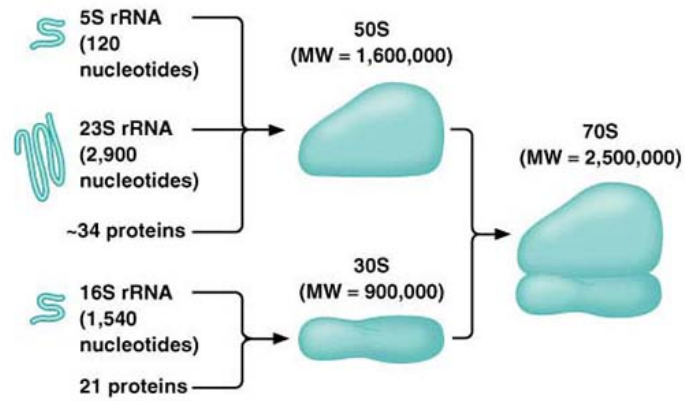
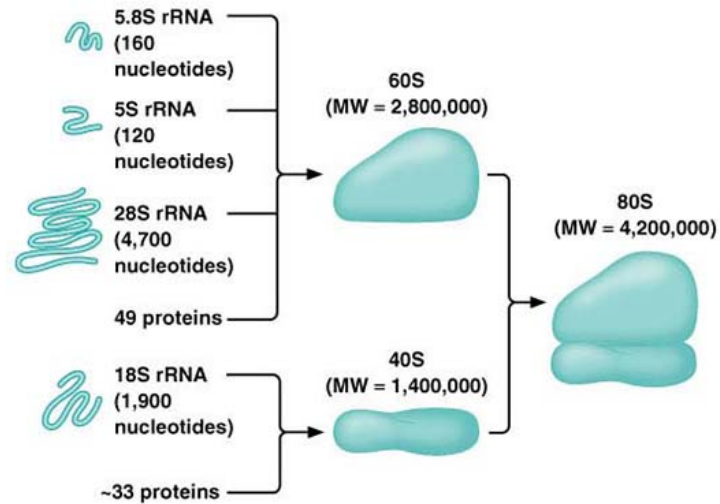


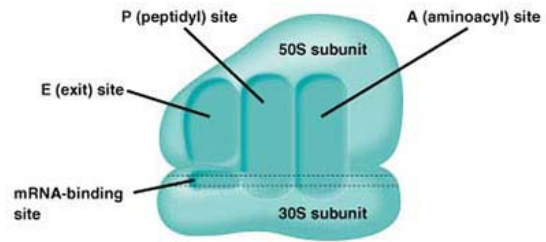
**(a) Bacterial ribosomes and free subunits**



