

PREFACE

Both the first and second editions of this book have been driven by the same impetus. For more than 30 years I have been fascinated by the viruses, not just as disease-causing agents, but as organisms that have evolved a wonderful variety of solutions to the problems posed by their reliance on host cells for their reproduction. In the course of studying these organisms, virologists discovered many of the mechanisms by which prokaryotes and eukaryotes replicate and express their own genomes (the bidirectional replication of DNA and the splicing of RNA are just two examples). More recently, bacteriophages like lambda and M13 and eukaryotic viruses like baculovirus and the retroviruses have become versatile research tools of molecular biologists. Clearly, the viruses are for everyone, not just the virologist or clinician.

Probably like many authors, I was driven to write this book originally by frustration. When I wanted to share my fascination with the viruses with undergraduates, I could not find a suitable text. General microbiology texts relegate the viruses to a few examples covered in a handful of pages. Virology books range from everything-you-ever-wanted-to-know-plus-a-little-bit-extra encyclopedias to specialist books for medical students or plant pathologists that are narrowly focused on particular viruses or groups of viruses. While such books are wonderful things of their sort, I wanted an introduction to the viruses that illustrated the common features of their lifestyles rather than a description of their every detail; I wanted the forest, but could get only the trees. Hence, this book.

SCHEME OF THE BOOK

The core of this book is organized around the features of the reproductive cycle shared by all viruses. How are viruses structured? What strategies do viruses use to enter their host cells? How do they express and replicate their genomes? How do they produce new virions? How do host cells respond to viral infection? How might the viruses have evolved? Additional topics like how new viruses emerge as pathogens are also considered. The approach is to describe the general strategies that the viruses have evolved to meet particular situations, with illustrations taken from a variety of different viruses, rather than to present each taxonomic group of viruses in its entirety. For this reason, examples are taken across the spectrum of the bacterial, animal, and plant viruses. My hope is that this "theme and variation" approach will allow the nonexpert to appreciate the viruses as biological entities that share many common features. To my colleagues who may think this approach is too idiosyncratic for their courses, I can only say, "Try it! You'll like it!"

FEATURES

I have tried to create a book that is "user friendly" so that students will actually read it. To this end, I have incorporated a number of features into the book to make it easier to follow the development of the material and its presentation:

- To emphasize concepts, the material in each chapter is presented to the student in the form of questions that open each section. The text then provides the answers to the questions.
- Since many of the illustrations depict the organization or expression of genetic material, the book uses a set of standard conventions that allow the student to identify immediately the exact nature of the molecules being shown and their relationships to each other.
- Each chapter concludes with a summary and an annotated list of suggested readings from readily available sources. These include *Scientific American* articles, reviews of broad topics, some of the classic works in the field, as well as recent papers that are discussed in the chapter.
- Throughout the text there are frequent discussions on how virologists know what they know, so an appendix called *The Virologist's Toolkit* presents brief descriptions of the experimental techniques widely used in virology.
- The body of the text does not use a taxonomic approach, so a second appendix, *Characteristics of Selected Viruses*, provides brief summaries (keyed to the text) of the features and life cycles of the viral groups discussed in the book.

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Any errors remaining in the text are the result of my own cussedness. Other “kind strangers” include the scientists who permitted me to use original photographs or illustrations

from their papers in this book. The credit line for each illustration in the credits section is only a token of my thanks for their courtesy and assistance.

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Finally, thanks beyond measure to my wife, Martha, and my children, Paul and Erin. Their loving support made it possible.

DEDICATION

I would like to dedicate this edition of *The Biology of Viruses* to Patricia Armstrong Johnson and to her son, Harold B. Johnson, Jr., who endowed in her memory the professorship that I have the honor to hold. Dr. Johnson, a historian who taught at the University of Virginia, developed an intense interest in biological chemistry and genetics. This interest led him to endow a professorship to support the study of these disciplines and to contribute to the immense promise they offer for the betterment of mankind in the twenty-first century. It is my hope that this book will advance the objectives that Dr. Johnson has so generously supported.

Bruce A. Voyles

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