8.5 Translation

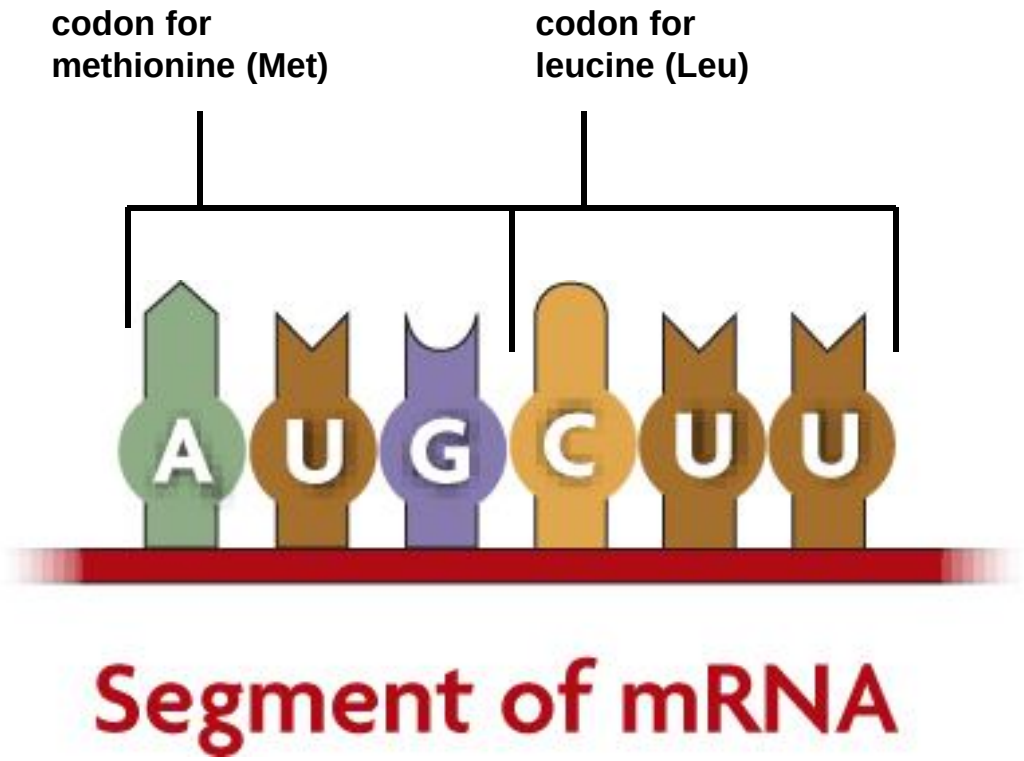
KEY CONCEPT

Translation converts an mRNA message into a polypeptide, or protein.

8.5 Translation

Amino acids are coded by mRNA base sequences.

- Translation converts mRNA messages into polypeptides.
- A codon is a sequence of three nucleotides that codes for an amino acid.



8.5 Translation

- The genetic code matches each codon to its amino acid or function.
  - three stop codons
  - one start codon, codes for methionine

The genetic code matches each RNA **codon** with its amino acid or function.

First base	Second base: U	Second base: C	Second base: A	Second base: G	Third base
U	UUU phenylalanine (Phe)	UCU serine (Ser)	UAU tyrosine (Tyr)	UGU cysteine (Cys)	U
	UUC phenylalanine (Phe)	UCC serine (Ser)	UAC tyrosine (Tyr)	UGC cysteine (Cys)	C
	UUA leucine (Leu)	UCA serine (Ser)	UAA STOP	UGA STOP	A
	UUG leucine (Leu)	UCG serine (Ser)	UAG STOP	UGG tryptophan (Trp)	G
C	CUU leucine (Leu)	CCU proline (Pro)	CAU **histidine** (His)	CGU arginine (Arg)	U
	CUC leucine (Leu)	CCC proline (Pro)	CAC **histidine** (His)	CGC arginine (Arg)	C
	CUA leucine (Leu)	CCA proline (Pro)	CAA glutamine (Gln)	CGA arginine (Arg)	A
	CUG leucine (Leu)	CCG proline (Pro)	CAG glutamine (Gln)	CGG arginine (Arg)	G
A	AUU isoleucine (Ile)	ACU threonine (Thr)	AAU asparagine (Asn)	AGU serine (Ser)	U
	AUC isoleucine (Ile)	ACC threonine (Thr)	AAC asparagine (Asn)	AGC serine (Ser)	C
	AUA isoleucine (Ile)	ACA threonine (Thr)	AAA lysine (Lys)	AGA arginine (Arg)	A
	AUG methionine (Met)	ACG threonine (Thr)	AAG lysine (Lys)	AGG arginine (Arg)	G
G	GUU valine (Val)	GCU alanine (Ala)	GAU aspartic acid (Asp)	GGU glycine (Gly)	U
	GUC valine (Val)	GCC alanine (Ala)	GAC aspartic acid (Asp)	GGC glycine (Gly)	C
	GUA valine (Val)	GCA alanine (Ala)	GAA glutamic acid (Glu)	GGA glycine (Gly)	A
	GUG valine (Val)	GCG alanine (Ala)	GAG glutamic acid (Glu)	GGG glycine (Gly)	G

