

Contents

<i>Preface</i>	<i>page</i> vii	
1	DNA structures	1
1.1	Chemical structure and conformational flexibility of single-stranded DNA	1
1.2	Double helices	4
1.3	Triple helices	8
1.4	G-quadruplexes	11
1.5	Stacking in single-stranded DNA	13
1.6	Structure of mismatches and bulge loops	14
1.7	Experimental and theoretical studies of DNA structure	15
2	Conformational transitions	23
2.1	Theoretical analysis of conformational transitions in DNA	23
2.2	DNA melting	27
2.3	B–A transition	49
2.4	B–Z transition	51
2.5	Thermal fluctuations of DNA secondary structure	55
2.6	Correlations between the states of base pairs	58
2.7	Binding small ligands with DNA	61
3	Equilibrium large-scale conformational properties of DNA	72
3.1	DNA and basic concepts of polymer statistical physics	72
3.2	Conformational parameters of DNA	83
3.3	DNA condensation	101
3.4	Computational and experimental methods specific for DNA studies	103
3.5	DNA nanotechnology	123
4	DNA dynamics	137
4.1	Large-scale conformational dynamics	137
4.2	Kinetics of DNA melting and renaturation	147
4.3	Kinetics of B–A and B–Z conformational transitions	151
4.4	Dynamics of DNA junctions	152

4.5	Gel electrophoresis of DNA	155
4.6	Moving DNA molecules through nanopores	158
5	DNA–protein interaction	165
5.1	Nonspecific DNA–protein binding	165
5.2	Selectivity of nucleosome core binding with DNA	168
5.3	Search for specific DNA sites by proteins	170
5.4	Recognition of specific DNA sites by proteins	172
5.5	Formation of protein-bridged DNA loops	175
5.6	DNA helicases	178
6	Circular DNA	184
6.1	Linking number of complementary strands and DNA supercoiling	184
6.2	Twist and writhe	187
6.3	Experimental studies of DNA supercoiling	192
6.4	Conformations of supercoiled DNA	202
6.5	Formation of alternative structures in supercoiled DNA	206
6.6	How supercoiling can affect DNA biological functions	217
6.7	Knots and links in DNA molecules	220
6.8	DNA supercoiling inside living cells	226
6.9	DNA topoisomerases	232
	<i>Index</i>	251

Color plates are between pages 152 and 153.