

TRANSLATION

Griffiths et al, p. 300-306, Griffiths et al, 7th Ed, 9th: 319-344
 rvsd 2/19/93, 2/17/95, 2/19/97, 18 Feb 00, 14 Feb 01, 15 Feb 02, 21 Feb 05, 25Feb09, 13Mar09, 26Feb10, 21Feb11

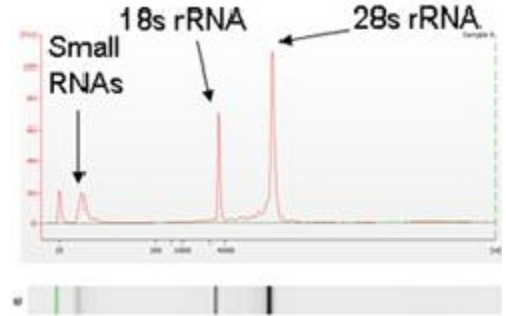
Corollary of Yanofsky's work: **mRNA and protein sequence are colinear**

RNA species: sucrose gradients shows different sizes of RNA:

prok: tRNAs = 4S; rRNA = 23, 16 and 5S; mRNA heterogeneous

euk: tRNAs = 4S; rRNA = 28S, 18S, 5Sx

TRANSLATION: mRNA directs the synthesis of protein.



tRNA charged by tRNA synthetase, using ATP to attach **A.A. COOH to 3'OH (ester bond)** p 331

Here is a YouTube clip on charging of the tRNA and translation (a high school animation).

<http://www.youtube.com/watch?v=yJdAxuA6QM>

codons: recognized by tRNA, if the AA is changed on a given charged tRNA, the new AA is inserted (alter cysteine with nickel hydride to alanine, alanine is inserted at places cysteine *should* be)

GENETIC CODE: p 329, degenerate (multiple codon for given AA)

Ribosomes: 50S: (60S) has 34 proteins and two RNAs; 30S: (40S) 21 proteins, single RNA p 334

ribosome: Three functional regions:

mRNA binding to 30S

tRNA binding first to 30S, then 50S

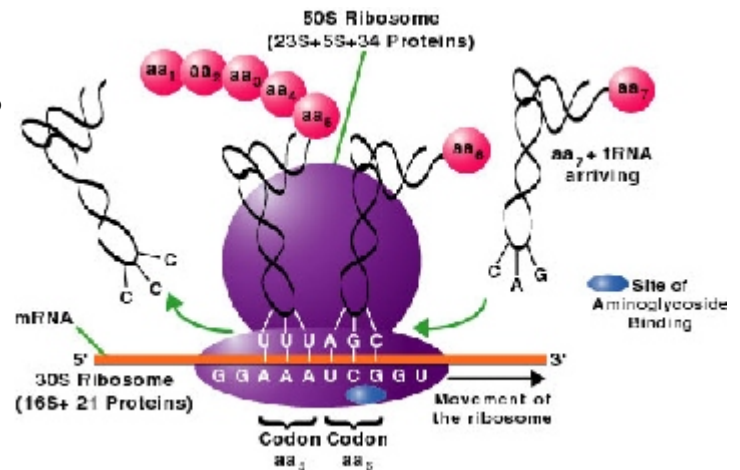
peptidyl transferase on 50S: transfers to peptide over to the amino acid, forming peptide bond (peptidyl ester to amino)

A site = **amino acid site** on 50S

P site = **peptide site** on 50S

PROCESS: (p 337, 338, 339, 340)

1. 30S coordinates binding of tRNAs to A site
2. flips over to align with transferase
3. peptide bond formed, naked tRNA released
4. tRNA at A shifted to P, new tRNA arrives



Here is a great YouTube animation on transcription and translation from PBS

http://www.youtube.com/watch?v=41_Ne5mS2ls

Wobble a given tRNA can read any of four of codons by the first two letters alone

Non-sense mutation a point mutation creates a termination codon, acts as a polar mutation (cis only) Brenner

Initiation: requires N-formylmethionine, also pairs well with 16S rRNA ("Shine-Delgarno" sequence upstream from initiation codon in prokaryotes)

Initiation complex: mRNA binds to 30S ribosome, methionyl tRNA binds to AUG. This complex is then recognized by the 50S ribosome

suppressor mutations in the same cistron show that the reversion induced second rII mutation:

+ frameshift only reverted by - frameshift, although 3 + will revert or 3 -.

Thus codon = triplet