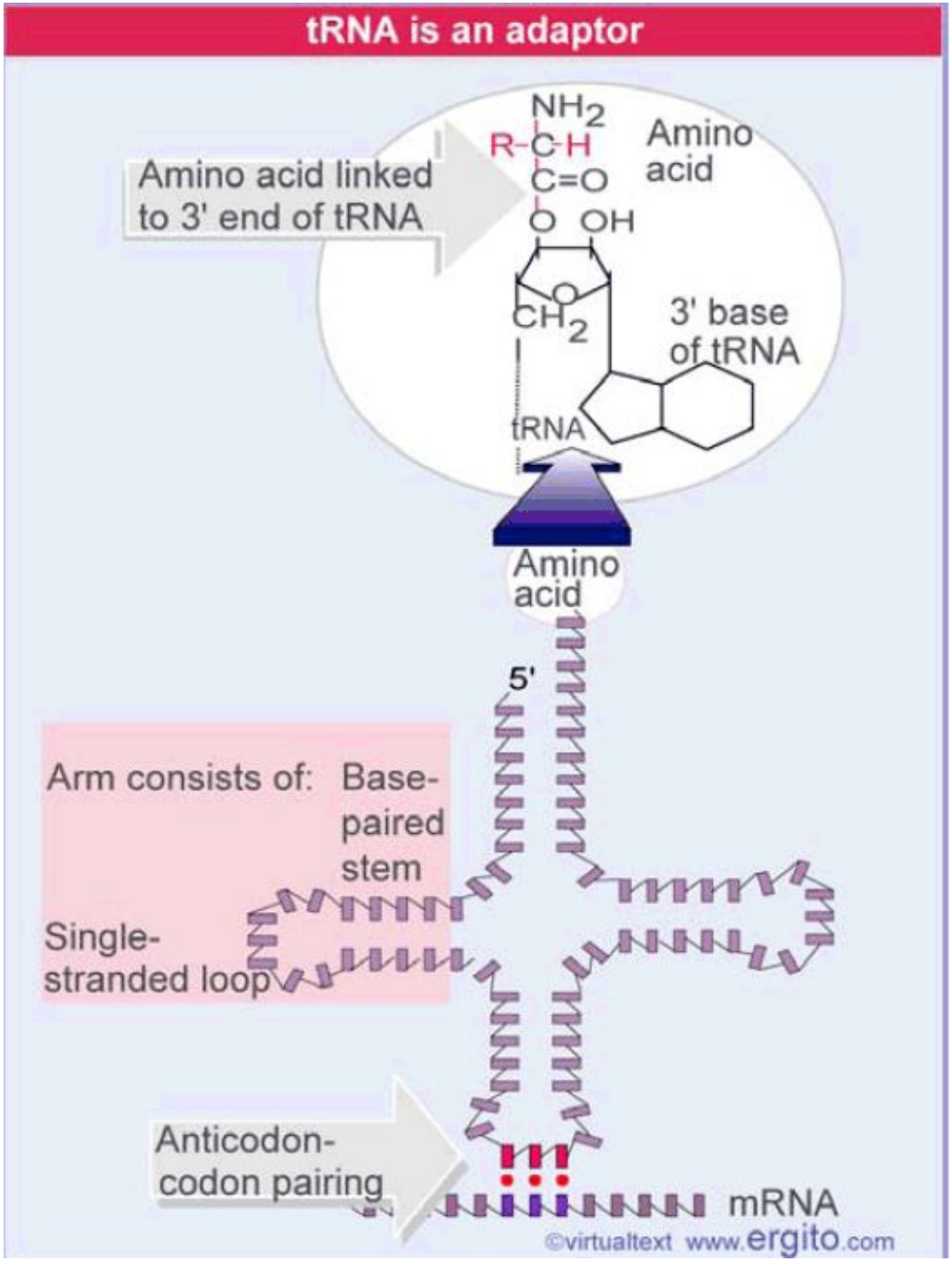
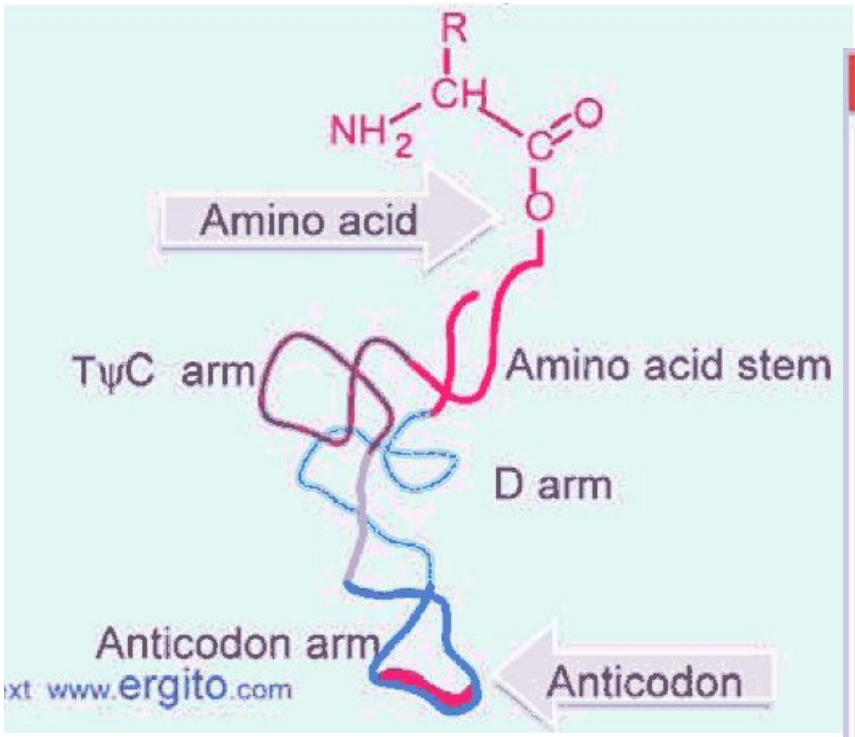