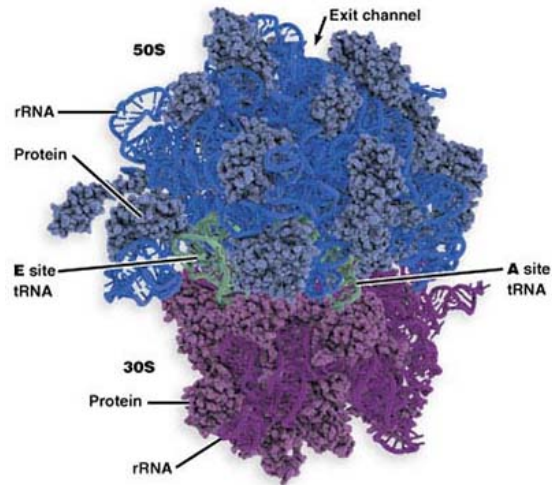
**(b) Bacterial ribosome**



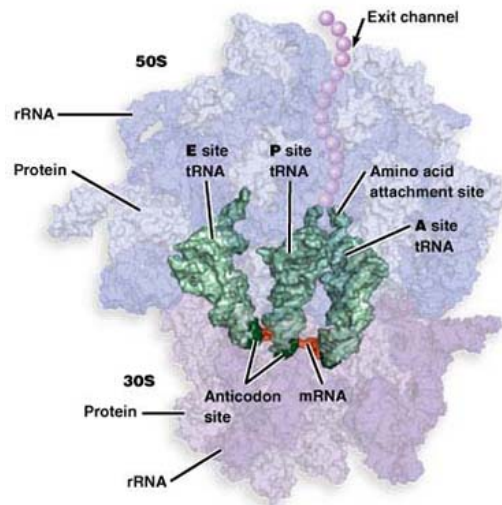
**(c) Eukaryotic ribosome**



(a) Diagram of a bacterial ribosome

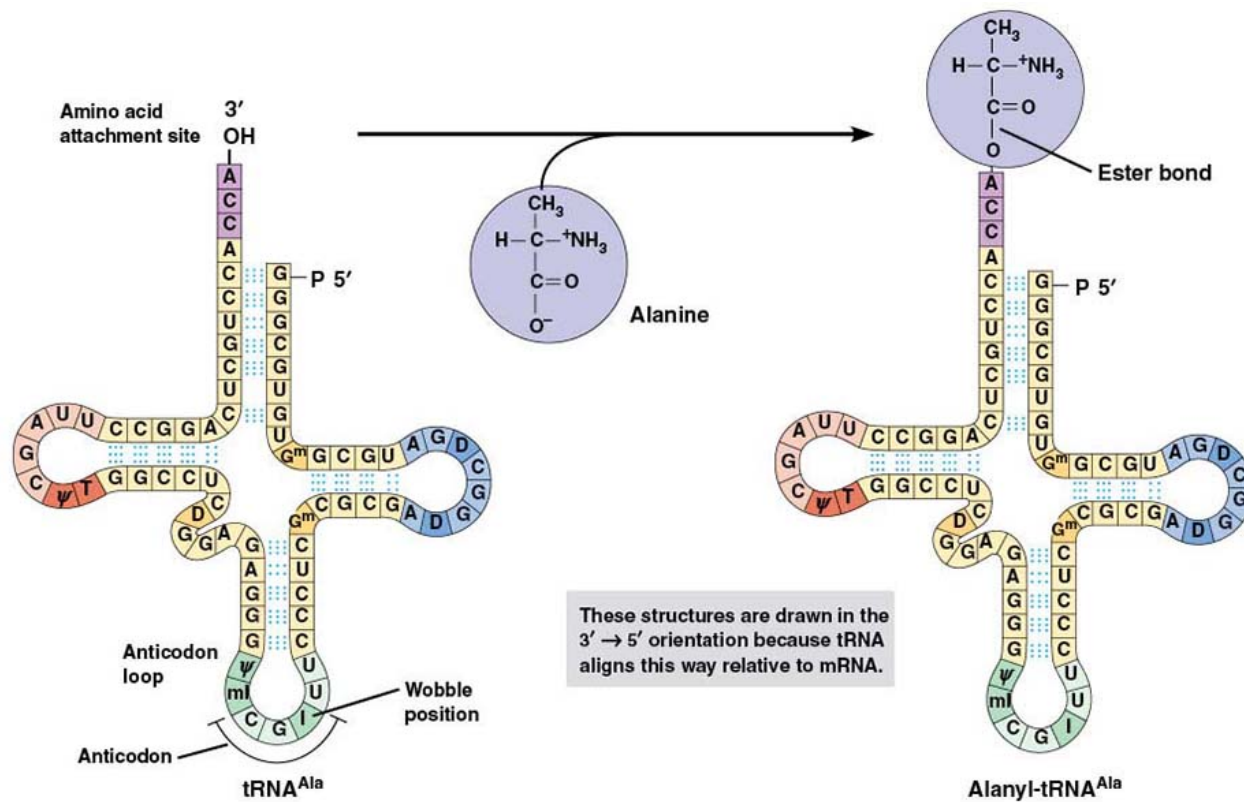


Surface view

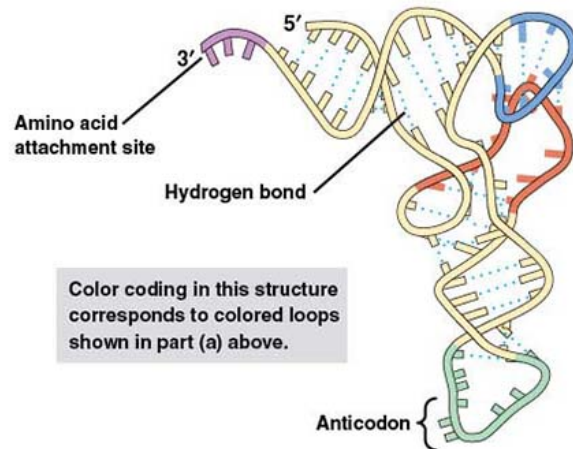


Interior view

(b) Molecular model of a bacterial ribosome

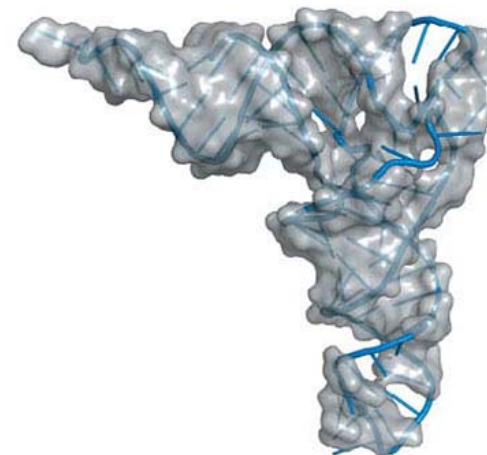


**(a)** Secondary structure of tRNA, before and after amino acid attachment

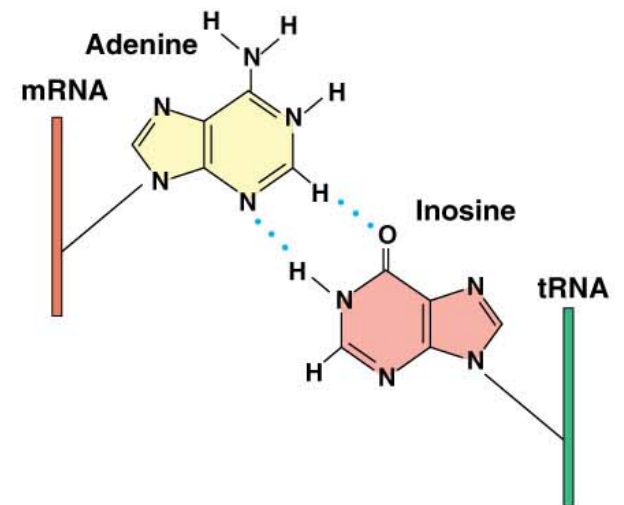
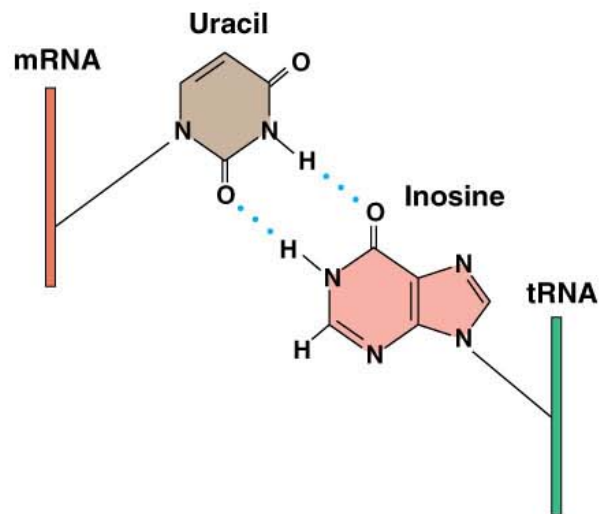
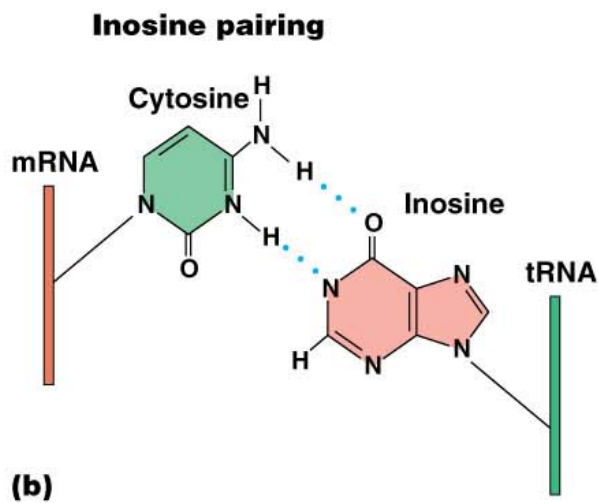
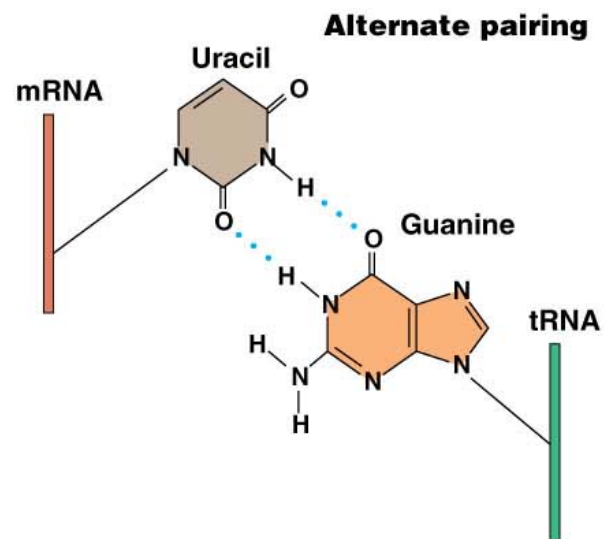
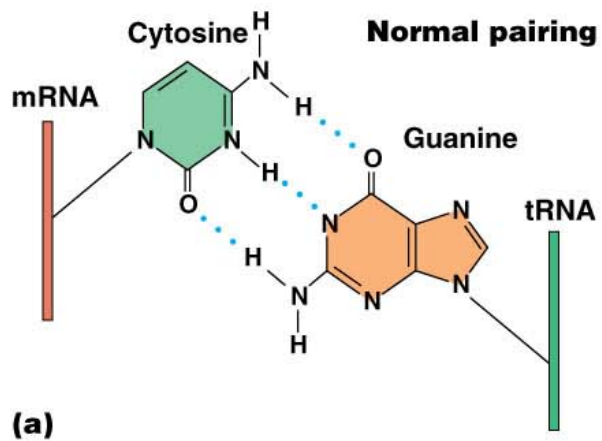


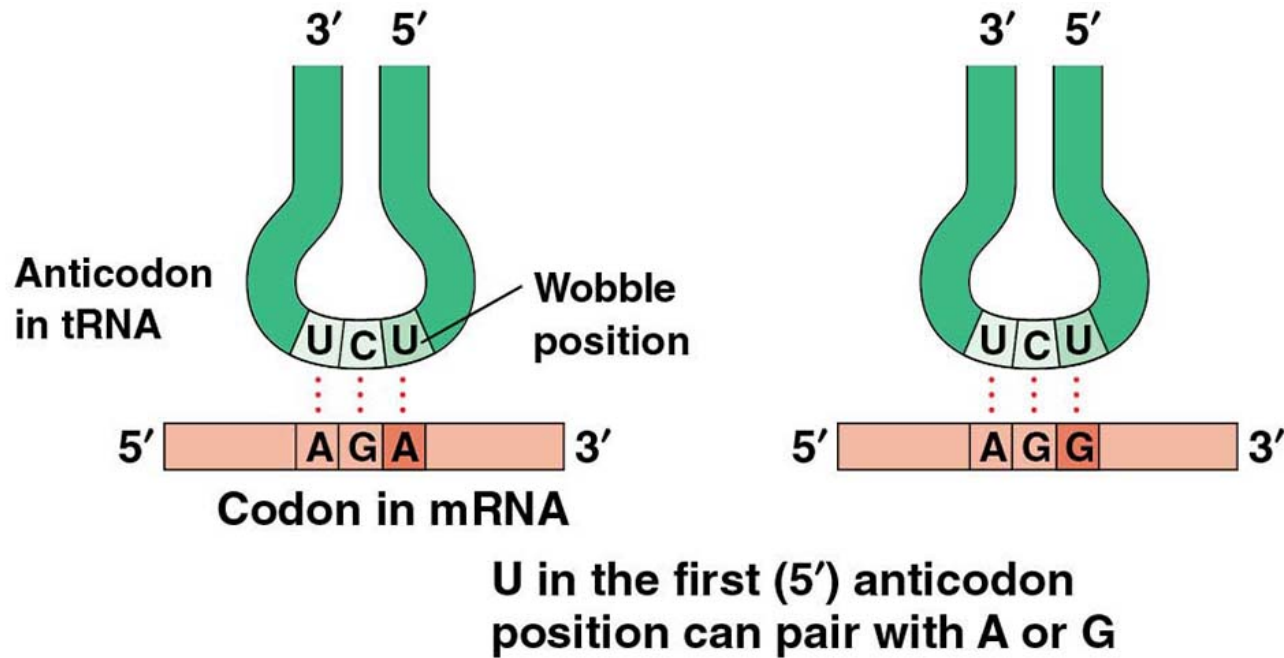
**(b)** Tertiary structure of tRNA

In the rest of the chapter, tRNAs will be illustrated using this simplified structure:



