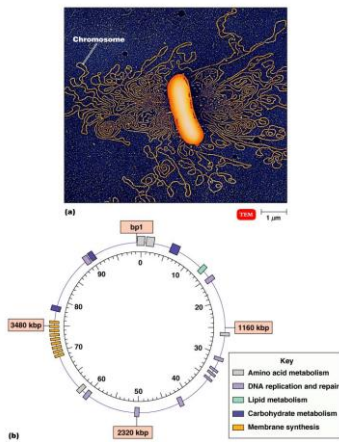


Genetics Objectives

- To understand how nucleic acids transport genetic information
- To understand experiments that showed the role of nucleic acids for genetic information
- To learn which enzymes are involved in genetic information flow
- To distinguish mechanisms of genetic exchange
- To understand mutations
- To familiarize with molecular biology tools

1) Structure and Function of Genetic Material

- Genotype: gene
- Phenotype
- Genome: Chromosome, Plasmids, Transposons

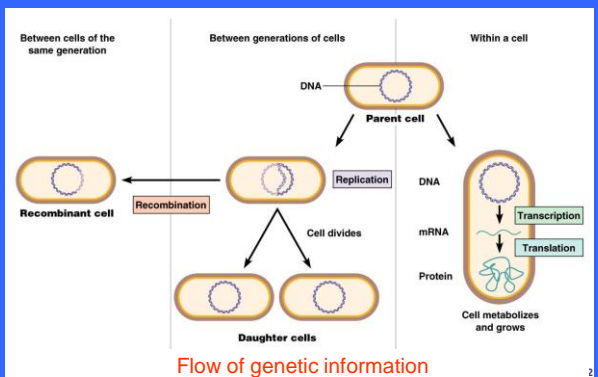


***E. Coli* genome is 4.6 million base pairs= 4.6 Mb;**
~ 1mm long (1000X cell),
10% cell volume= supercoiled or twisted

Figure 8.1 - Overview

2) Flow of genetic information

DNA replication
RNA and protein synthesis: transcription and translation



