

Preface

West Nile virus is a neurotropic flavivirus that has emerged globally as a primary cause of viral encephalitis. Infection of humans and other vertebrate animals is associated with a febrile illness that can progress to a lethal encephalitis or flaccid paralysis syndrome. Its appearance in the Western Hemisphere in 1999 and the corresponding increase in global disease burden over the last decade have been accompanied by intensive study, including the entry of many scientists into the field. Breakthroughs have been made in understanding the unique transmission pattern between the vector and the multiple avian and mammalian hosts and targets. Studies in mammalian systems have dissected the viral and host factors that determine the pathogenesis and outcome of West Nile virus infection. On the basis of these experiments, progress has been made on the identification of genetic factors that predispose to severe human disease. Thus, in a remarkably short period of time, insight has been gained on a wide variety of disciplines related to West Nile virus biology.

The aim of this book was to assemble an up-to-date and cutting-edge anthology from the leading experts in the field. The chapters are balanced by submissions from newcomers who have made significant recent contributions with those from established investigators who have dedicated their careers to the study of West Nile virus. The topics are directed at the biology of West Nile virus, and cover ecology, vertebrate biology, epidemiology, clinical disease, pathogenesis, host immune response, structural biology, immune evasion, and progress on the development of vaccines and therapeutics. Nonetheless, because it belongs to a family of clinically relevant arthropod-borne human pathogens including dengue virus, Japanese encephalitis virus, yellow fever virus, and tick-borne encephalitis virus, many of the paradigms established for West Nile virus will be relevant for the transmission and pathogenesis of these viruses. Reciprocally, advances with other flaviviruses have influenced our understanding of the West Nile pathogenesis. As such, in some sections, chapters address West Nile virus biology in the context of findings with other pathogenic flaviviruses.

While the topics in this book are focused on West Nile virus, they are broad in scope ranging from understanding vector transmission

patterns to the dynamics of structural transitions of proteins on the surface of the virion. As such, it is hoped that this book will have broad use for readers from a variety of backgrounds including clinical infectious disease, epidemiology, virology, immunology, and vector biology. The almost daily discoveries by investigators in this field make this virus an exciting and evolving area of study, and encourage the entry of new talented individuals and ideas. As an editor, I am deeply indebted and grateful to the dedication and perseverance of colleagues who pursue West Nile virus biology with passion, rigor, integrity, and collegiality. Indeed, the significant scientific progress in a relatively short period in the field has prompted optimism on the development, implementation, and targeting of vaccines and therapeutics that control West Nile virus disease in nature.