



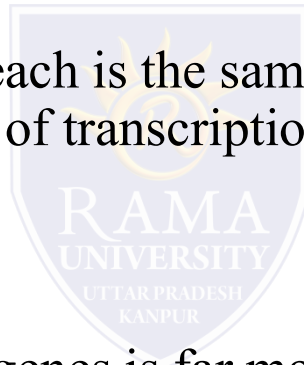
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DEPARTMENT OF BIOTECHNOLOGY

# Prokaryotic versus Eukaryotic Transcription

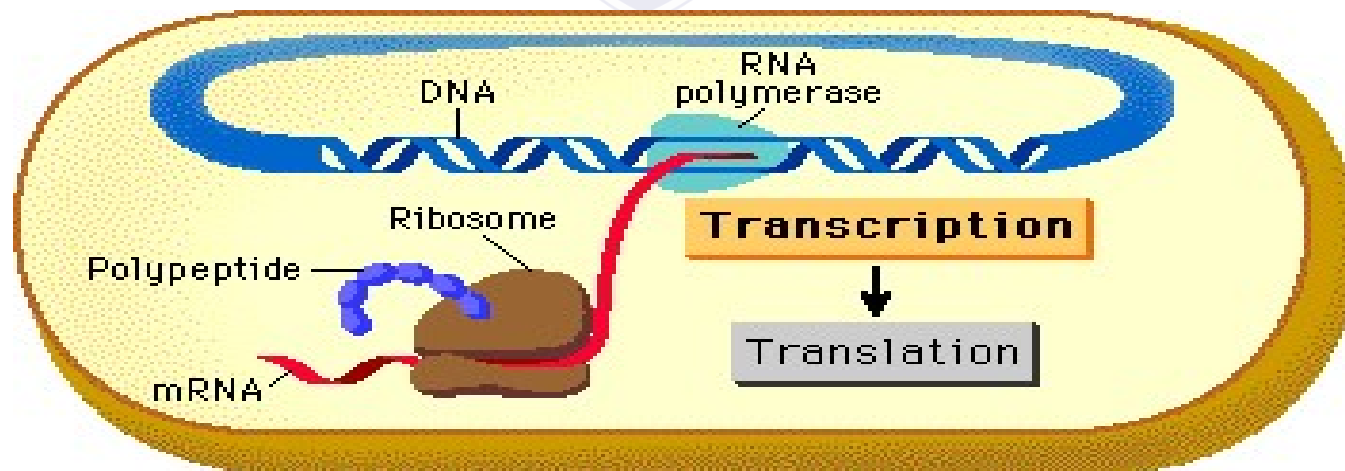
- The general process of transcription can be applied to both prokaryotic cells and eukaryotic cells.
- The basic biochemistry for each is the same; however, the specific mechanisms and regulation of transcription differ between prokaryotes and eukaryotes.
- Transcription of eukaryotic genes is far more a complicated process than prokaryotes.



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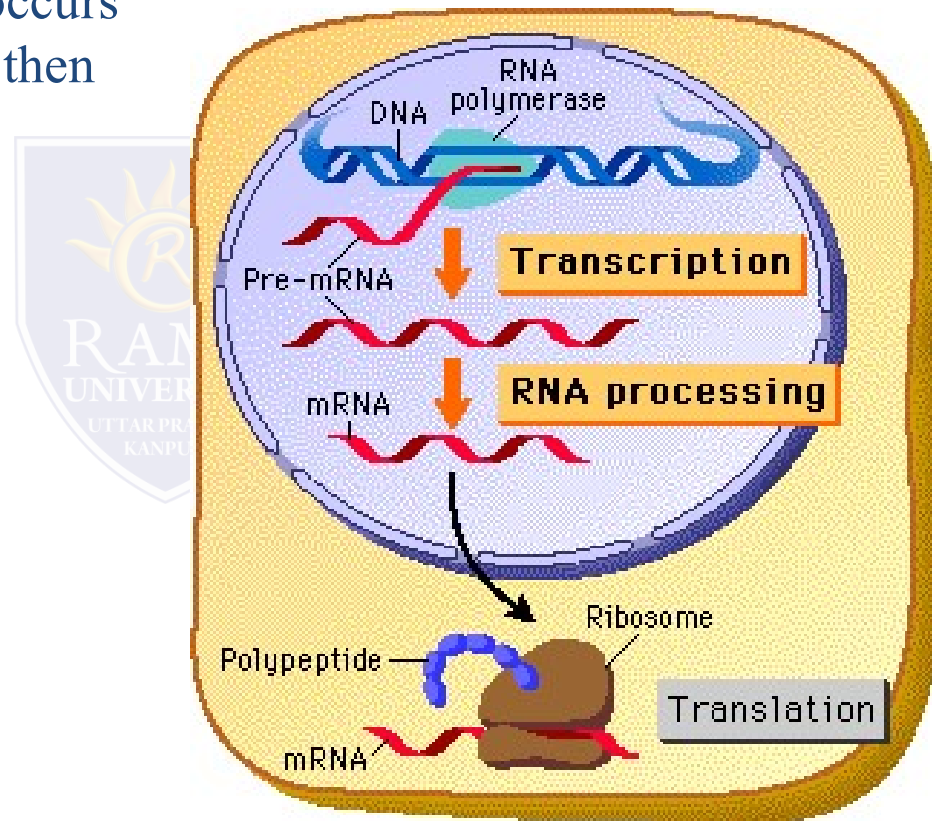
## 1) Location