**(c)** Molecular model of phenylalanine tRNA



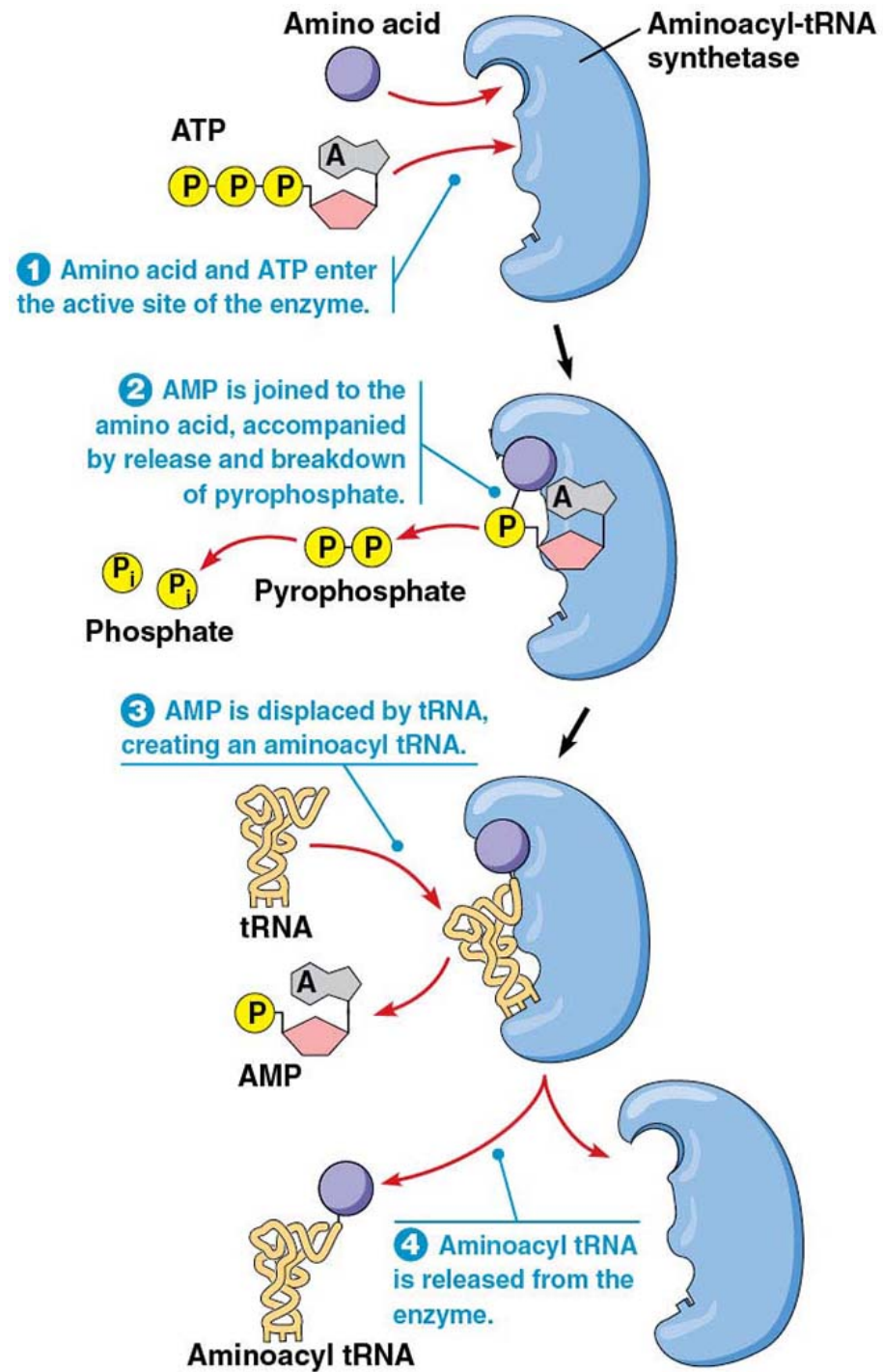


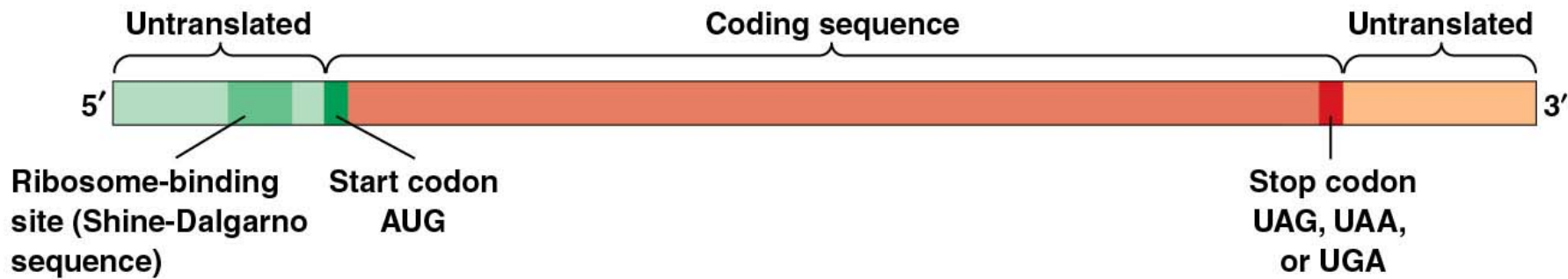
**(a)**

Bases Recognized in Codon (third position only)	Base in Anticodon
U	A
G	C
A or G	U
C or U	G
U, C, or A	I (Inosine)

