Chromosome Components

The components that make up a chromosome can be broken down through many levels into the basic unit, a DNA strand. The DNA strand is made up of nucleotides and the sugar-phosphate backbone, and has the appearance of a double-stranded helix. The DNA is wrapped around organizational proteins called histones, similar to how thread is wrapped around a spool. When eight or more histones are compacted together, they form a nucleosome. The nucleosome is the basic structural unit of chromatin, which is still not fully condensed. Chromatin will have many nucleosomes separated by unspooled DNA strands. When the chromatin becomes condensed during replication and division, it is called chromatid. A chromosome is simply one chromatid or two sister chromatids. The terms chromatid and chromosome are typically used only in the context of replication, as the genetic information exists as uncondensed chromatin most of the time. Finally, the telomere is a cap of repetitive nucleotide sequences placed on the ends of chromosomes that help protect it from degradation and fusion with another chromosome.



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Characteristics

DNA
DNA-strand
The basic unit of chromosomes is the DNA double-stranded helix. It is composed of nucleotides and a sugar-phosphate backbone.

Histones
Stones
DNA helices are wound around histones, which are proteins that act as spools. Histones allow for compact storage of genetic information (which can be large in eukaryotes) and also play a role in gene regulation.

Nucleosomes
Nuclear-sign
Nucleosomes are bundles of eight or more histones. They compact together to reduce the size of DNA.

Chromatin
Chrome-tin-can
Chromatin is fundamentally made up of nucleosomes but is largely uncondensed, with nucleosome bundles spaced out and connected by wound-up DNA.

Chromosome
Chromosome
The chromosome is condensed chromatin and is present when the cell is about to divide. In prophase, chromatin condenses to form a chromosome. The chromosome decondenses back to chromatin after cell division. In the chromatin state DNA can be replicated and transcribed.

Telomere
Telephone-mirror
The telomere is a repeated nucleotide sequence at the end of a chromosome (or chromatid). Telomeres prevent exonucleases from deteriorating the ends of chromosome, and prevent fusion with nearby chromosomes.

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