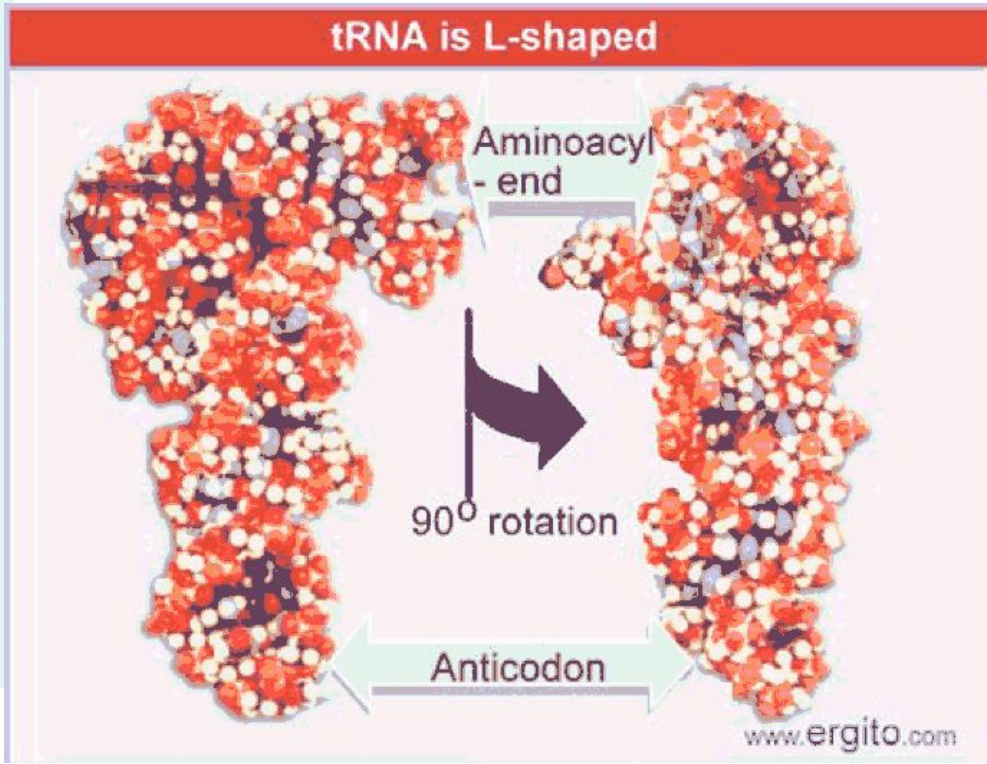
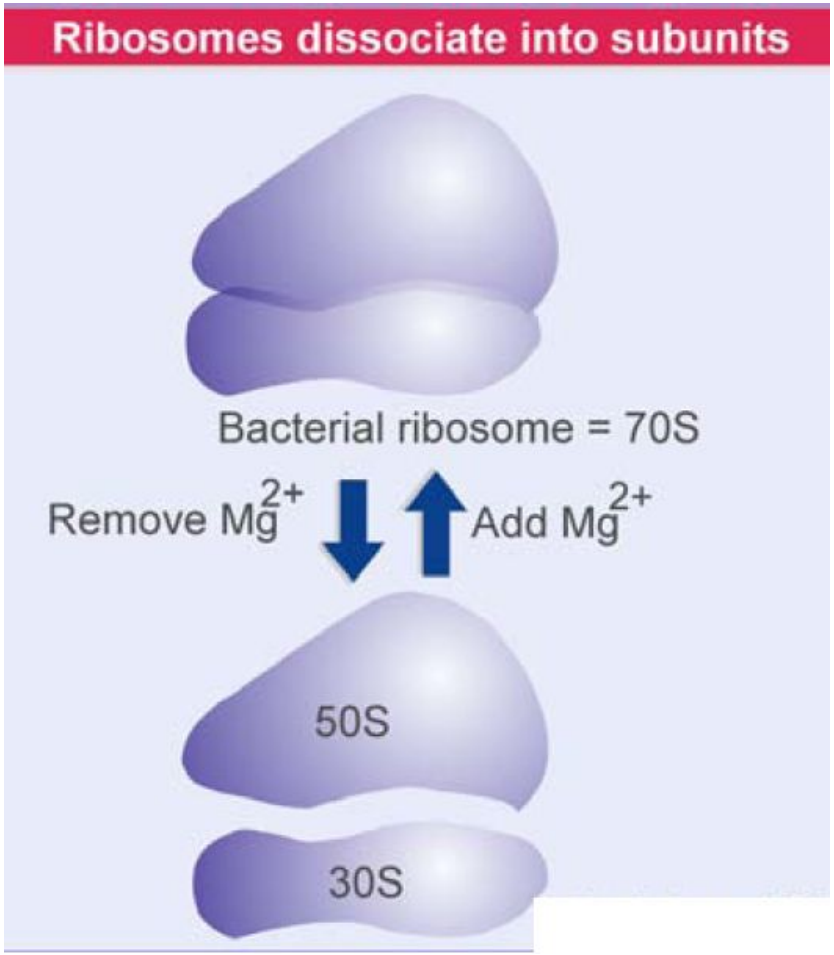