- In prokaryotes (bacteria), transcription occurs in the cytoplasm.
- Translation of the mRNA into proteins also occurs in the cytoplasm



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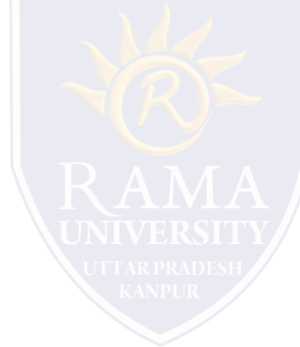
- In eukaryotes, transcription occurs in the cell's nucleus, mRNA then moves to the cytoplasm for translation.



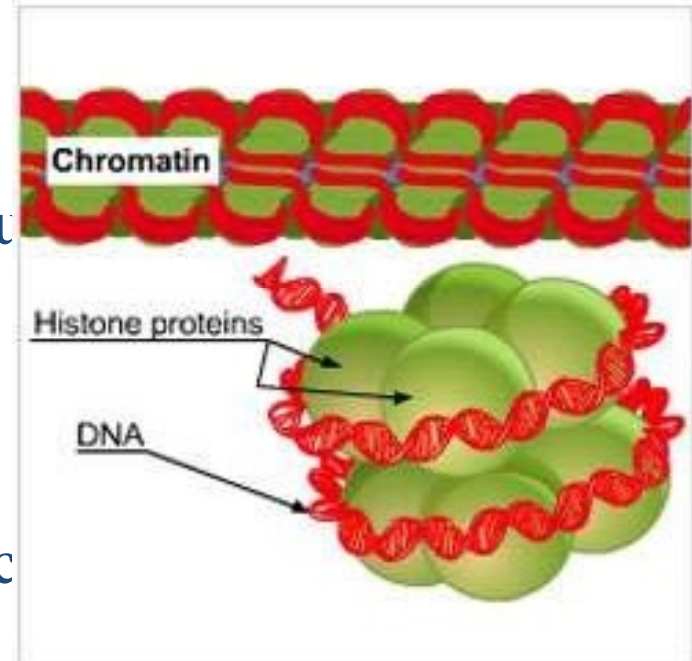
# Prokaryotic versus Eukaryotic Transcription

## 2) Genome size

- The genome size is much larger in eukaryotes.
- Greater specificity is needed for the transcription of eukaryotic genes



- DNA in prokaryotes is much more accessible to RNA polymerase than DNA in eukaryotes.
- Eukaryotic DNA is wrapped around proteins called histones to form structures called nucleosomes
- Eukaryotic DNA is packed to form chromatin .
- While RNA polymerase interacts directly with prokaryotic DNA, other proteins mediate the interaction between RNA polymerase and DNA in eukaryotes



## Prokaryotic versus Eukaryotic Transcription

### RNA polymerases

- There are three distinct classes of RNA polymerases in eukaryotic cells. All are large enzymes with multiple subunits. Each class of RNA polymerase recognizes particular types of genes.
- RNA polymerase I- Synthesizes the precursor of the large ribosomal RNAs (28S, 18S and 5.8S).
- RNA polymerase II - Synthesizes the precursors of messenger RNA and small nuclear RNAs(snRNAs).
- RNA polymerase III- Synthesizes small RNA, including t RNAs, small 5S RNA and some snRNAs.

