

Comprehensive Virology

Edited by Heinz Fraenkel-Conrat
University of California, Berkeley

and Robert R. Wagner
University of Charlottesville

Volume 19

Viral Cytopathology
*Cellular Macromolecular
Synthesis and
Cytocidal Viruses*

Virology

19

Viral Cytopathology

*Cellular Macromolecular Synthesis
and Cytocidal Viruses*

*Including a Cumulative Index to the Authors and
Major Topics Covered in Volumes 1-19*

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Comprehensive Virology 19

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Edited by Heinz Fraenkel-Conrat
University of California at Berkeley

and Robert R. Wagner
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Comprehensive

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Foreword

The time seems ripe for a critical compendium of that segment of the biological universe we call viruses. Virology, as a science, having passed only recently through its descriptive phase of naming and numbering, has probably reached that stage at which relatively few new—truly new—viruses will be discovered. Triggered by the intellectual probes and techniques of molecular biology, genetics, biochemical cytology, and high resolution microscopy and spectroscopy, the field has experienced a genuine information explosion.

Few serious attempts have been made to chronicle these events. This comprehensive series, which will comprise some 6000 pages in a total of 19 volumes, represents a commitment by a large group of active investigators to analyze, digest, and expostulate on the great mass of data relating to viruses, much of which is now amorphous and disjointed, and scattered throughout a wide literature. In this way, we hope to place the entire field in perspective, and to develop an invaluable reference and sourcebook for researchers and students at all levels.

This series is designed as a continuum that can be entered anywhere, but which also provides a logical progression of developing facts and integrated concepts.

Volume 1 contains an alphabetical catalogue of almost all viruses of vertebrates, insects, plants, and protists, describing them in general terms. Volumes 2–4 deal primarily, but not exclusively, with the processes of infection and reproduction of the major groups of viruses in their hosts. Volume 2 deals with the simple RNA viruses of bacteria, plants, and animals; the togaviruses (formerly called arborviruses), which share with these only the feature that the virion's RNA is able to act as messenger RNA in the host cell; and the reoviruses of animals and plants, which all share several structurally singular features, the most important being the double-strandedness of their multiple RNA molecules.

Volume 3 addresses itself to the reproduction of all DNA-containing viruses of vertebrates, encompassing the smallest and the largest viruses known. The reproduction of the larger and more complex RNA viruses is the subject matter of Volume 4. These viruses share the property of being enclosed in lipoprotein membranes, as do the togaviruses included in Volume 2. They share as a group, along with the reoviruses, the presence of polymerase enzymes in their virions to satisfy the need for their RNA to become transcribed before it can serve messenger functions.

Volumes 5 and 6 represent the first in a series that focuses primarily on the structure and assembly of virus particles. Volume 5 is devoted to general structural principles involving the relationship and specificity of interaction of viral capsid proteins and their nucleic acids, or host nucleic acids. It deals primarily with helical and the simpler isometric viruses, as well as with the relationship of nucleic acid to protein shell in the T-even phages. Volume 6 is concerned with the structure of the picornaviruses, and with the reconstitution of plant and bacterial RNA viruses.

Volumes 7 and 8 deal with the DNA bacteriophages. Volume 7 concluded the series of volumes on the reproduction of viruses (Volumes 2-4 and Volume 7) and deals particularly with the single- and double-stranded virulent bacteriophages.

Volume 8, the first of the series on regulation and genetics of viruses, covers the biological properties of the lysogenic and defective phages, the phage-satellite system P2-P4, and in-depth discussion of the regulatory principles governing the development of selected lytic phages.

Volume 9 provides a truly comprehensive analysis of the genetics of all animal viruses that have been studied to date. These chapters cover the principles and methodology of mutant selection, complementation analysis, gene mapping with restriction endonucleases, etc. Volume 10 also deals with animal cells, covering transcriptional and translational regulation of viral gene expression, defective virions, and integration of tumor virus genomes into host chromosomes.

Volume 11 covers the considerable advances in the molecular understanding of new aspects of virology which have been revealed in recent years through the study of plant viruses. It covers particularly the mode of replication and translation of the multicomponent viruses and others that carry or utilize subdivided genomes; the use of protoplasts in such studies is authoritatively reviewed, as well as the nature of viroids, the smallest replicatable pathogens. Volume 12

deals with special groups of viruses of protists and invertebrates which show properties that set them apart from the main virus families. These are the lipid-containing phages and the viruses of algae, fungi, and invertebrates.

Volume 13 contains chapters on various topics related to the structure and assembly of viruses, dealing in detail with nucleotide and amino acid sequences, as well as with particle morphology and assembly, and the structure of virus membranes and hybrid viruses. The first complete sequence of a viral RNA is represented as a multicolored foldout.

Volume 14 contains chapters on special and/or newly characterized vertebrate virus groups: bunya-, arena-, corona-, calici-, and orbiviruses, icosahedral cytoplasmic deoxyriboviruses, fish viruses, and hepatitis viruses.

Following Volume 14 is a group of volumes dealing with virus-host interactions. Volume 15 focuses on immunity to viruses: Volume 16 on viral invasion, factors controlling persistence of viruses, responses to viral infection, and certain diseases. Volume 17 contains chapters discussing and evaluating most of the biophysical, biochemical, and serological methods used in virus research. Volume 18 contains chapters on cell receptors of picornaviruses and persistence of lymphocytic choriomeningitis virus, as well as two on the most important neurological diseases known to be caused by viruses.

The current volume is the last in the series and deals extensively with the molecular basis of viral cytopathogenicity. An introductory chapter on historical perspectives of viral cytopathic effects is followed by two chapters on transcriptional and translational strategies of uninfected mammalian cells. The remaining chapters provide in-depth analyses of the mechanisms by which cytotoxic viruses shut off cellular macromolecular synthesis leading to cell death.

Our knowledge of certain viruses has advanced greatly since publication of the early volumes of *Comprehensive Virology*, and a second updated edition for each of these was considered. The editors and publishers have decided that instead of such a second edition they would approach the concept of comprehensive coverage of virology in a different manner. A series of books or groups of books, termed *The Viruses*, each dealing with a specific virus family in *extenso*, will be planned and edited by an eminent specialist in the respective field.

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