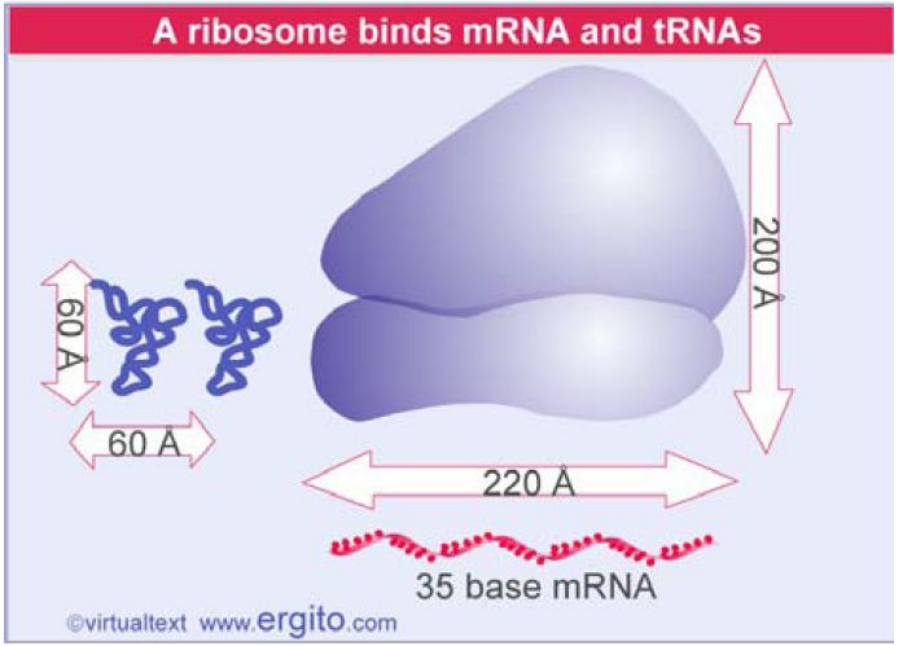
tRNA is an adaptor

