

CONTENTS

Contributors

vii

1. Biomedical and Catalytic Opportunities of Virus-Like Particles in Nanotechnology	1
B. Schwarz, M. Uchida, and T. Douglas	
1. What Is a Virus-Like Particle?	2
2. The Essentials of Protein VLP Structure	5
3. VLPs as Materials	7
4. VLPs as Templates for Constrained Material Synthesis	14
5. VLPs for Biomedical Delivery and Imaging	17
6. VLPs as Metabolic Compartments	22
7. VLPs as Stimulants of Immunity	36
8. Outlook	50
Acknowledgments	51
References	51
 2. A Renaissance in Nepovirus Research Provides New Insights Into Their Molecular Interface With Hosts and Vectors	 61
M. Fuchs, C. Schmitt-Keichinger, and H. Sanfaçon	
1. Introduction	62
2. Taxonomy and Genome Structure	63
3. Population Structure, Genetic Diversity, and Evolution	67
4. Genome Expression by Cap-Independent Translation and Polyprotein Processing	69
5. Replication Proteins and Assembly of Replication Complexes	73
6. Virion Structure and Encapsidation	77
7. Viral and Plant Factors Implicated in Cell-to-Cell Movement	81
8. Host Defense and Virus Counter-Defense Responses	83
9. Viral Symptom Determinants	89
10. Transmission	90
11. Disease Management	93
12. Conclusions and Future Prospects	94
Acknowledgments	94
References	95

3. Have NEC Coat, Will Travel: Structural Basis of Membrane Budding During Nuclear Egress in Herpesviruses	107
J.M. Bigalke and E.E. Heldwein	
1. Introduction	108
2. The Role of NEC in Membrane Budding	111
3. NEC Structures	115
4. The Hexagonal Lattice of the NEC: Structure and Function	119
5. NEC Lattice Curvature	132
6. Regulation of NEC Lattice Assembly	133
7. NEC and Capsid Deenvelopment at the ONM	135
8. Summary	136
Acknowledgments	137
References	137
4. Nonsegmented Negative-Sense RNA Viruses—Structural Data Bring New Insights Into Nucleocapsid Assembly	143
M. Jamin and F. Yabukarski	
1. The Nonsegmented Negative-Sense RNA Viruses	145
2. The RNA Replication Complex	149
3. The N ⁰ -P Complex	160
4. A Proposed Scenario for NC Handling and Assembly by the RNA Polymerase Complex	173
5. Conclusions and Future Directions	176
Acknowledgments	177
References	177
5. Modified Vaccinia Virus Ankara: History, Value in Basic Research, and Current Perspectives for Vaccine Development	187
A. Volz and G. Sutter	
1. Introduction	188
2. History and Development of MVA	189
3. MVA as Tool for Research in Poxvirus Biology	194
4. Recombinant MVA Vaccines Against Infectious Diseases	203
5. MVA as Third-Generation Vaccine Against Smallpox	220
6. Conclusions	224
References	226
Index	245