
Preface

The genomes of cellular organisms are organized as double-stranded DNAs with the information content (nucleotide bases) packed into the interior of the protective double helix. This structure must be unwound to provide DNA replication, recombination, and repair machinery access to genomic information. DNA unwinding comes with inherent risks, however—single-stranded (ss) DNA can self-associate to create impediments to genome maintenance and is prone to chemical and nucleolytic attack. To help mediate these risks, bacterial, archael, and eukaryotic cells have evolved protective ssDNA-binding proteins (SSBs) that bind ssDNA with high affinity and specificity. As such, SSB-coated ssDNA comprises the *bonafide* cellular nucleoprotein substrates upon which genome maintenance processes ultimately must act. Accordingly, SSBs from all kingdoms of life directly interact with protein components that are central in DNA replication, recombination, repair, and replication restart.

This volume assembles protocols and methods developed over the past 20 years for examining the fundamental properties of SSBs and for exploiting the biochemical functions of SSBs for their use as *in vitro* and *in vivo* reagents. The chapters are organized into several themes: (1) an introduction to the structures and functions of SSBs, (2) protocols for studying SSB/DNA complexes, (3) methods for studying SSB/heterologous protein complexes, (4) protocols for interrogating post-translational modifications of SSBs, and (5) uses of fluorescently labeled SSBs for *in vitro* and *in vivo* studies of genome maintenance processes. Together, these chapters assemble a rich introduction for investigators who are interested in this fascinating family of DNA-binding proteins and for exploiting their unique and highly-adapted biochemical functions to new uses.

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