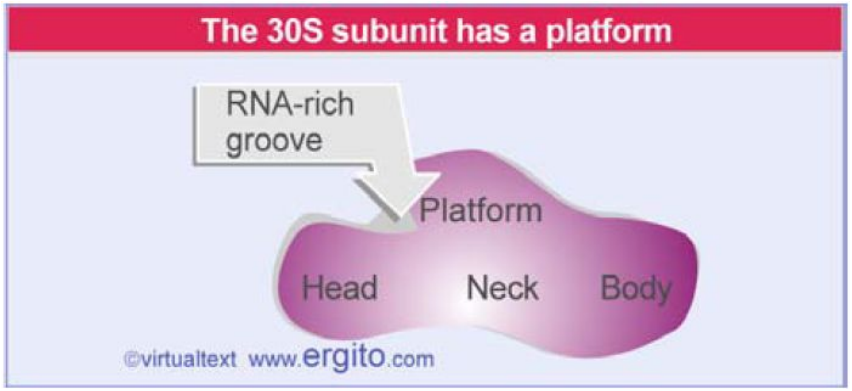



R
CH
NH2
C=O
O
Amino acid
TψC arm
Amino acid stem
D arm
Anticodon arm
Anticodon
xt www.ergito.com


tRNA is L-shaped
Aminoacyl
- end
90° rotation
Anticodon
www.ergito.com


Ribosomes dissociate into subunits
Bacterial ribosome = 70S
Remove Mg^{2+}
Add Mg^{2+}
50S
30S


A ribosome binds mRNA and tRNAs
60 Å
60 Å
200 Å
220 Å
35 base mRNA
©virtualtext www.ergito.com



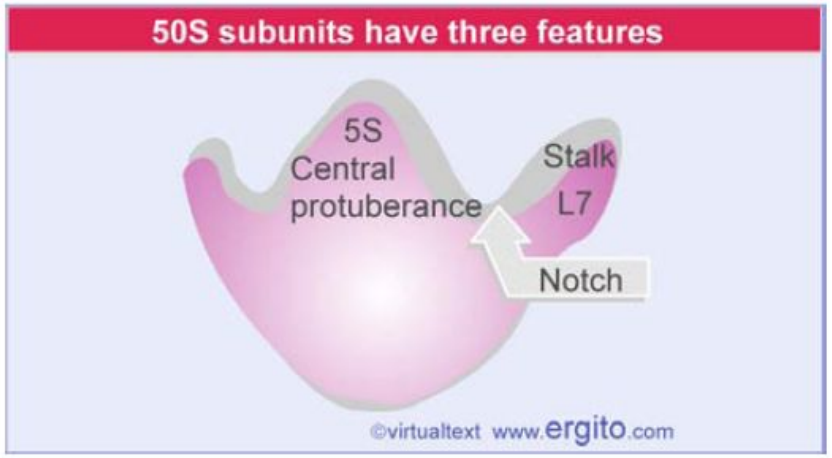


Figure 6.37 The 50S subunit has a central protuberance where 5S rRNA is located, separated by a notch from a stalk made of copies of the protein L7.

Figure 6.38 The platform of the 30S subunit fits into the notch of the 50S subunit to form the 70S ribosome.

