

CONTENTS

<i>Contributors</i>	ix
<i>Preface</i>	xi
1. Replication Initiation in Bacteria	1
S. Chodavarapu and J.M. Kaguni	
1. Introduction	2
2. Bacterial Replication Origins	2
3. Mechanism of Initiation	11
4. Summary	20
Acknowledgments	21
References	21
2. The <i>E. coli</i> DNA Replication Fork	31
J.S. Lewis, S. Jergic, and N.E. Dixon	
1. Introduction	32
2. Initiation at <i>oriC</i> , the Origin of Replication	36
3. The Primosome, DnaB, and DnaG	36
4. Role of SSB at the Replication Fork	41
5. The Elongation Stage	43
6. Concluding Comments	68
Acknowledgments	69
References	69
3. The Replication System of Bacteriophage T7	89
A.W. Kulczyk and C.C. Richardson	
1. Introduction	90
2. T7-Encoded Proteins Involved in DNA Replication	91
3. Initiation of DNA Replication at the Chromosomal Origin	93
4. Replication Intermediates	95
5. Minimal T7 Replisome	95
6. Leading-Strand Synthesis	110
7. Lagging-Strand Synthesis	115
8. Coordination of Leading- and Lagging-Strand Synthesis	123
References	124

4. Protein-Primed Replication of Bacteriophage Φ29 DNA	137
M. Salas and M. de Vega	
1. Introduction	138
2. The Protein-Primed Replication Mechanism	138
3. In Vivo Compartmentalization of ϕ 29 DNA Replication	158
Acknowledgments	161
References	161
5. Archaeal DNA Replication Origins and Recruitment of the MCM Replicative Helicase	169
R.Y. Samson and S.D. Bell	
1. Introduction	170
2. Origin Recognition in Eukaryotes	171
3. Recruitment of the Replicative Helicase	174
4. Archaeal Replication Origin Specification	175
5. Structure of Archaeal Orc1/Cdc6 Proteins	177
6. Role of ATP in MCM Loading	181
7. The Mechanism of MCM Recruitment by Orc1-1	182
8. Concluding Remarks	186
Acknowledgments	187
References	187
6. The Eukaryotic Replication Machine	191
D. Zhang and M. O'Donnell	
1. Introduction	192
2. The CMG Helicase	194
3. The Polymerase Alpha-Primase	201
4. The Leading and Lagging Strand DNA Polymerases Epsilon and Delta	205
5. The PCNA Clamp and RFC Clamp Loader	208
6. The Eukaryotic Replisome Structure and Function	210
7. Comparison of Bacterial and Eukaryotic Replisomes	215
8. Future Perspectives	219
Acknowledgments	220
References	220
7. The Many Roles of PCNA in Eukaryotic DNA Replication	231
E.M. Boehm, M.S. Gildenberg, and M.T. Washington	
1. Introduction	232
2. PCNA Structure and Function	233

3. The Role of PCNA in Normal DNA Replication	236
4. The Role of PCNA in Translesion Synthesis	239
5. The Role of PCNA in Error-Free Damage Bypass	241
6. The Role of PCNA in Break-Induced Replication	243
7. The Role of PCNA in Mismatch Repair	245
8. The Role of PCNA in Replication-Coupled Nucleosome Assembly	246
9. Putting It All Together	247
Acknowledgments	249
References	249
8. Animal Mitochondrial DNA Replication	255
G.L. Ciesielski, M.T. Oliveira, and L.S. Kaguni	
1. Overview	256
2. Structure-Function Relationships in mtDNA Replication Proteins	256
3. Mechanisms of Mitochondrial DNA Replication In Vivo	273
4. Perspectives	283
Acknowledgments	284
References	284
9. Fidelity of Nucleotide Incorporation by the RNA-Dependent RNA Polymerase from Poliovirus	293
C.E. Cameron, I.M. Moustafa, and J.J. Arnold	
1. Introduction	294
2. Nucleic Acid Polymerases Employ General Acid Catalysis	299
3. Kinetic and Structural Determinants of PV RdRp Fidelity	304
4. Remote-Site Control of an Active-Site Fidelity Checkpoint	307
5. RdRp Fidelity Is a Determinant of Viral Virulence	308
6. RdRp Fidelity Mutants Are Vaccine Candidates	308
7. Correlated Motions of Functionally Important Motifs of the RdRp may be a Determinant of Nucleotide Incorporation Fidelity	311
8. Nucleotide Binding-Occluded and Binding-Competent States of the RdRp-RNA Complex as Determinants of Fidelity	313
9. Conserved, Active-Site Determinants of RdRp Incorporation Fidelity may Exist that can be Targeted for Viral Attenuation	316
Acknowledgments	318
References	318
Author Index	325
Subject Index	353