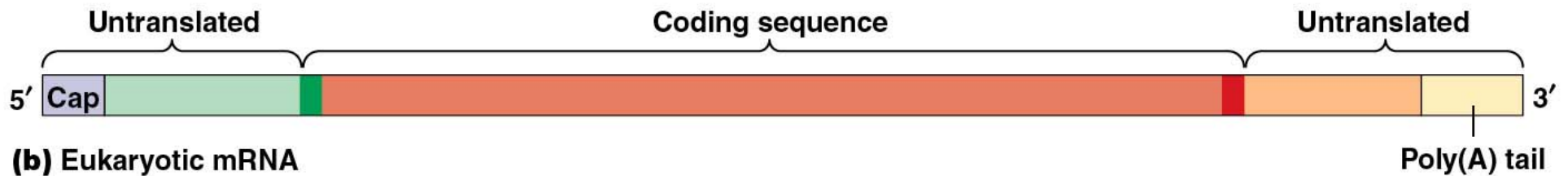
**(b)**



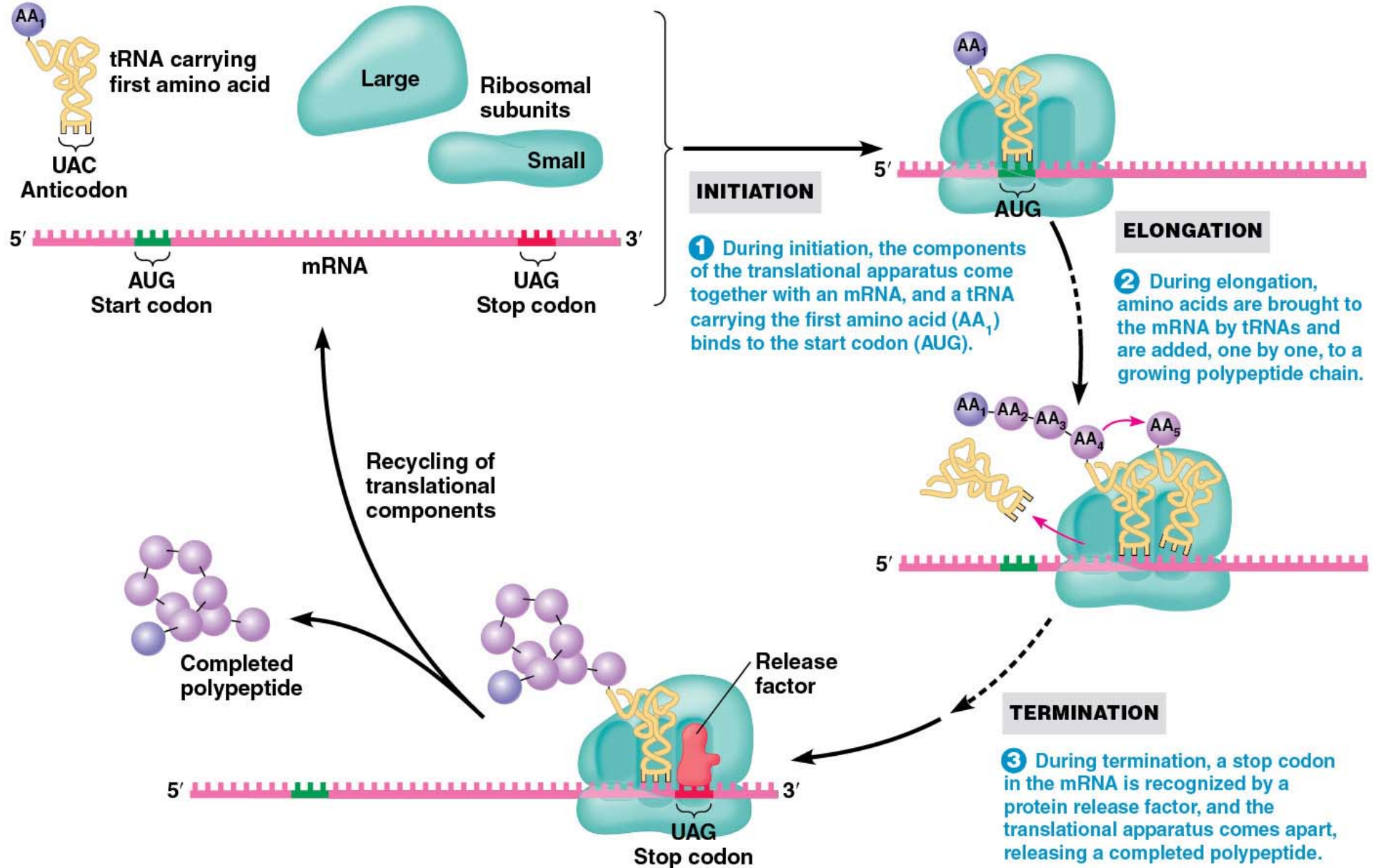




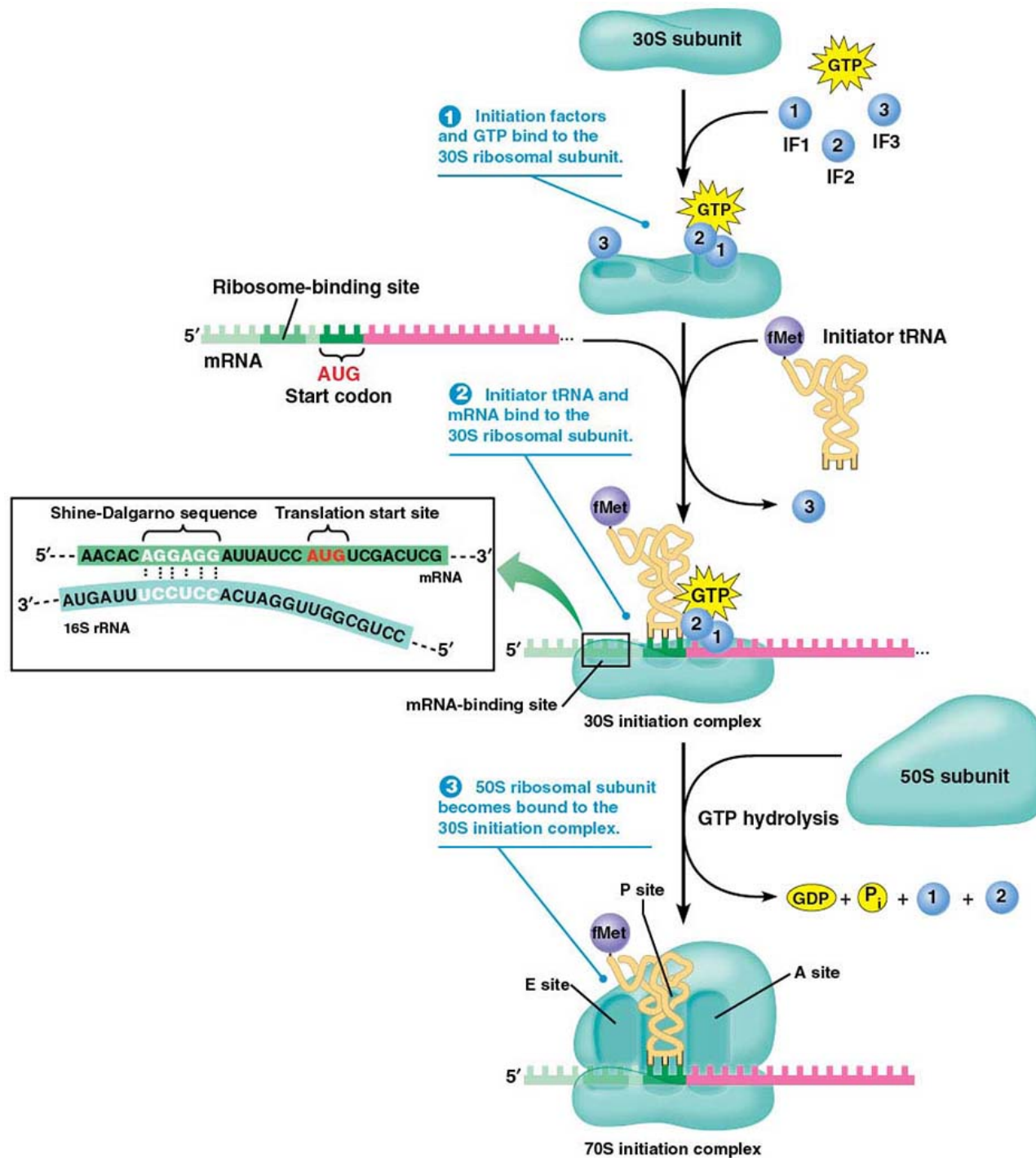
**(a) Prokaryotic mRNA**

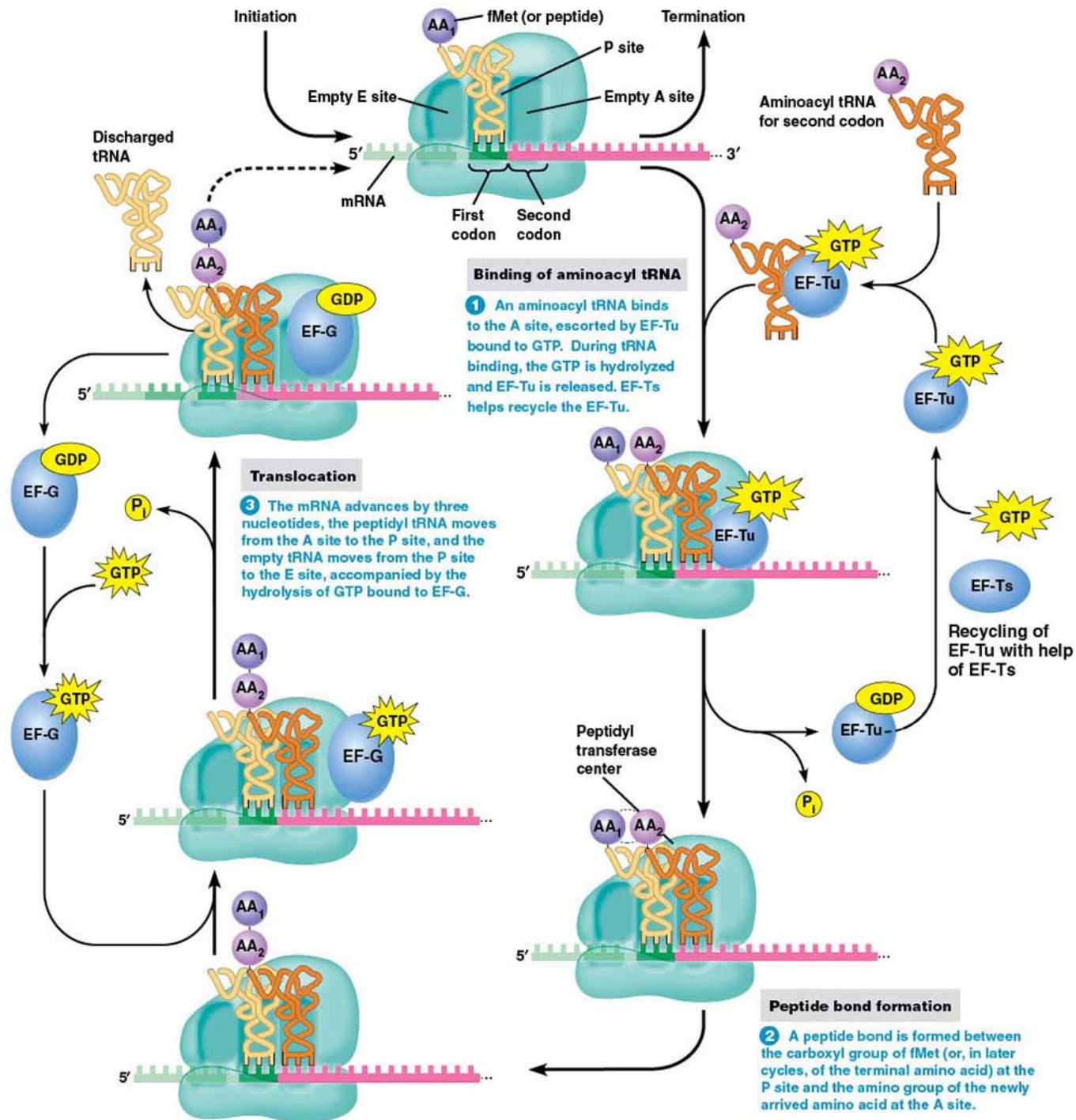


