

Glossary

Bidirectional replication	DNA replication that proceeds in both directions from a given starting point
Branch migration	Translocation of a three- or four-strand hybrid-duplex junction along the DNA
Conservative replication	Mode of replication whereby the original template duplex is one of the products of the reaction
D-loop (displacement loop)	Structure formed when ssDNA is taken up by a DNA duplex, disrupting the original duplex to produce a new hybrid duplex and a displaced strand
DNA strand exchange	Process whereby strands of DNA are exchanged between two homologous DNA molecules
DNA strand exchange protein	Protein that catalyses the transfer of ssDNA to a homologous region of duplex DNA, disrupting the original duplex to produce a new hybrid duplex
Double-strand break (DSB)	Backbone break through both strands of the DNA duplex
Helicase	Enzyme that promotes the ATP-dependent strand separation of dsDNA
Holliday junction	Crossover point of DNA hybrid duplexes formed during homologous recombination
Homologous chromosomes	Chromosomes that, except for allelic differences, are identical
Homologous genetic recombination (or generalized recombination)	Physical exchange of genetic information between two homologous chromosomes
Joint molecule	Intermediate in the recombination process comprising DNA paired to a homologous region of a dsDNA molecule
Lagging strand	DNA strand that is replicated discontinuously in a 5'→3' direction
Leading strand	DNA strand that is replicated continuously (also 5'→3')
Non-homologous end-joining (NHEJ)	Joining of non-homologous chromosomes at the site of a double-strand break
Non-homologous recombination	DNA recombination occurring between two DNA molecules with limited DNA sequence homology
Nucleoprotein filament (presynaptic complex)	Extended helical complex of a RecA-like protein, DNA and a nucleoside triphosphate cofactor
Okazaki fragments	Short fragments of newly synthesized DNA strands produced during lagging-strand synthesis
Primase	Enzyme that polymerizes ribonucleotide triphosphates in the 5'→3' direction to form short RNA oligomers that serve to 'prime' lagging-strand DNA synthesis
Primosome	Multi-enzyme complex consisting of helicase and primase that drives dsDNA separation at the replication fork and synthesizes RNA primers for Okazaki fragment synthesis
Processivity factor	Protein that regulates the ability of an enzyme to continue its catalytic function repetitively without dissociating from its substrate
Processivity (or sliding) clamp	A ring-shaped protein dimer or trimer that encircles dsDNA and, by binding the synthesizing DNA polymerase to the DNA template, renders the polymerase processive
Processivity clamp-loader complex	Multi-subunit protein complex that uses ATP to open the processivity clamp and place it on the DNA
Recombination-dependent replication (RDR)	DNA replication events that are initiated on a recombination intermediate: RDR rescues DNA replication at blocked or broken replication forks; repairs dsDNA breaks; initiates replication <i>de novo</i> ; and may replicate the ends of chromosomes in cells that lack telomerase
Replication fork	Point at which the two semi-conservatively replicated DNA duplexes meet the unreplicated duplex

Replication fork collapse	Detachment of an arm of the replication fork, resulting in a DSB, when the replisome encounters a pre-existing nick or gap
Replication/recombination mediator (or matchmaker) protein (RMP)	Protein that allows assembly of functional complexes on ssDNA by overcoming the inhibition caused by coating of the DNA with ssDNA-binding proteins
Replisome	Multi-enzyme complex that includes the primosome and all other activities associated with replication
Resection	Exonucleolytic processing
R-loop	Structure formed when a strand of RNA is taken up by a DNA duplex, creating an RNA–DNA hybrid and a displaced DNA strand
Rolling-circle replication	Replication in which DNA synthesis starts with a single-strand cut in a circular double-stranded DNA molecule, with synthesis extending the DNA from the 3' end of the nick, using the complementary intact circular strand as the template
Semi-conservative replication	Each new duplex formed contains one old and one newly synthesized DNA strand
Single-stranded-DNA-binding protein	Protein that preferentially binds ssDNA
SOS response	Cellular response to DNA damage that increases recombination and repair
Strand invasion	Displacement of one strand in a DNA duplex by ssDNA
Telomerase	DNA polymerase that uses an integral RNA component to synthesize telomere repeats onto chromosome ends
Telomeres	The DNA and protein structure at the ends of chromosomes that distinguish natural ends from DNA breaks. Telomere DNA sequences typically contain tandemly repeated simple sequence repeats
Topoisomerase	Enzyme that changes the topology of DNA by transiently cutting one or both strands and carrying out strand passage through the break
Unidirectional replication	DNA replication that proceeds in only one direction along the DNA template
V(D)J recombination	Recombination process whereby V (variable), D (diversity) and J (joining) segments are assembled into functional immunoglobulin and T-cell receptor genes

Summary table. Proteins involved in recombination-dependent replication and repair

General function	Bacteria (<i>E. coli</i>)	Bacteriophage (T4)	Eukarya (<i>S. cerevisiae</i>)	Archaea
Initiating protein(s)	RecBCD, RecQ, RecJ	gp46, gp47	Mre11, Rad50, Xrs2	Mre11, Rad50
DNA strand exchange	RecA	UvsX	Rad51	RadA
ssDNA-binding protein	SSB	gp32	RPA	RPA
Accessory protein(s)	RecF, RecO, RecR	UvsY	Rad52, Rad54, Rad55/57, Rad59	Rad52, Rad54, RadB
Branch migration	RecG RuvAB	UvsW, Dda gp41	Rad54	Rad54 (?)
Holliday junction cleavage	RuvC	gp49	?	Hjc, Hje
Priming proteins	PriA, PriB, PriC DnaC, DnaG, DnaT	gp59 (?), gp61	DNA polymerase α	DNA polymerase (family B)
Replicative polymerase	DNA polymerase III	gp43	DNA polymerase α , δ/ϵ	DNA polymerase (family B)
Replicative helicases	DnaB, Rep	gp41	Mcm proteins (?)	?
Processivity factor	β	gp45	PCNA	PCNA
Processivity (clamp) loader	γ complex	gp44/62	RFC	RFC
Lesion bypass polymerases	UmuD' ₂ C (Pol V) DinB (Pol IV)		Rad30 (Pol η) Rev3/7 (Pol ζ)	