

Preface

The enduring goal of scientific endeavor, as of all human enterprise, I imagine, is to achieve an intelligible view of the universe. One of the great discoveries of modern science is that its goal cannot be achieved piecemeal, certainly not by the accumulation of facts. To understand a phenomenon is to understand a category of phenomena or it is nothing. Understanding is reached through creative acts.

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Carnegie Institution Yearbook 65

The major goal of all three editions of this book has been to define and illustrate the basic principles of animal virus biology. In this information-rich age, the quantity of data describing any given virus can be overwhelming, if not indigestible, for student and expert alike. Furthermore, the urge to write more and more about less and less is the curse of reductionist science and the bane of those who write textbooks meant to be used by students. Consequently, in the third edition, we have continued to distill information with the intent of extracting essential principles, while retaining some descriptions of how the work is done. Our goal is to illuminate process and strategy as opposed to listing facts and figures. We continue to be selective in our choice of topics, viruses, and examples in an effort to make the book readable, rather than comprehensive. Detailed encyclopedic works like *Fields Virology* (2007) have made the best attempt to be all-inclusive, and *Fields* is recommended as a resource for detailed reviews of specific virus families.

What's New

The major change in the third edition is the separation of material into two volumes, each with its unique appendix(es) and general glossary. Volume I covers molecular aspects of the biology of viruses, and Volume II focuses on viral pathogenesis, control of virus infections, and virus evolution. The organization into two volumes follows a natural break in pedagogy and provides considerable flexibility and utility for students and teachers alike. The smaller size and soft covers of the two volumes make them easier for students to carry

and work with than the single hardcover volume of earlier editions. The volumes can be used for two courses, or as parts I and II of a one-semester course. While differing in content, the volumes are integrated in style and presentation. In addition to updating the material for both volumes, we have used the new format to organize the material more efficiently and to keep chapter size manageable.

As in our previous edition, we have tested ideas for inclusion in the text in our own classes. We have also received constructive comments and suggestions from other virology instructors and their students. Feedback from students was particularly useful in finding typographical errors, clarifying confusing or complicated illustrations, and pointing out inconsistencies in content.

For purposes of readability, references again are generally omitted from the text, but each chapter ends with an updated and expanded list of relevant books, review articles, and selected research papers for readers who wish to pursue specific topics. In general, if an experiment is featured in a chapter, one or more references are listed to provide more detailed information.

Principles Taught in Two Distinct, but Integrated Volumes

These two volumes outline and illustrate the strategies by which all viruses are propagated in cells, how these infections spread within a host, and how such infections are maintained in populations. The principles established in Volume I enable understanding of the topics of Volume II: viral disease, its control, and the evolution of viruses.

Volume I: the Science of Virology and the Molecular Biology of Viruses

This volume features the molecular processes that take place in an infected host cell. Chapters 1 and 2 discuss the foundations of virology. A general introduction with historical perspectives as well as definitions of the unique properties of viruses is provided first. The unifying principles that are the foundations of virology, including the concept of a common strategy for viral propagation, are then described. Chapter 2 establishes the principle of the infectious cycle with an introduction to cell biology. The basic techniques for cultivating and assaying viruses are outlined, and the concept of the single-step growth cycle is presented.

Chapter 3 introduces the fundamentals of viral genomes and genetics, and it provides an overview of the perhaps surprisingly limited repertoire of viral strategies for genome replication and mRNA synthesis. Chapter 4 describes the architecture of extracellular virus particles in the context of providing both protection and delivery of the viral genome in a single vehicle. In Chapters 5 through 13, we describe the broad spectrum of molecular processes that characterize the common steps of the reproductive cycle of viruses in a single cell, from decoding genetic information to genome replication and production of progeny virions. We describe how these common steps are accomplished in cells infected by diverse but representative viruses, while emphasizing principles applicable to all.

The appendix in Volume I provides concise illustrations of viral life cycles for the main virus families discussed in the text. It is intended to be a reference resource when one is reading individual chapters and a convenient visual means by which specific topics may be related to the overall infectious cycles of the selected viruses.

