

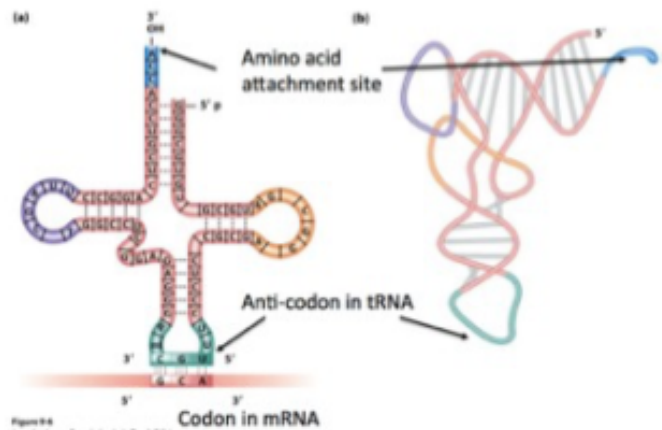
BIOL 10005

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The **Anti-codon**, responsible for codon recognition, is found at the end of a loop in each tRNA molecule.

Complementary base pairing between the codon and anticodon ensures that the correct amino acid is brought to the site of protein synthesis.



How, then, is a tRNA with a particular codon loaded only with the amino acid it specifies?

The answer lies in the enzymes that attach the amino acid to the tRNA. Specifically, the adenine residue at the 3' end of a tRNA molecule becomes covalently attached to the appropriate amino acid by aminoacylation, creating an **aminoacyl-tRNA** (referred to as a charged tRNA).

E.g. tRNA^{Leu} is converted to leucyl - tRNA^{Leu} (L-tRNA^{Leu}) by this process.

- Such reactions are catalysed by at least 20 different aminoacyl-tRNA synthetases, one required for the attachment of each amino acid to its specific tRNA.
- Each aminoacyl-tRNA synthetase enzyme puts one amino acid on to the tRNA molecule, whose anticodon subsequently pairs with the codon specifying that amino acid.
- The result is that, for example, leucine is only attached to tRNA^{Leu}, so that leucine is always added to the growing chain when the ribosome encounters a codon for leucine.

Polypeptide Synthesis

Ribosomes are made up of a specific set of RNA molecules and proteins.

The ribosome provides a scaffold for the mRNA and aminoacyl-tRNA to assemble and provides a reaction chamber for the catalysis of polypeptide synthesis.

Like tRNA, each rRNA folds upon itself to form short, double-stranded regions.

- The resultant stem-loop structures in each rRNA give a characteristic three-dimensional structure, which is important for interactions with ribosomal proteins.

Mature ribosomes consist of two subunits, one large and one small, each containing different-sized rRNA molecules.

Prokaryotic ribosomes are smaller than those of eukaryotes.