

Preface to the Second Edition

A second, updated edition of a scientific book is a good sign that the first edition was well accepted, and that the book contents respond to the demands of a dynamic field of activity. The second edition of *Origin and Evolution of Viruses* tries to reflect, as the first edition did, the different molecular strategies that viruses use to evolve within and between hosts, and to provide a view of the complexities of short-term and long-term evolution, with their implications for viral disease. To this aim, the book includes several chapters related to general concepts and tools for the study of virus diversity, evolution, and pathogenesis, and a number of chapters covering specific viral systems including animal, plant, and bacterial viruses. We have broadened the scope of the first edition by including new subjects such as phylogenetic analysis of viral genomes, the enzymological bases of error-prone replication, RNA interference, and cellular functions involved in hypermutagenesis. We have maintained and expanded the chapters needed to provide a historical view of how viruses might have originated, with updated accounts of the primitive RNA world, quasispecies dynamics, and how virus evolution relates to the general evolution of our biosphere. We hope that the reader will find the series of chapters to be both informative and a stimulus for further research.

It is now well established, and it becomes even more transparent upon reading the book, that the diversity of viruses, and their population numbers are astonishing. On top of this,

individual viral populations consist of clouds of related variants rather than defined genomic nucleotide sequences in the classical sense. This is carefully explored in the book from the viewpoints of biochemistry and of evolution. It will not escape the reader that the extreme dynamics of viral populations, with all its implications for virus evolution and pathogenesis, represents a translation into virology of the quasispecies concept, proposed initially by Manfred Eigen in an influential paper published 36 years ago. Quasispecies theory was further developed by several of Eigen's colleagues, and some of them have contributed chapters to the book. Quasispecies has represented the introduction of concepts of complexity to virology. The editors wish to highlight the relevance of quasispecies theory for virology, and gratefully dedicate this volume to Manfred Eigen on the occasion of his 80th birthday.

Such a diversity of topics and viral systems would not have been possible without the commitment and hard work of the many authors to whom we are deeply indebted. Our thanks go also to Elsevier, in particular to Lisa Tickner and Maureen Twaig, first for taking the initiative to propose a second edition of the book, and, second, for their careful involvement in the various matters that require attention before a book can be printed.

Esteban Domingo, Colin Parrish, John Holland

'Theory cannot remove complexity, but it shows what kind of "regular" behavior can be expected and what experiments have to be done to get a grasp on the irregularities.'

Manfred Eigen