

Preface

This book, *Viruses: From Understanding to Investigation*, was inspired by a long career of teaching and research. My students include undergraduate, graduate, medical, and veterinary students. As regards the book title, my intent is to lead students of virology from a basic understanding to an interest in the investigations that have provided the information contained herein. The focus of this textbook is on animal and human viruses, only because these have been the focus of my research and teaching for many years. The viruses of plants, fungi, bacteria, and single-celled organisms are certainly no less interesting.

There is a huge amount of information about viruses available online, in journals, books, websites, and blogs. So what is the need for another virology textbook? My intent was to organize and present a thoughtful, understandable, and up-to-date summary of the volumes of information available for consumption elsewhere. While every textbook, including this one, contains many facts, I have tried to emphasize general concepts.

With more than 40 chapters in the second edition, this book contains more than enough material for a semester-long course in introductory virology. The book is geared toward students with some background in cell biology, microbiology, immunology, and/or biochemistry, and I hope that it will be useful for both undergraduate and beginning graduate students. I also hope that no instructor will try to cover all of the material contained herein during a single semester. The book is organized into two parts, the first 10 chapters cover topics including an introduction to viruses (containing information on replication cycle, diversity, taxonomy, and outcomes of virus infection); structure; interactions with the host cell; methods for studying viruses; immunity to viruses; antiviral agents and introductions to viral epidemiology; evolution; and pathogenesis. There are also chapters that serve as introductions to RNA and DNA viruses. I imagine that this will be more than enough information for many instructors and students.

The remaining chapters present viruses by family, with information about structure, genome organization, replication strategies, and disease. I have tried to

be up-to-date and include virus families that are relatively new (hence, these chapters are short). While each chapter contains basic information about a particular virus family, I am fond of narratives that tie the molecular basis of virus replication to pathogenesis and have provided examples from a variety of animals, including human animals. The inclusion of "animal diseases" specifically serves as a reminder that companion and food animals play integral roles in human health and well-being. (As do plant and bacterial viruses, but those are subjects for other authors to address.)

I encourage instructors to review the material on virus families and choose a handful of these chapters to use in their courses. Positive-strand RNA viruses are presented first followed by negative and dsRNA viruses. The DNA viruses are presented from the smallest to the largest. Last, but certainly not least, are chapters covering the reverse transcribing retroviruses and hepadnaviruses. I have included some taxonomic information in each chapter, sometimes more, sometimes less. I have tried to include the most up-to-date information available from the International Committee on the Taxonomy of Viruses while still focusing on virus "families" to organize this book. The readers should be aware of the fact that the huge number of new viruses being identified using nucleic acid sequencing strategies has resulted in the need for an expansion of viral taxonomy, the details of which are, for the most part, not provided herein.

Throughout the book, I have included brief discussions of both a historical nature (e.g., oncogenic retroviruses and an account of the discovery of hepatitis C virus) and current issues [such as the initiative of the World Health Organization and the World Organization for Animal Health (OIE) to collaborate to reduce human deaths by rabies virus in underdeveloped countries]. In the mix are also topics relevant to basic research such as use of vesicular stomatitis virus G protein for pseudotyping and lymphocytic choriomeningitis virus as a model for pathogenesis. I hope that the readers will find at least a few topics of interest and will use this textbook as a jumping-off point for more in-depth investigations into the world of viruses.