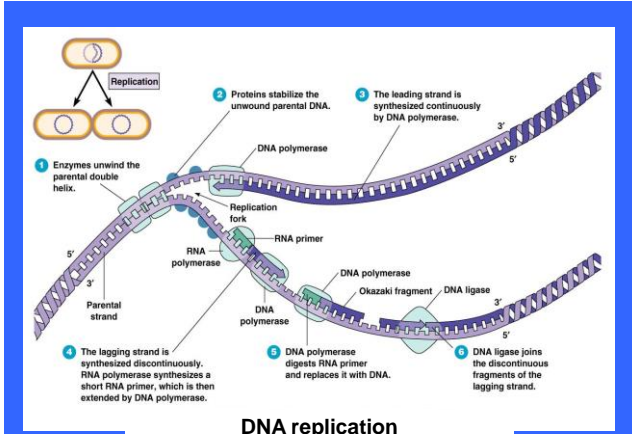


Figure 8.5

Bacterial DNA replication

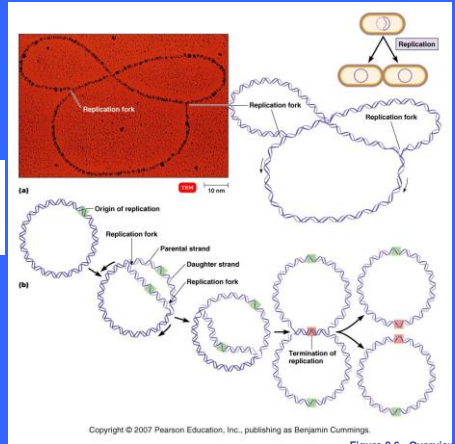


Figure 8.6 - Overview

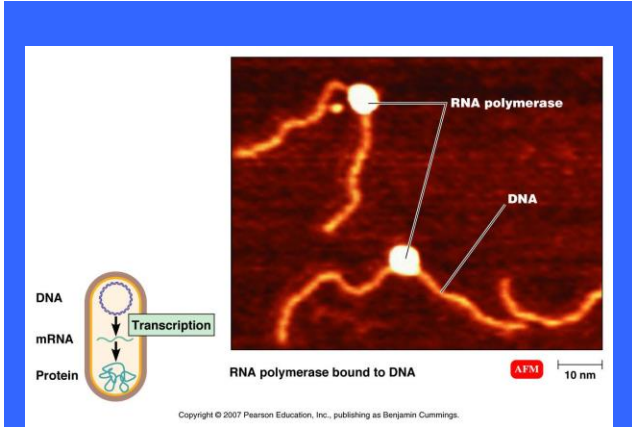


Figure 8.7 (2 of 7)

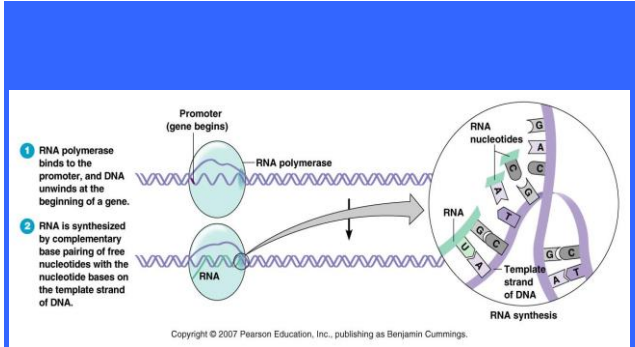


Figure 8.7 (3 of 7)

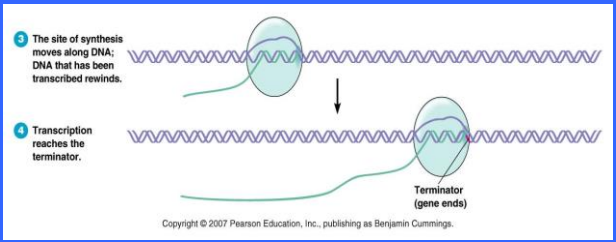


Figure 8.7 (4 of 7)

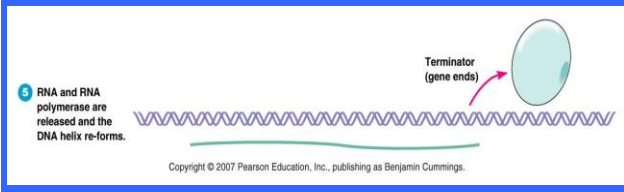


Figure 8.7 (5 of 7)

		Second position					
		U	C	A	G		
U	UUU	Phe	UCU	UAU	Tyr	UGU	Cys
	UUC	UCC	UAC	UGC			
	UUA	UCA	UAA	Stop	UGA	Stop	
	UUG	UCG	UAG	Stop	UGG	Trp	
C	CUU	CCU	CAU	His	CGU		
	CUC	CCC	CAC	His	CGC	Arg	
	CUA	CCA	CAA	Gln	CGA		
	CUG	CCG	CAG		CGG		
A	AUU	ACU	AAU	Asn	AGU	Ser	
	AUC	ACC	AAC	Asn	AGC		
	AUA	ACA	AAA	Lys	AGA	Arg	
	AUG	Met/start	ACG	AAG	AGG		
G	GUU	GCU	GAU	Asp	GGU		
	GUC	GCC	GAC		GGC		
	GUA	GCA	GAA	Glu	GGA	Gly	
	GUG	GCG	GAG		GGG		