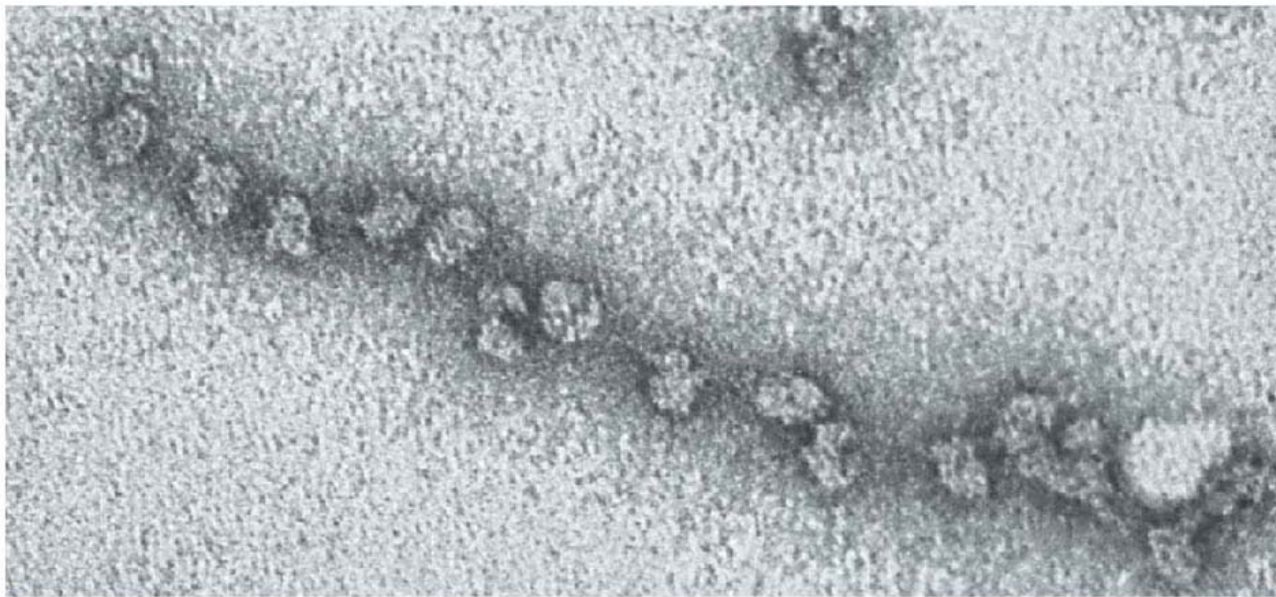
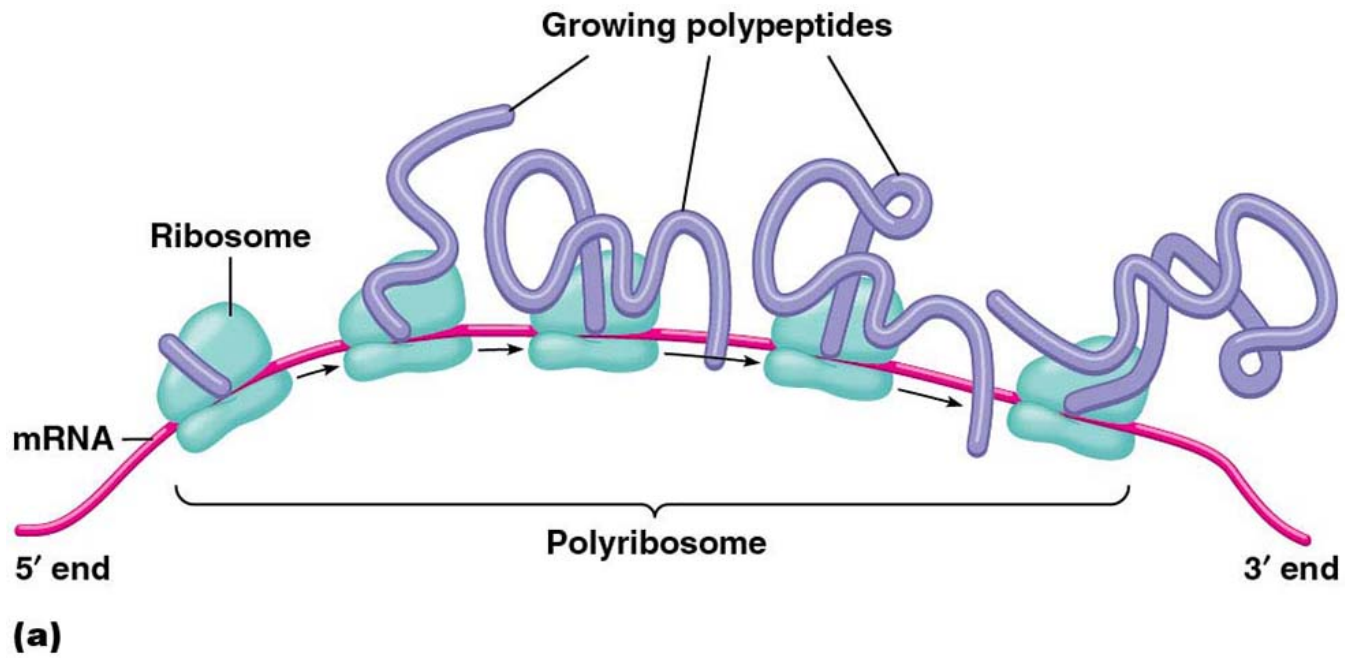
**(b) Eukaryotic mRNA**







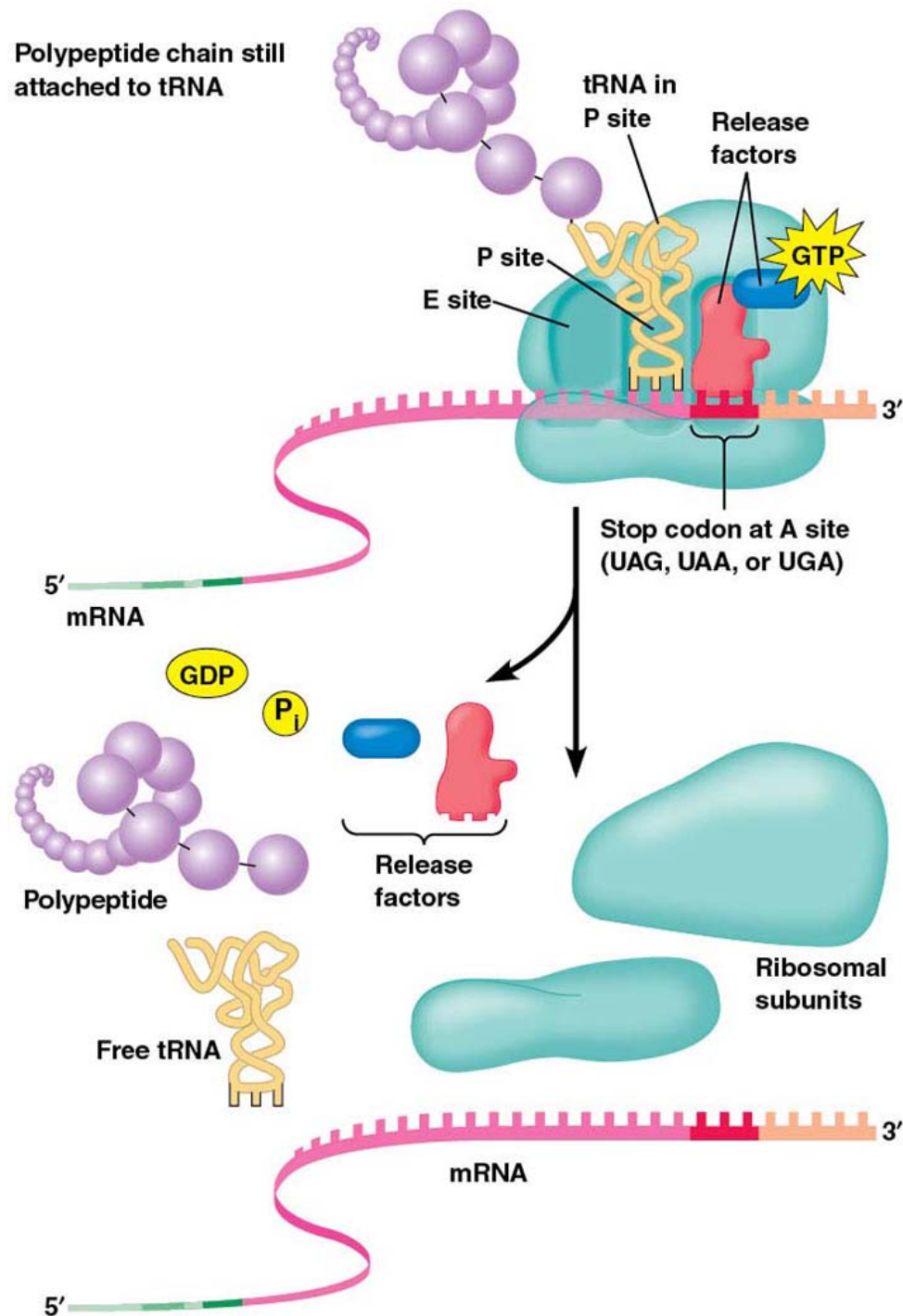


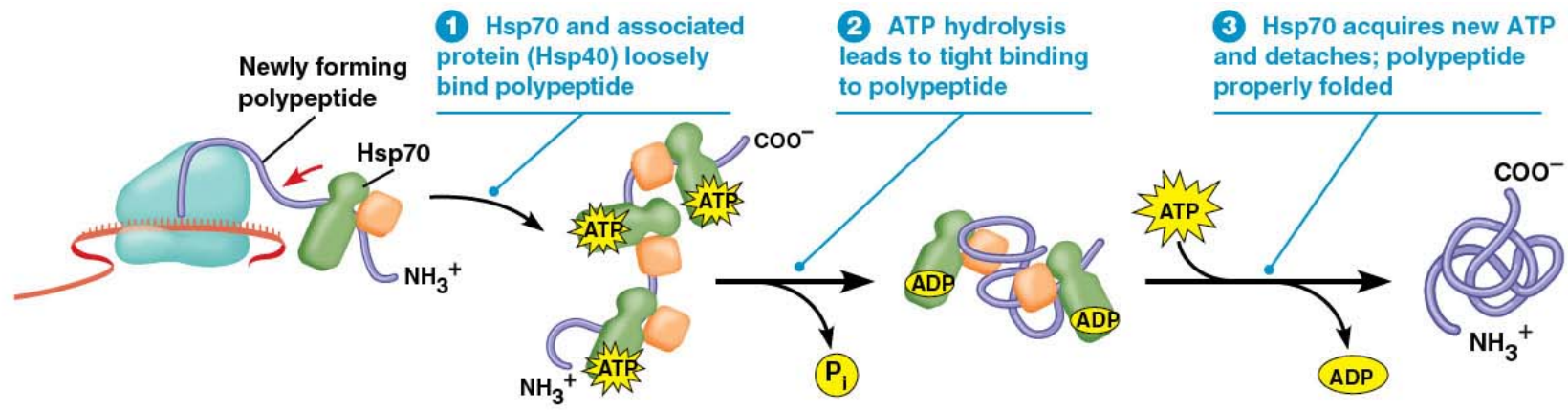


(b)

