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Welcome to the World of Bacterial Genetics and Genomics

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Part I DNA, Genes, and Genomes

Chapter 1 DNA

Life originated from RNA with DNA evolving later

Nucleic acids are made of nucleoside bases attached to a phosphate sugar backbone

DNA was discovered in 1869 and identified as the genetic material 75 years later

The first X-ray images of DNA were taken in 1937 with the structure finally solved in 1953

DNA consists of two bidirectional strands joined by deoxyribose sugars and nucleotide bases

DNA is copied semi-conservatively every time a cell divides

Replication starts at the origin of replication and requires primers

DNA polymerase can only add bases in the 5' to 3' direction

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Chapter 4 RNA

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The size of mRNA is determined by the genes it encodes

The start of the 5' end of mRNA is dictated by its promoter region

Not all transcripts are translated into proteins

There are untranslated regions at the 5' end of the mRNA transcript

Features at the 3' end of the mRNA transcript can influence the expression of encoded genes

Stability of RNA and its degradation by nucleases and hydrolysis

Secondary structures formed by mRNAs impact ribosome binding and translation initiation

Secondary structures formed by mRNA influence translational termination

Tertiary structures within mRNAs impact expression of the encoded gene

RNA thermometers modify the expression of proteins from mRNA based on temperature

Polyadenylation of mRNA is not just for eukaryotes

Bacterial tRNAs are folded into tight structures

tRNA transcripts undergo post-transcriptional processing

rRNAs are essential components of the ribosome

The bacterial cell also contains noncoding RNAs that can regulate other RNAs

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