First position

Third position

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Figure 8.8

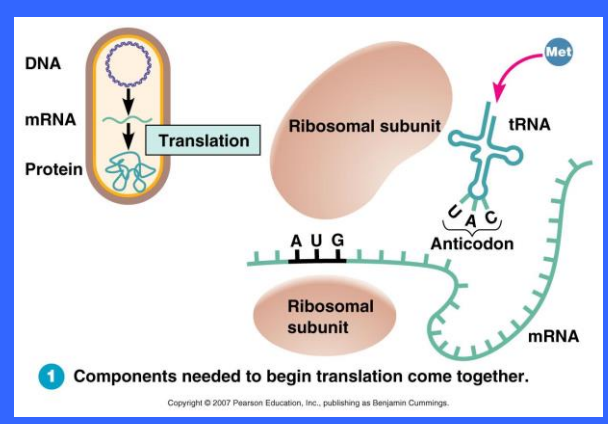
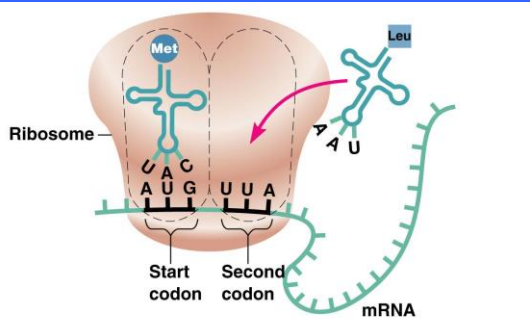


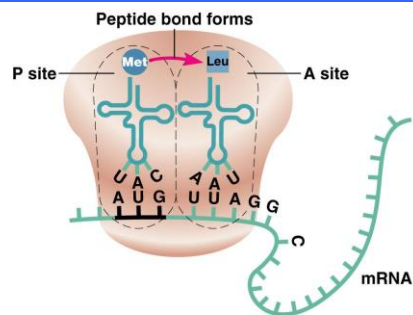
Figure 8.9, step 1



2 On the assembled ribosome, a tRNA carrying the first amino acid is paired with the start codon on the mRNA. A tRNA carrying the second amino acid approaches.

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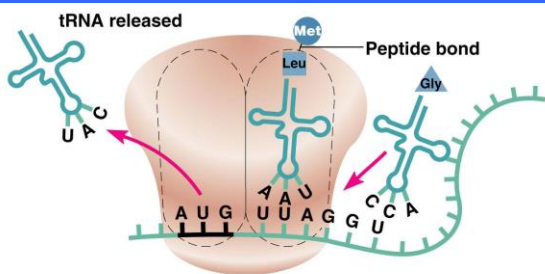
Figure 6.9, step 2



3 The place on the ribosome where the first tRNA sits is called the P site. In the A site next to it, the second codon of the mRNA pairs with a tRNA carrying the second amino acid.

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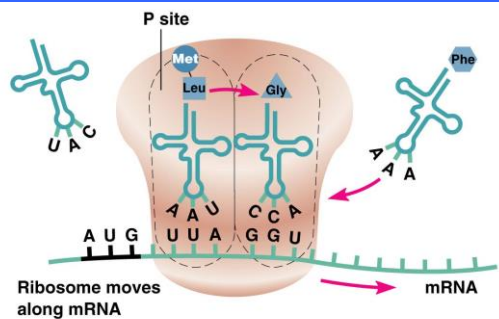
Figure 6.9, step 3