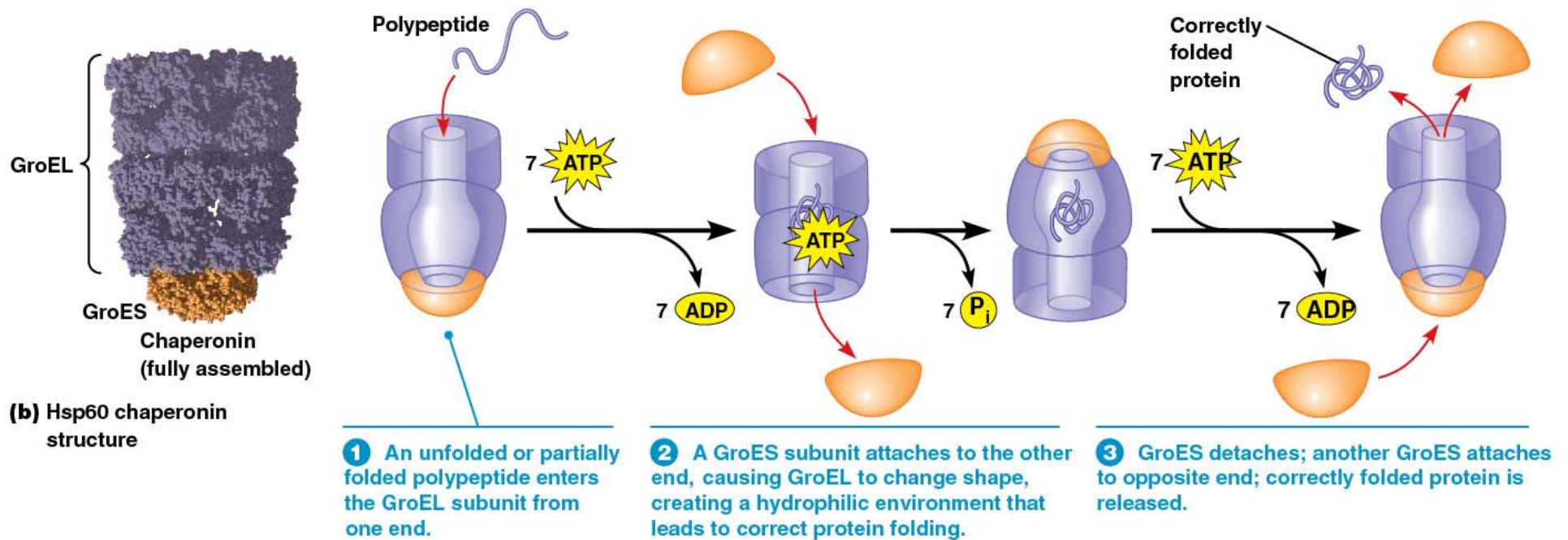
0.1  $\mu\text{m}$







**(a)** Folding aided by Hsp70 protein



**(c)** Folding aided by Hsp60



**Base-pair substitutions can create a:**

**Missense mutation** DNA: G A A → G T A  
 C T T → C A T  
 mRNA: G A A → G U A  
 Protein: Glu → Val

**Nonsense mutation** DNA: T T A → T A A  
 A A T → A T T  
 mRNA: U U A → U A A  
 Protein: Leu → Stop

**Silent mutation** DNA: C C C → C C A  
 G G G → G G T  
 mRNA: C C C → C C A  
 Protein: Pro → Pro

**Base-pair insertions or deletions can create a:**

**Frameshift mutation**

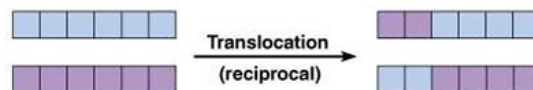
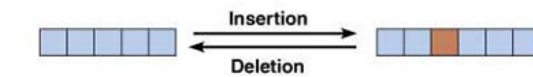
DNA: A T G A A G T T T G A C → A T G C A A G T T T G A C  
 T A C T T C A A A C T G → T A C G T T C A A A C T G