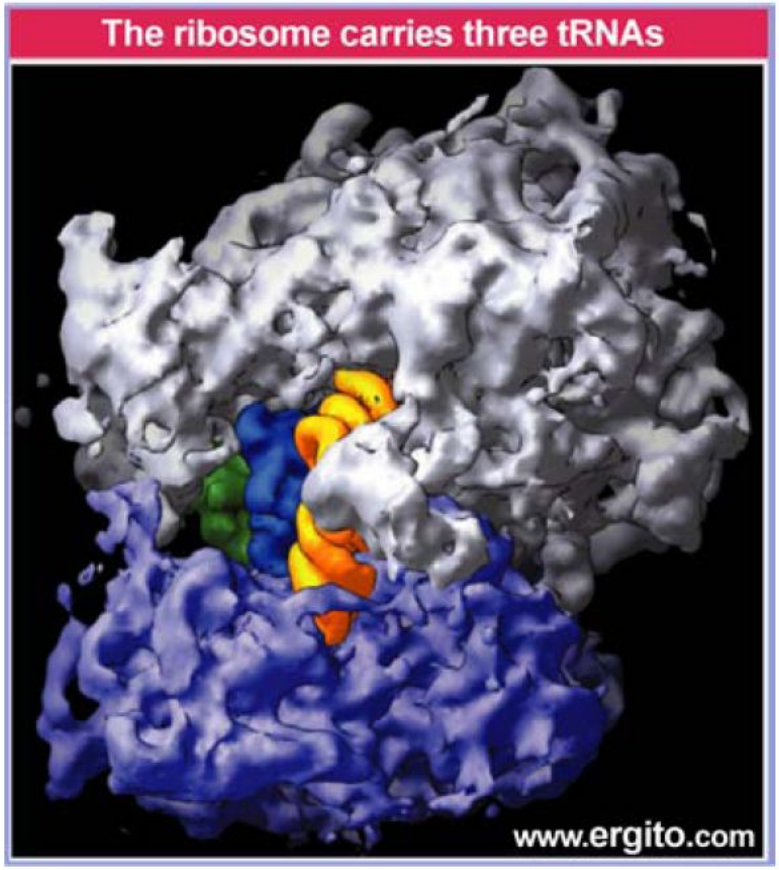


Figure 6.42 The 70S ribosome consists of the 50S subunit (blue) and the 30S subunit (purple) with three tRNAs located superficially: yellow in the A site, blue in the P site, and green in the E site. Photograph

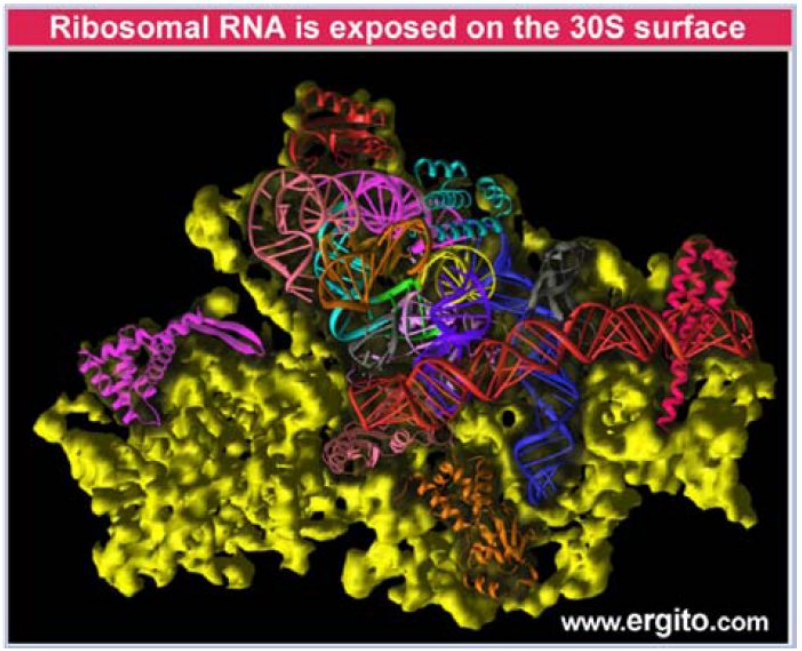


Figure 6.39 The 30S ribosomal subunit is a ribonucleoprotein particle. Proteins are in yellow. Photograph kindly provided by

