

# Prokaryotes vs eukaryotes

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In prokaryotes, it's easier to make DNA replication because of the lack of a nucleus, but to do DNA replication in a eukaryotic cell is more difficult. DNA of an eukaryotic cell is in chromatin form to fit into the small nucleus for the replication to occur, first the DNA should open. This is because it is harder for eukaryotes to carry out DNA synthesis. Replication of DNA in a prokaryote is different from a eukaryote. In a prokaryote they have a single origin where the replication process starts.

Also eukaryotes synthesize the same time they are being transcribed, and ribosomes will be active on the single mRNA while it is being synthesized. All the replication of a prokaryote takes place in the cytoplasm and cell membrane. In a eukaryote there is multiple origins where DNA replication starts. In eukaryotes there are more proteins that are involved therefore it is a more complex replication than a prokaryote. Eukaryotes carry out their replication in the nucleus, mitochondria, and the chloroplast. The transcription of a prokaryote occurs in the cytoplasm. When transcription takes place there is no RNA processing.

In the eukaryotic cell transcription takes place in the nucleus, mitochondria and chloroplast. When transcription is taking place in the eukaryotic cell, there is RNA processing. Translation in a prokaryote also takes place in the cytoplasm and is coupled with the transcription. In eukaryotes it is different, translation takes place in the mitochondria and chloroplast but is not coupled with the transcription. In Prokaryotes, the gene regulation is determined with the position of the repressor.

To make proteins, the RNA polymerase should attach to the promoter of the DNA. If there is an active repressor, this repressor prevents the RNA

polymerase from binding to the promoter. In prokaryotes, substances like lactose involve gene regulation, because they bind to the repressor and stop its function. When the repressor becomes inactive, RNA polymerase can bind to the promoter and make proteins. In eukaryotes, it's different, there are transcription factors, which bind to the enhancers of the DNA. If they bind both to the transcription factors, and to the genes of interest. If this occurs the RNA polymerase can start making proteins.

So, in prokaryotic repressors are responsible for gene regulation, while in eukaryotic activators do the same job. Prokaryotes divide by binary fission in which two identical cells are formed. First, the components of the cell are duplicated, and then the cell breaks off into two parts. In eukaryotic cells, mitosis and meiosis is used. They also duplicate the components during interphase, but they divide in a different way. Especially, meiosis, it is very different from the dividing technique of prokaryotes, In meiosis, the newly formed cells don't have to be identical to the parent cell, therefore there is genetic variability.