4 The first amino acid joins to the second by a peptide bond, and the first tRNA is released.

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Figure 6.9, step 4



5 The ribosome moves along the mRNA until the second tRNA is in the P site, and the process continues.

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Figure 6.9, step 5

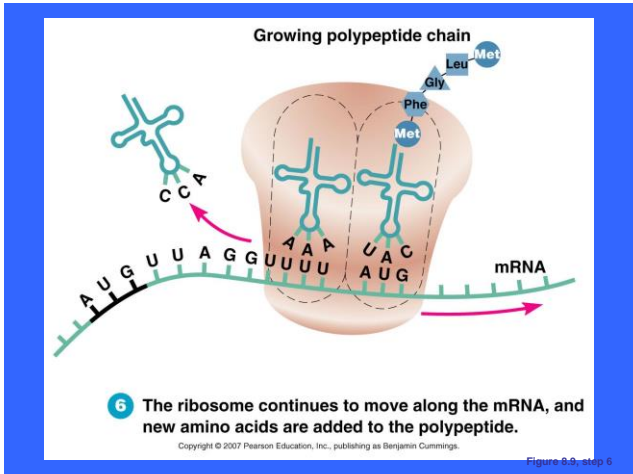


Figure 8.9, step 6

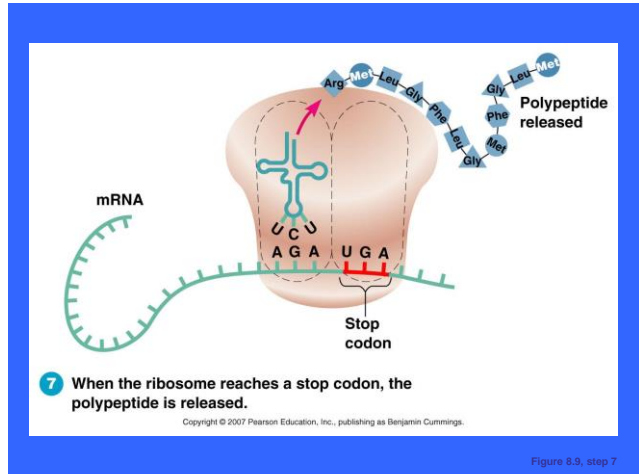


Figure 8.9, step 7

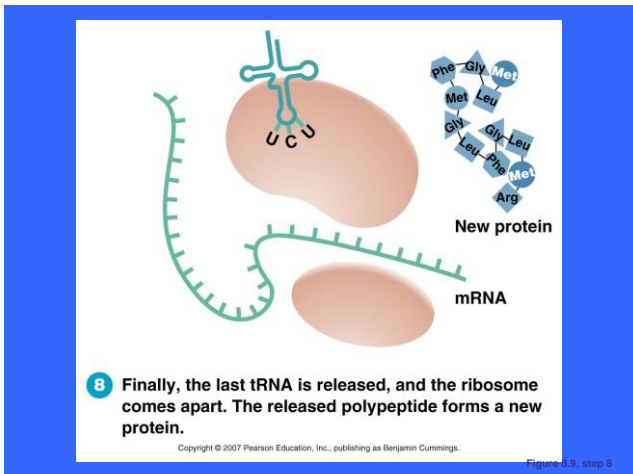


Figure 8.9, step 8

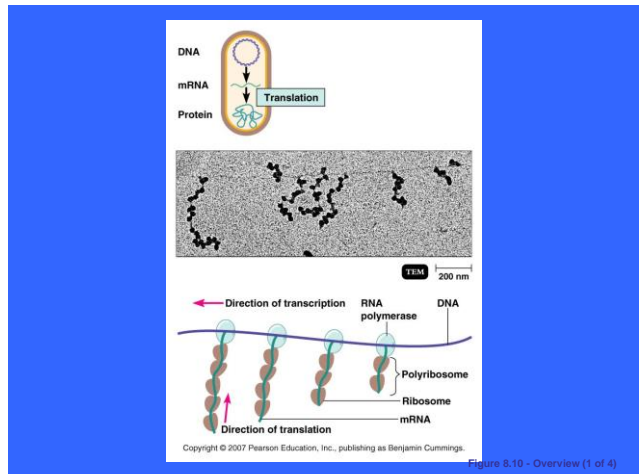


Figure 8.10 - Overview (1 of 4)

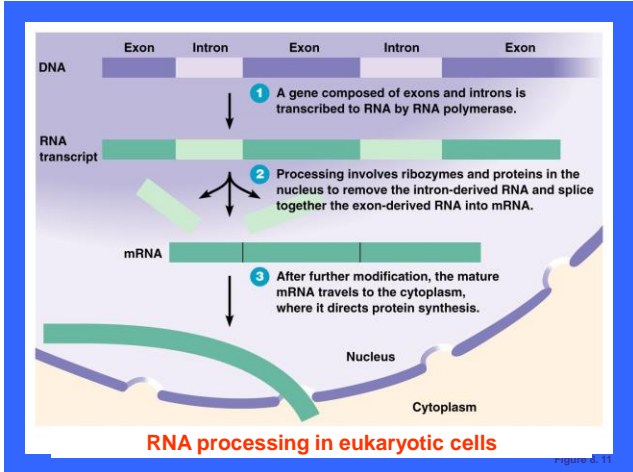


Figure 3.11