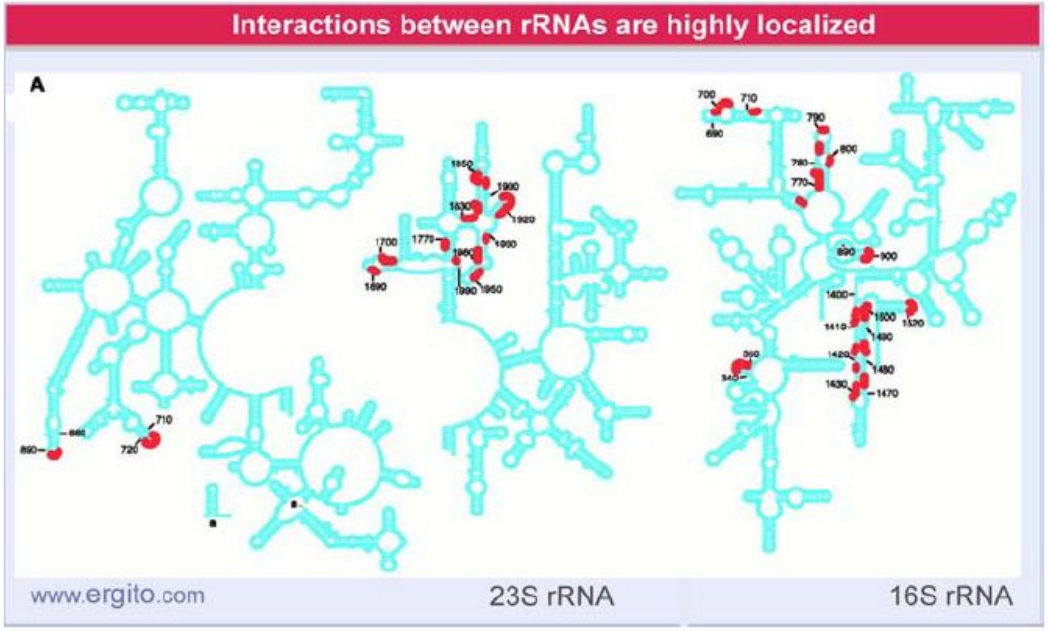


Figure 6.40 Contact points between the rRNAs are located in two domains of 16S rRNA and one domain of 23S rRNA. Photograph kindly provided by Harry Noller (see 1670).

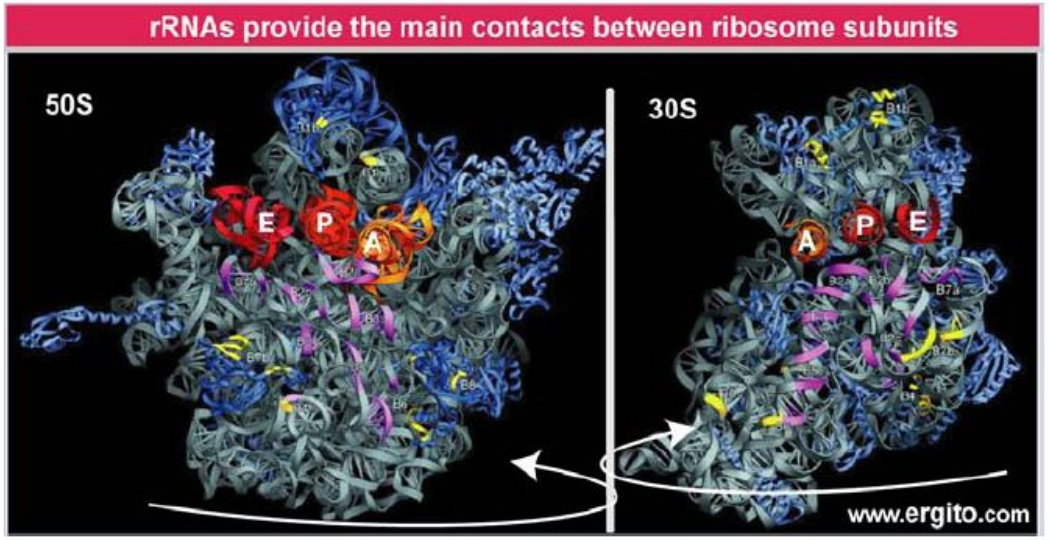
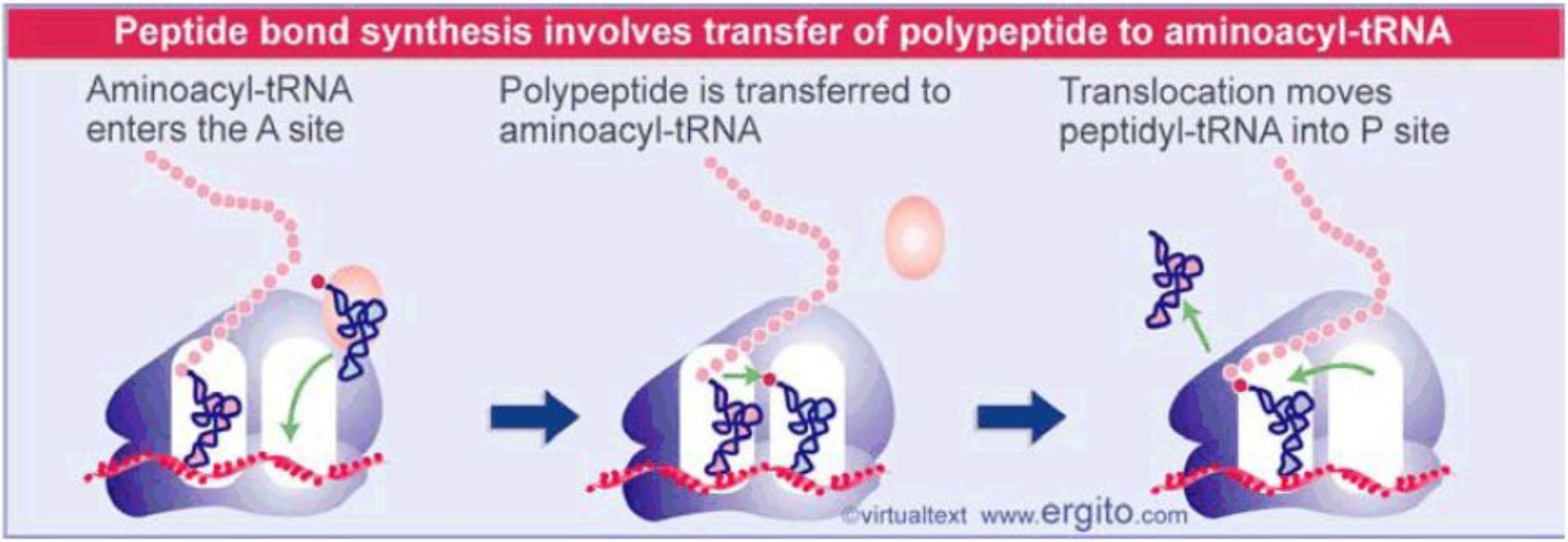


