

PREFACE

Nearly 100 years passed from the discovery of DNA by Friedrich Miescher in 1869 until the determination of its 3D structure by James Watson and Francis Crick in 1953. Then, just several years later, Arthur Kornberg and colleagues identified the mechanism of its synthesis and the first DNA polymerase. Since that time, the field of DNA replication has grown from the early biochemical investigations to the elucidation of the myriad modes of replication employed in biological systems. In this volume, contributions from nine leading scientists summarize recent progress in studies of systems across taxa. Early research on replication in bacteria revealed the strategies of the less complicated single-stranded DNA bacteriophages G4, M13, and ϕ X174. Studies followed of double-stranded bacterial plasmids and bacteriophages, including the bacteriophages T7 and ϕ 29, for which recent progress is presented in Chapters 3 and 4, respectively. The *in vitro* reconstitution of *E. coli* chromosomal replication in 1982 has led to the elucidation of its mechanism of initiation and elongation, discussed in Chapters 1 and 2, respectively. Although complete replication systems for more complex organisms have remained elusive for a lengthy period, studies of various eukaryotic viruses yielded much information revealing similar basic strategies with multifarious variations. Chapter 5 presents current knowledge in the archaeal system, and Chapters 6–8 describe nuclear and mitochondrial replication in eukaryotes. Similarities and differences in nucleotide polymerization among the polymerases that copy both DNA and RNA genomes are discussed in the final chapter (Chapter 9).

We thank the authors for their unique and comprehensive contributions. We are also grateful to Mary Ann Zimmerman and Helene Kabes of Elsevier for their help in launching this project and to Kirsten Shankland and Hannah Colford for seeing it to completion.

LAURIE S. KAGUNI
MARCOS TÚLIO OLIVEIRA
FUYUHIKO TAMANOI
April 2016