1. Find the first base, C, in the left column.
2. Find the second base, A, in the top row. Find the box where these two intersect.
3. Find the third base, U, in the right column. CAU codes for histidine, abbreviated as His.

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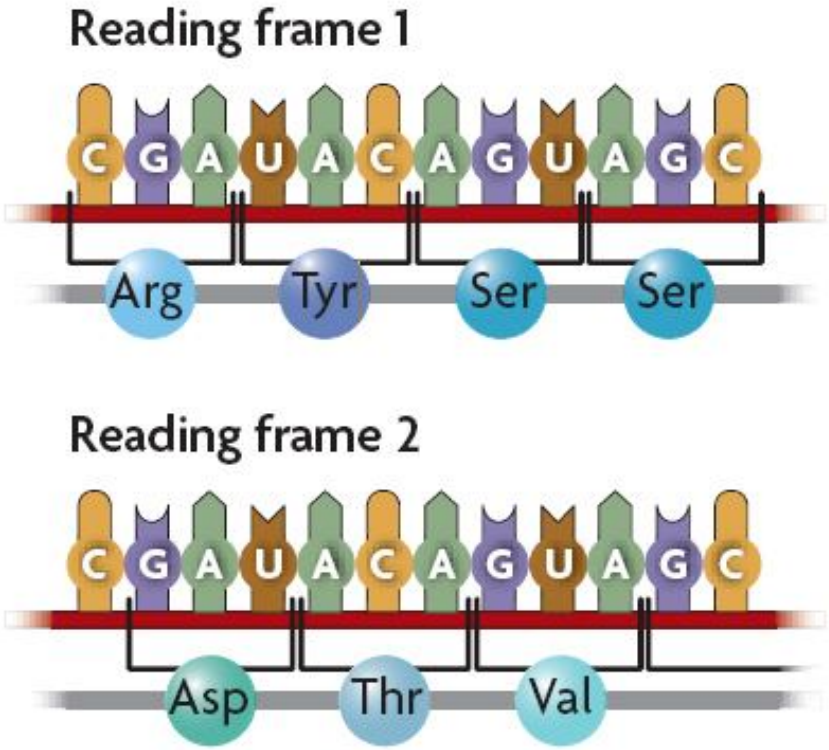
- A change in the order in which codons are read changes the resulting protein.



- Regardless of the organism, codons code for the same amino acid.