mRNA: A U G A A G U U U G A C → A U G C A A G U U U G A C

Protein: Met - Lys - Phe - Asp → Met - Gln - Val - Stop

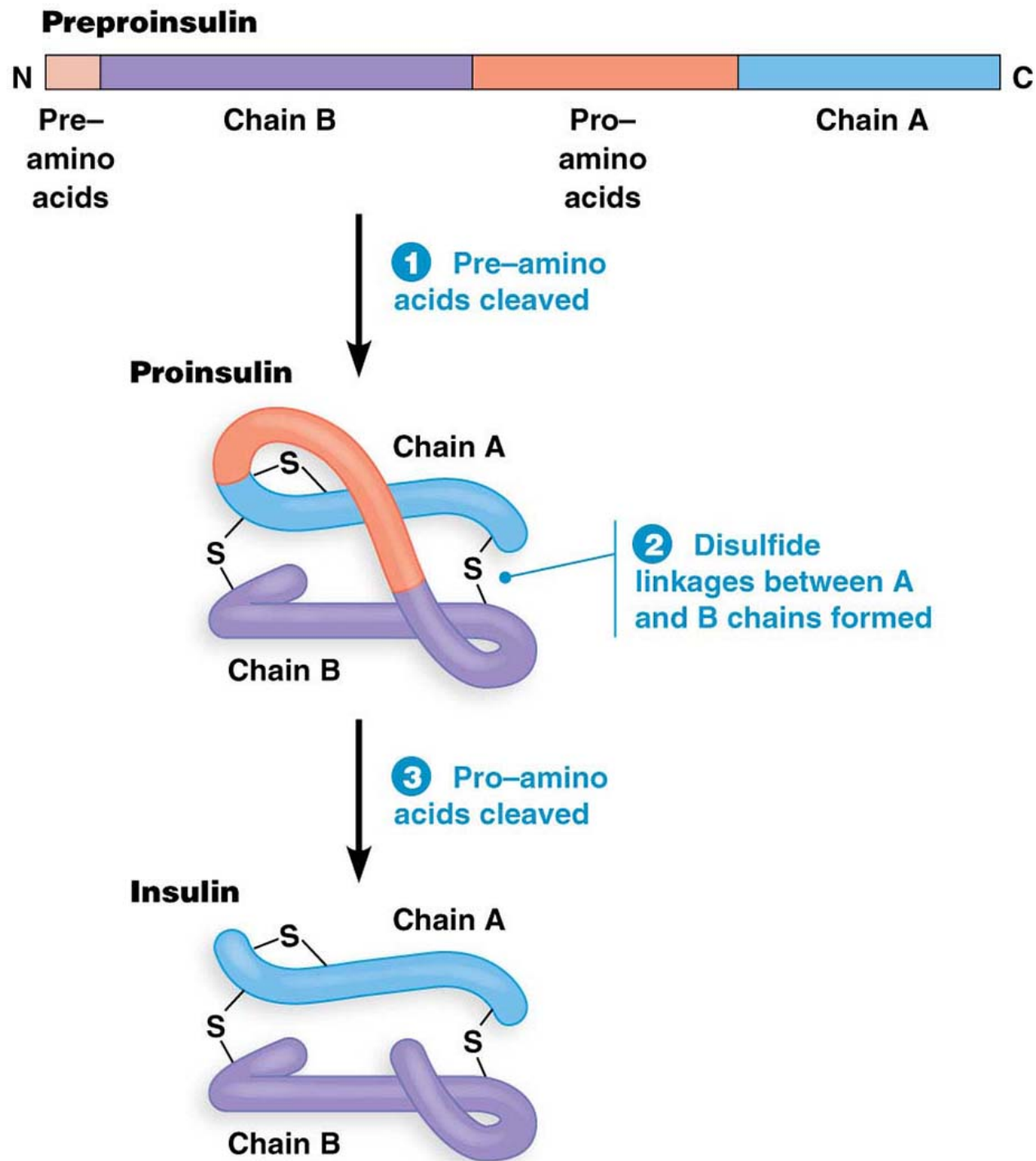
Missense Nonsense

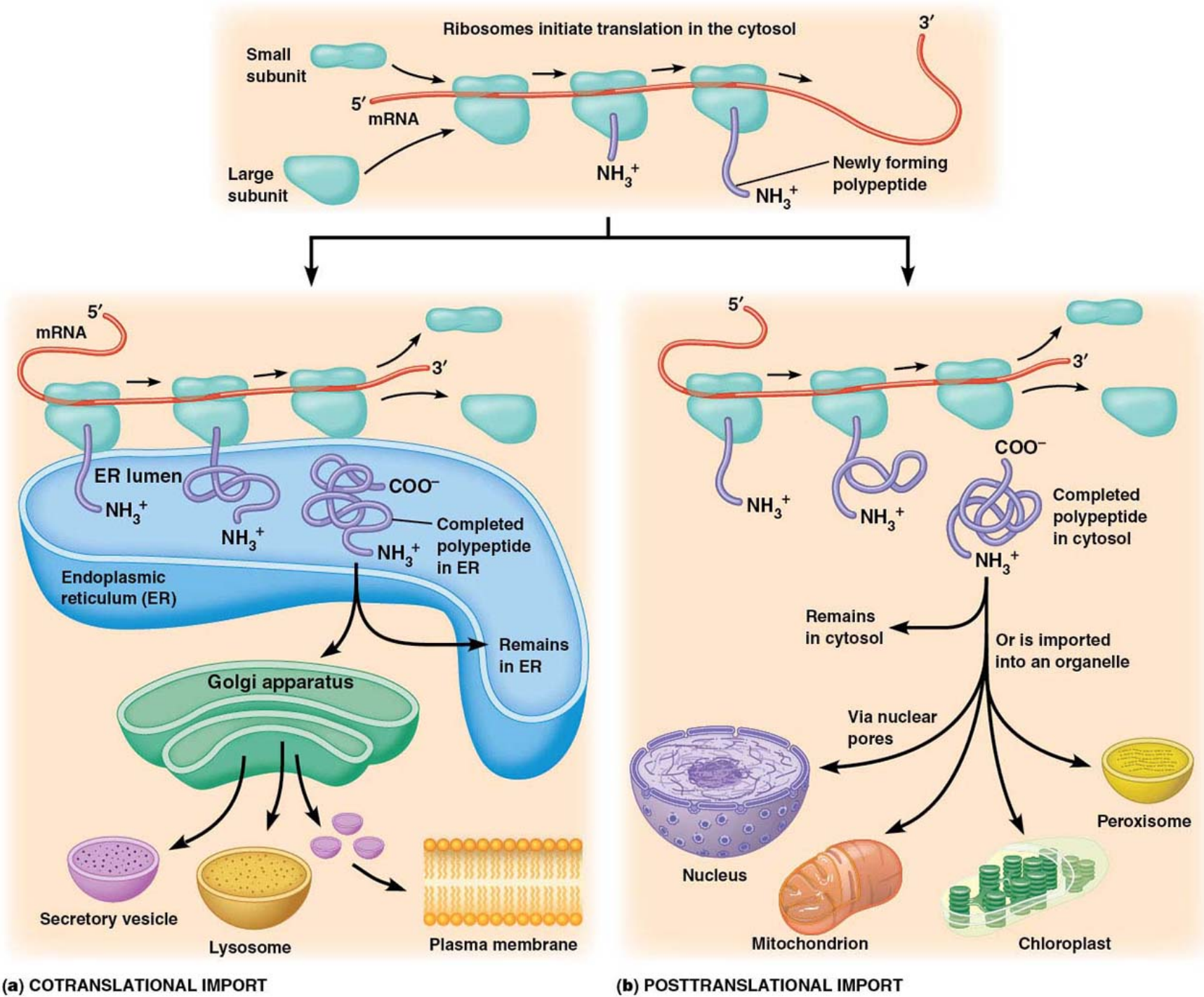
**(a) Mutations affecting one base pair**

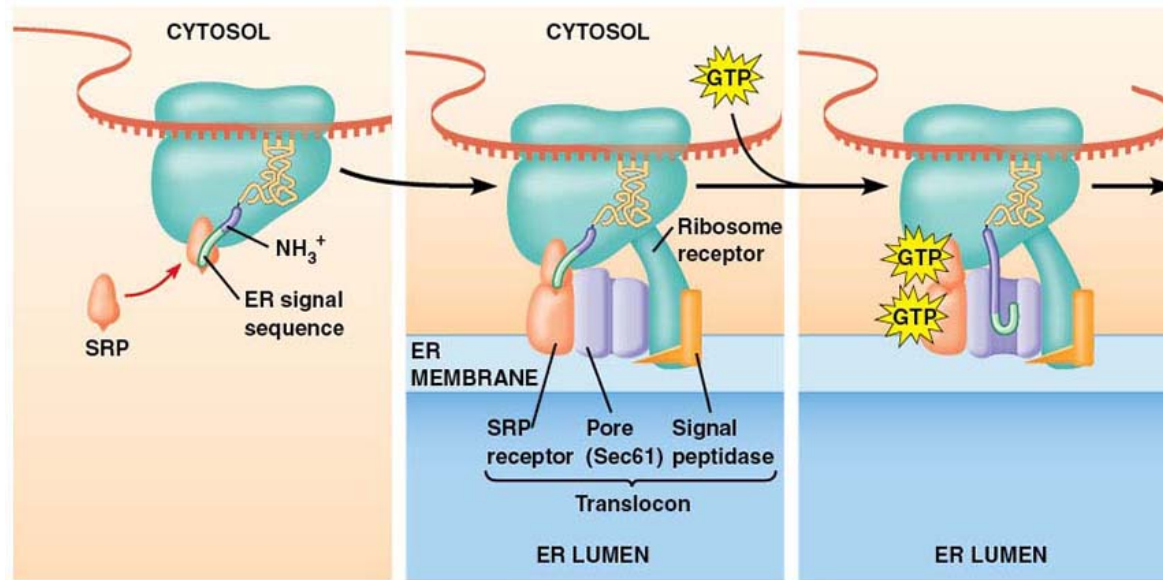


DNA of nonhomologous chromosomes

**(b) Mutations affecting long DNA segments**



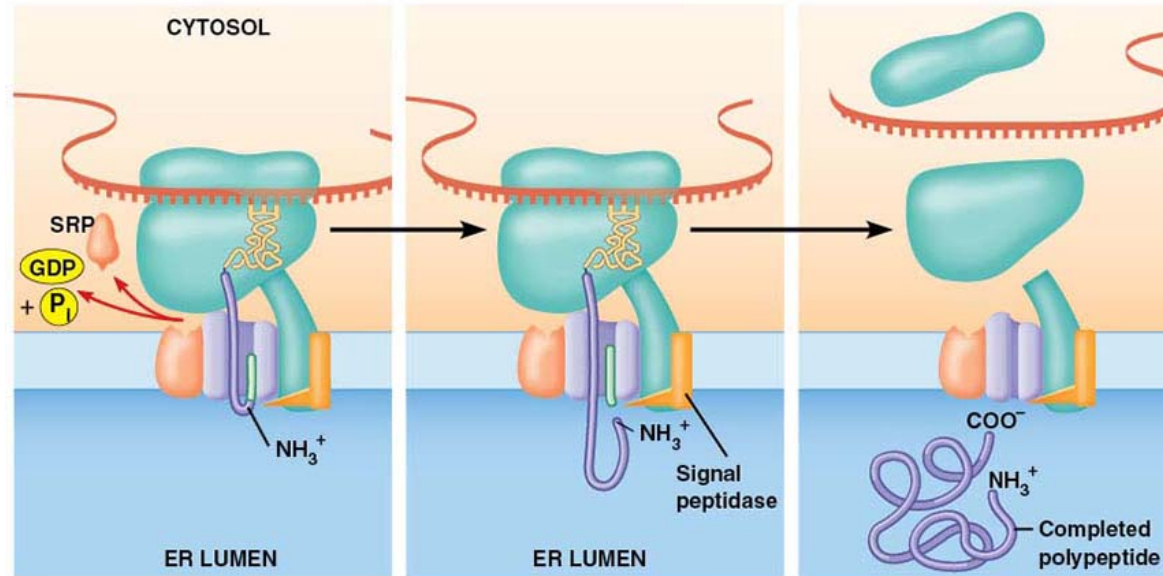




1 SRP binds to ER signal sequence and blocks translation.

2 SRP binds to SRP receptor; ribosome docks on membrane.

3 GTP binds to SRP and SRP receptor; pore opens as the polypeptide is inserted.



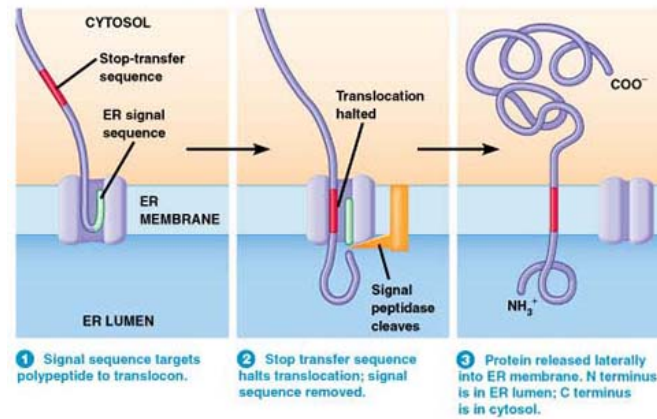
4 GTP is hydrolyzed and SRP is released.

