

The three types of RNA

There are three types of RNA:

- messenger RNA (mRNA);
- transfer RNA (tRNA); and
- ribosomal RNA (rRNA).

mRNA

The key features of mRNA are:

- it is formed by transcription of complementary sections of DNA;
- its M_r varies from 25 000 to 1 000 000;
- after its formation, it is transported selectively from the nucleus to the ribosomes.

tRNA

The key features of molecules of tRNA are:

- they act as “carriers” of amino acids during protein synthesis;
- they have a characteristic “clover leaf” structure;
- they are relatively small, 73–93 nucleotides long, M_r 23 000 to 30 000;
- there is at least one tRNA for each amino acid;
- they have an **anticodon** (a triplet base code which is complementary to the codon for the particular amino acid) which can bind to the appropriate codon on the mRNA;
- they have a specific structure which allows them to bind specific amino acids; and
- specific enzymes enable amino acids to bind to their tRNA molecules via ester bonds.

The key features of these ester bonds are:

- they are between the $-\text{COOH}$ group of the amino acid, and the $-\text{OH}$ at the end of the tRNA nucleic acid chain;
- their formation needs energy from the hydrolysis of ATP.

The correct attachment of tRNA-amino acid to ribosome-bound mRNA also requires energy from the hydrolysis of ATP, and occurs by anticodon–codon base-pairing.

Anticodon	Amino acid	Anticodon	Amino acid
AAA	phe	GAA	leu
AUA	tyr	GCG	arg
CAU	val	GGG	pro
CCC	gly	GUA	his
CGC	ala	UAU	ile
CUU	glu	UUU	lys

rRNA

rRNA is a structural component of ribosomes. The molecules consist of single strands of RNA, and have M_r values up to 1 000 000. The specific function of rRNA is not fully established, but it binds proteins and mRNA to provide the site of protein synthesis.