially grateful to my wife Diana Flasher for her support and love during the seemingly endless editing process and to my dear children Avery and Maxine for their companionship, creativity, and love.

I would like to dedicate this volume to the mentors who have helped me during my early education in science, Drs. Cengiz Yalçın, Feriha Erman, Richard Burger, and Marcel Bastin at the Middle East Technical University in Ankara, and Drs. Shinpei Ohki and Robert Spangler at the State University of New York at Buffalo.

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