5 Signal sequence is cleaved by signal peptidase as polypeptide elongates and translocates into ER lumen.

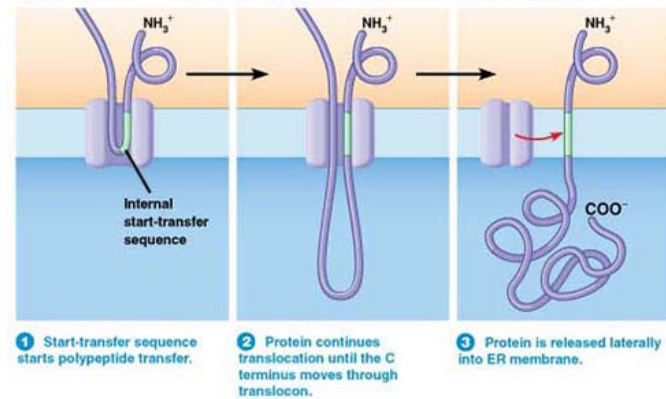
6 Completed polypeptide is released into ER lumen, ribosome is released, and translocon pore closes.



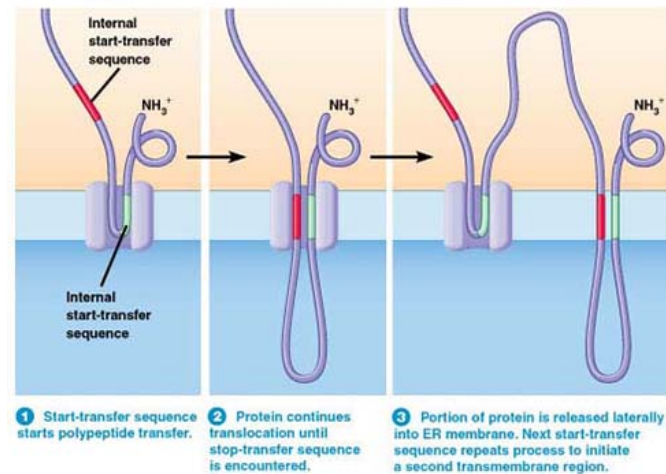
**(a) Type I transmembrane protein: Internal stop-transfer sequence and terminal ER signal sequence**



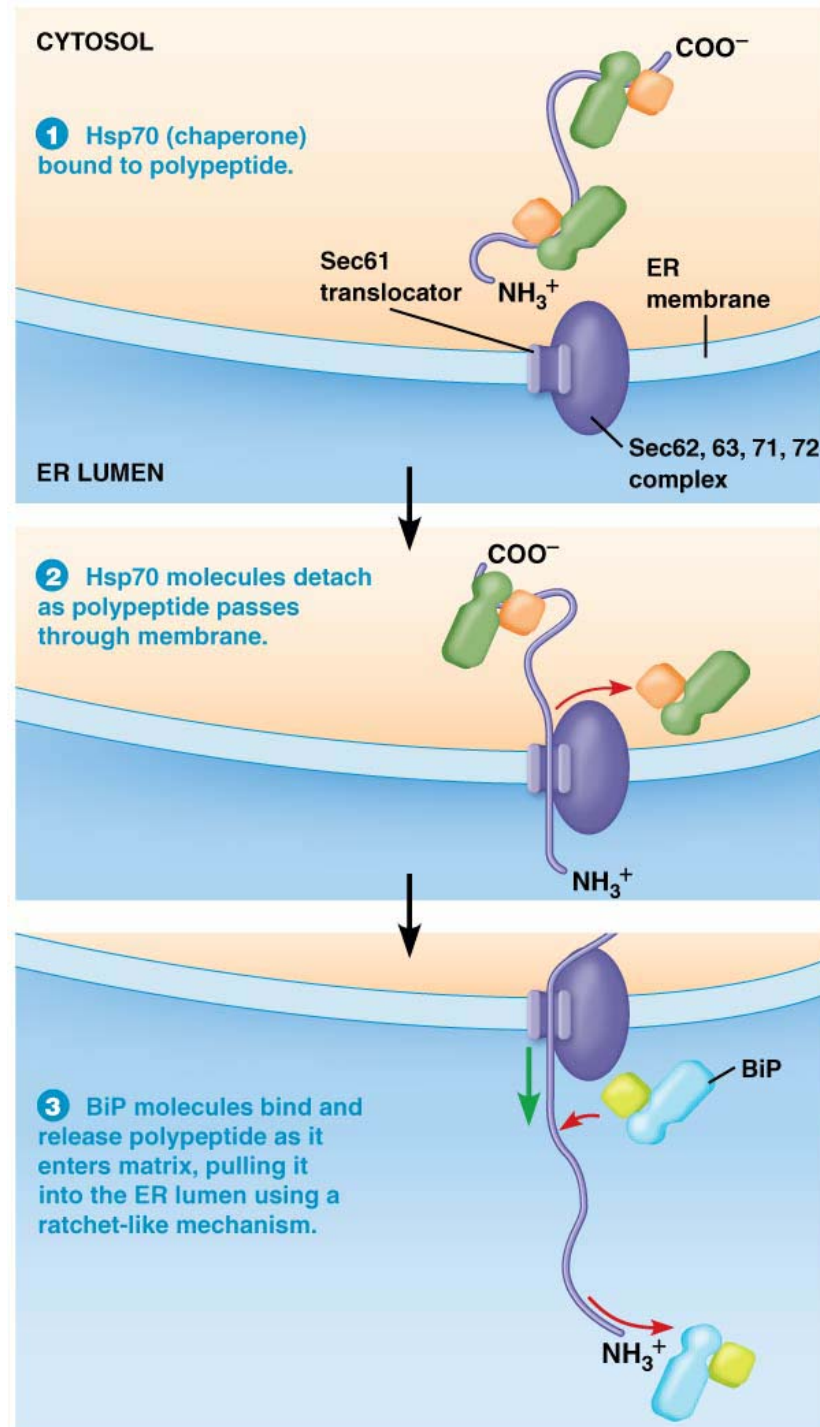
**(b) Type II transmembrane protein: Polypeptide with single internal start-transfer sequence**

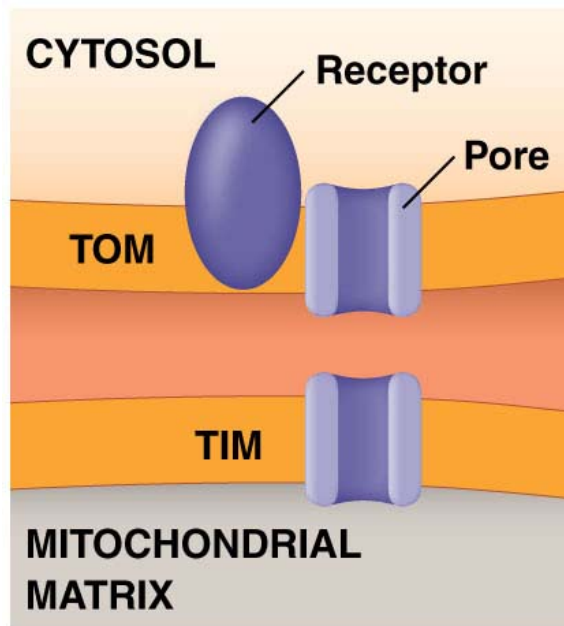


**(c) Multi-pass transmembrane protein: Multiple internal start- and stop-transfer sequences**

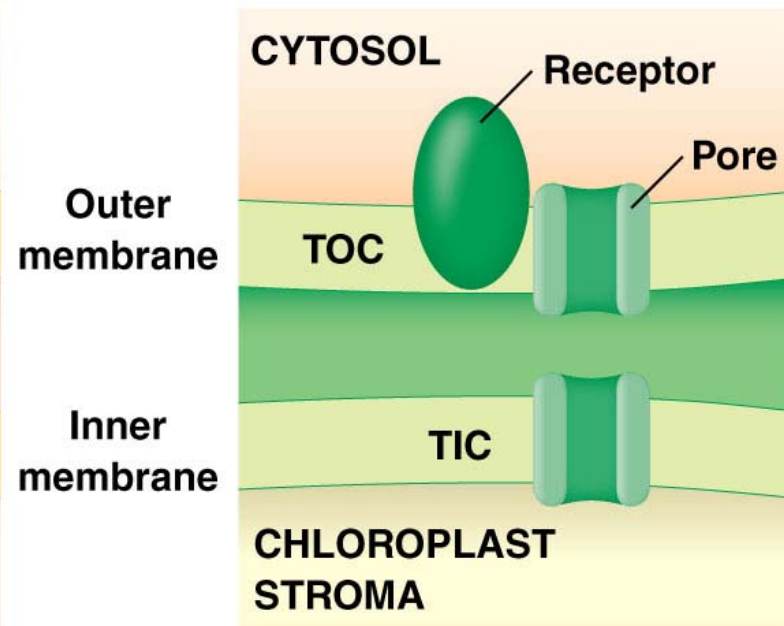








**Mitochondrion**



**Chloroplast**