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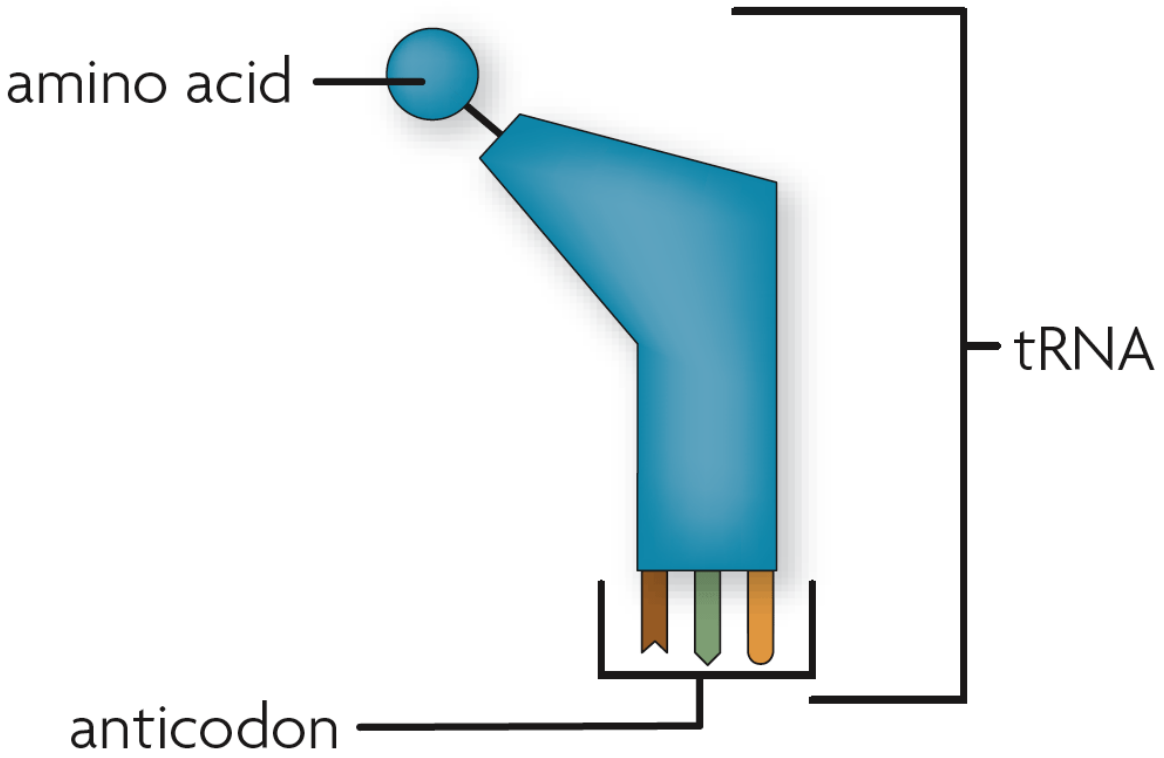
- **Amino acids are linked to become a protein.**
  - An anticodon is a set of three nucleotides that is complementary to an mRNA codon.
  - An anticodon is carried by a tRNA.



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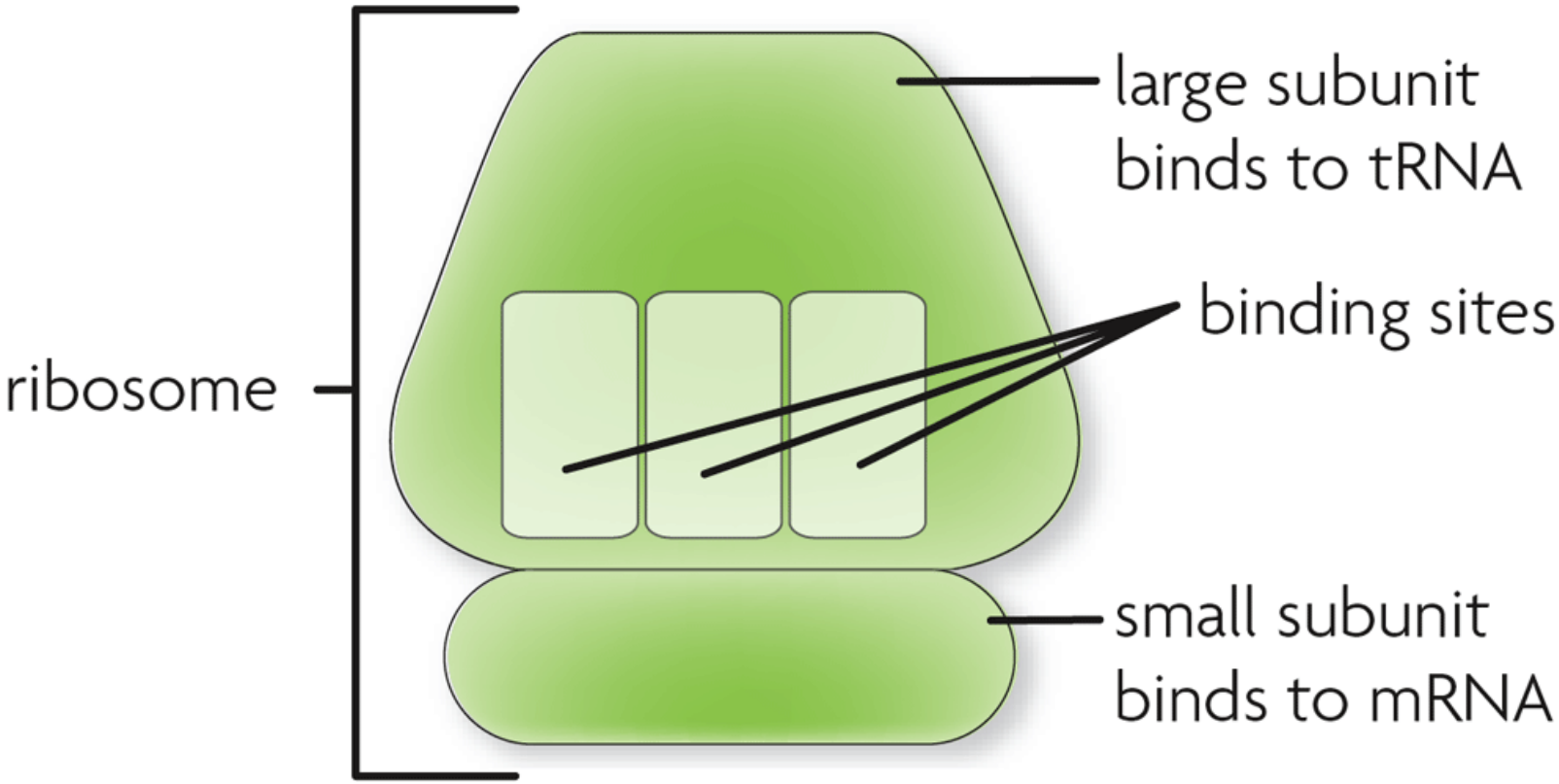
- Ribosomes consist of two subunits.
  - The large subunit has three binding sites for tRNA.
  - The small subunit binds to mRNA.



