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**Steps of DNA replication**

* Intiation
* Enlongation
* termination

**DNA replication proteins**

At the replication fork, many replication enzymes assemble on the DNA into a complex molecular machine called the [replisome](mhtml:file://C:\Users\USER\AppData\Local\Microsoft\Windows\INetCache\IE\56D12UF8\DNA_replication_-_Wikipedia%5b1%5d.mhtml!https://en.m.wikipedia.org/wiki/Replisome). The following is a list of major DNA replication enzymes that participate in the replisome:

|  |  |
| --- | --- |
| **Enzyme** | **Function in DNA replication** |
| [DNA helicase](mhtml:file://C:\Users\USER\AppData\Local\Microsoft\Windows\INetCache\IE\56D12UF8\DNA_replication_-_Wikipedia%5b1%5d.mhtml!https://en.m.wikipedia.org/wiki/DNA_helicase) | Also known as helix destabilizing enzyme. Helicase separates the two strands of DNA at the [Replication Fork](mhtml:file://C:\Users\USER\AppData\Local\Microsoft\Windows\INetCache\IE\56D12UF8\DNA_replication_-_Wikipedia%5b1%5d.mhtml!https://en.m.wikipedia.org/wiki/Replication_Fork) behind the topoisomerase. |
| [DNA polymerase](mhtml:file://C:\Users\USER\AppData\Local\Microsoft\Windows\INetCache\IE\56D12UF8\DNA_replication_-_Wikipedia%5b1%5d.mhtml!https://en.m.wikipedia.org/wiki/DNA_polymerase) | The enzyme responsible for catalyzing the addition of nucleotide substrates to DNA in the 5′ to 3′ direction during DNA replication. Also performs proof-reading and error correction. There exist many different types of DNA Polymerase, each of which perform different functions in different types of cells. |
| [DNA clamp](mhtml:file://C:\Users\USER\AppData\Local\Microsoft\Windows\INetCache\IE\56D12UF8\DNA_replication_-_Wikipedia%5b1%5d.mhtml!https://en.m.wikipedia.org/wiki/DNA_clamp) | A protein which prevents elongating DNA polymerases from dissociating from the DNA parent strand. |
| [Single-strand DNA-binding protein](mhtml:file://C:\Users\USER\AppData\Local\Microsoft\Windows\INetCache\IE\56D12UF8\DNA_replication_-_Wikipedia%5b1%5d.mhtml!https://en.m.wikipedia.org/wiki/Single-strand_DNA-binding_protein) | Bind to ssDNA and prevent the DNA double helix from re-annealing after DNA helicase unwinds it, thus maintaining the strand separation, and facilitating the synthesis of the nascent strand. |
| [Topoisomerase](mhtml:file://C:\Users\USER\AppData\Local\Microsoft\Windows\INetCache\IE\56D12UF8\DNA_replication_-_Wikipedia%5b1%5d.mhtml!https://en.m.wikipedia.org/wiki/Topoisomerase) | Relaxes the DNA from its super-coiled nature. |
| [DNA gyrase](mhtml:file://C:\Users\USER\AppData\Local\Microsoft\Windows\INetCache\IE\56D12UF8\DNA_replication_-_Wikipedia%5b1%5d.mhtml!https://en.m.wikipedia.org/wiki/DNA_gyrase) | Relieves strain of unwinding by DNA helicase; this is a specific type of topoisomerase |
| [DNA ligase](mhtml:file://C:\Users\USER\AppData\Local\Microsoft\Windows\INetCache\IE\56D12UF8\DNA_replication_-_Wikipedia%5b1%5d.mhtml!https://en.m.wikipedia.org/wiki/DNA_ligase) | Re-anneals the semi-conservative strands and joins [Okazaki Fragments](mhtml:file://C:\Users\USER\AppData\Local\Microsoft\Windows\INetCache\IE\56D12UF8\DNA_replication_-_Wikipedia%5b1%5d.mhtml!https://en.m.wikipedia.org/wiki/Okazaki_Fragments) of the lagging strand. |
| [Primase](mhtml:file://C:\Users\USER\AppData\Local\Microsoft\Windows\INetCache\IE\56D12UF8\DNA_replication_-_Wikipedia%5b1%5d.mhtml!https://en.m.wikipedia.org/wiki/Primase) | Provides a starting point of RNA (or DNA) for DNA polymerase to begin synthesis of the new DNA strand. |
| [Telomerase](mhtml:file://C:\Users\USER\AppData\Local\Microsoft\Windows\INetCache\IE\56D12UF8\DNA_replication_-_Wikipedia%5b1%5d.mhtml!https://en.m.wikipedia.org/wiki/Telomerase) | Lengthens telomeric DNA by adding repetitive nucleotide sequences to the ends of [**eukaryotic chromosomes**](mhtml:file://C:\Users\USER\AppData\Local\Microsoft\Windows\INetCache\IE\56D12UF8\DNA_replication_-_Wikipedia%5b1%5d.mhtml!https://en.m.wikipedia.org/wiki/Eukaryotic_chromosome_fine_structure). This allows germ cells and stem cells to avoid the Hayflick limit on cell division |