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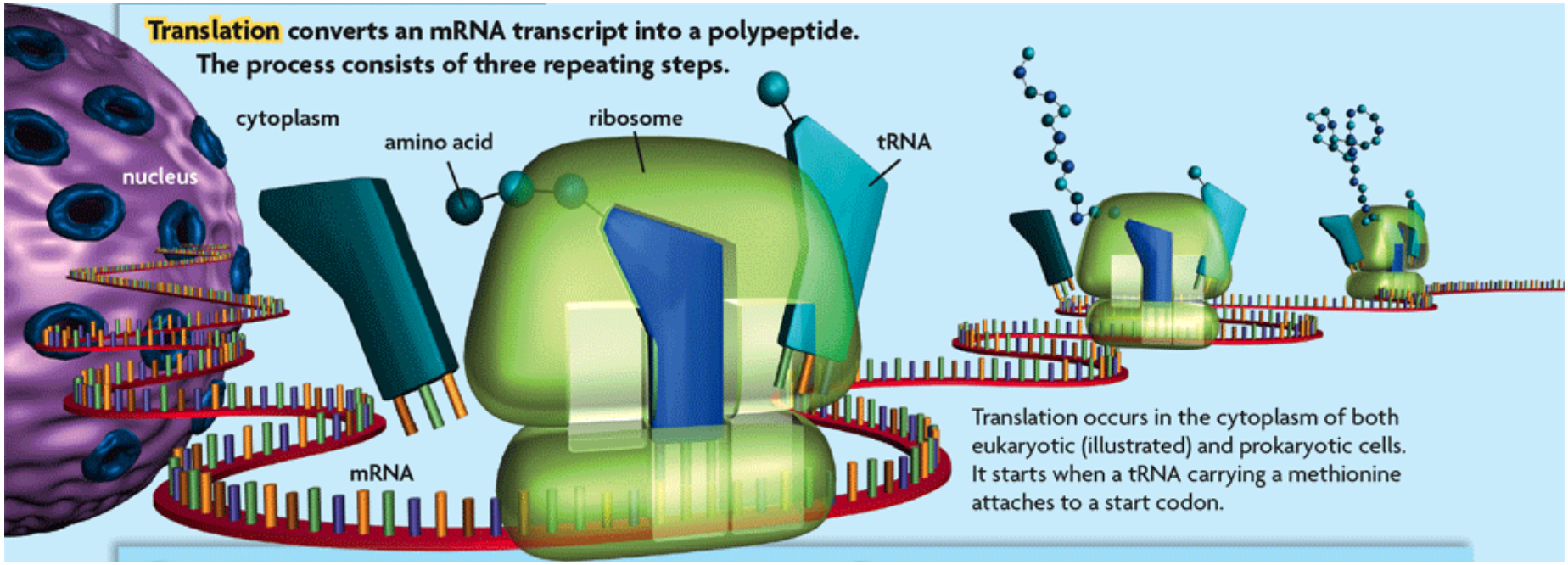
- For translation to begin, tRNA binds to a start codon and signals the ribosome to assemble.
  - A complementary tRNA molecule binds to the exposed codon, bringing its amino acid close to the first amino acid.



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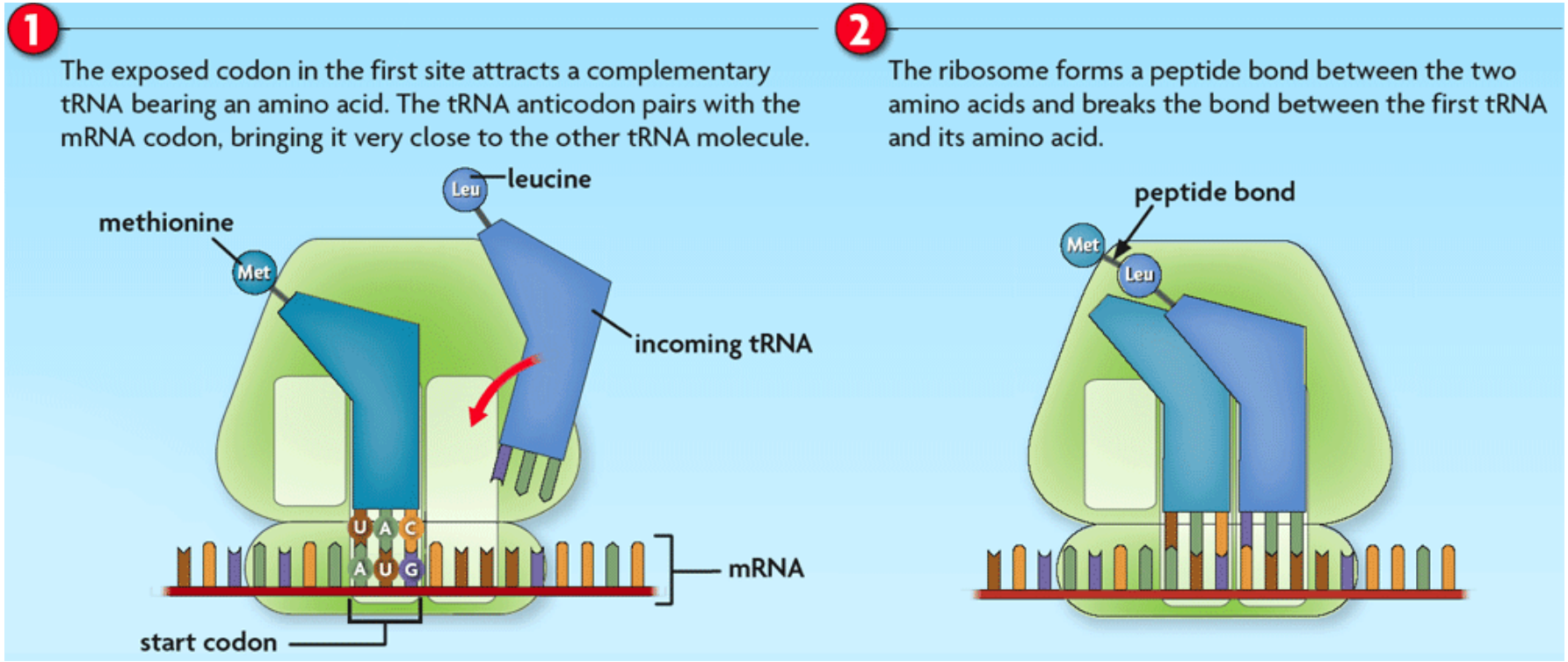
- The ribosome helps form a polypeptide bond between the amino acids.
- The ribosome pulls the mRNA strand the length of one codon.



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- The now empty tRNA molecule exits the ribosome.
- A complementary tRNA molecule binds to the next exposed codon.
- Once the stop codon is reached, the ribosome releases the protein and disassembles.