Figure 6.41 Contacts between the ribosomal subunits are mostly made by RNA (shown in purple). Contacts involving proteins are shown in yellow. The two subunits are rotated away


Peptide bond synthesis involves transfer of polypeptide to aminoacyl-tRNA
Aminoacyl-tRNA enters the A site
Polypeptide is transferred to aminoacyl-tRNA
Translocation moves peptidyl-tRNA into P site
©virtualtext www.ergito.com

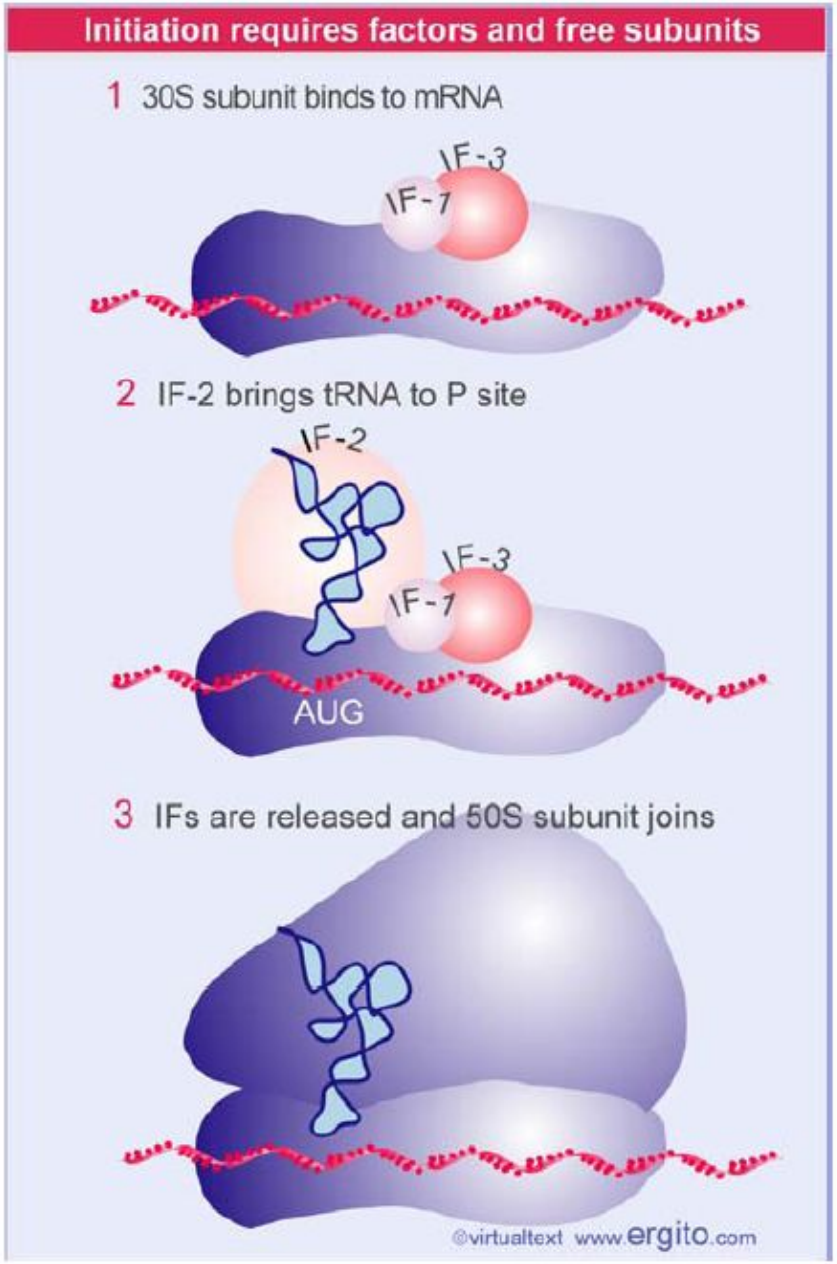
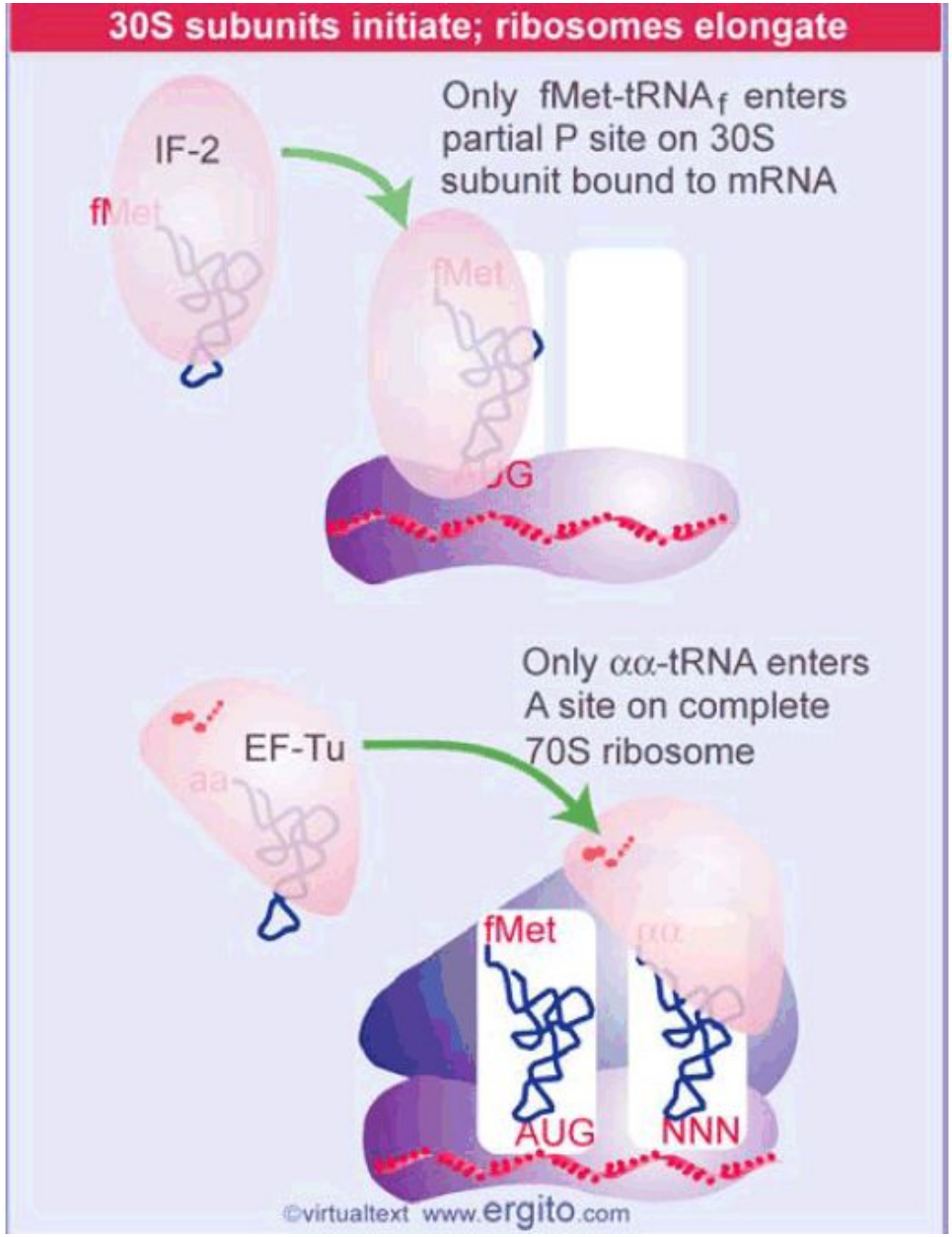
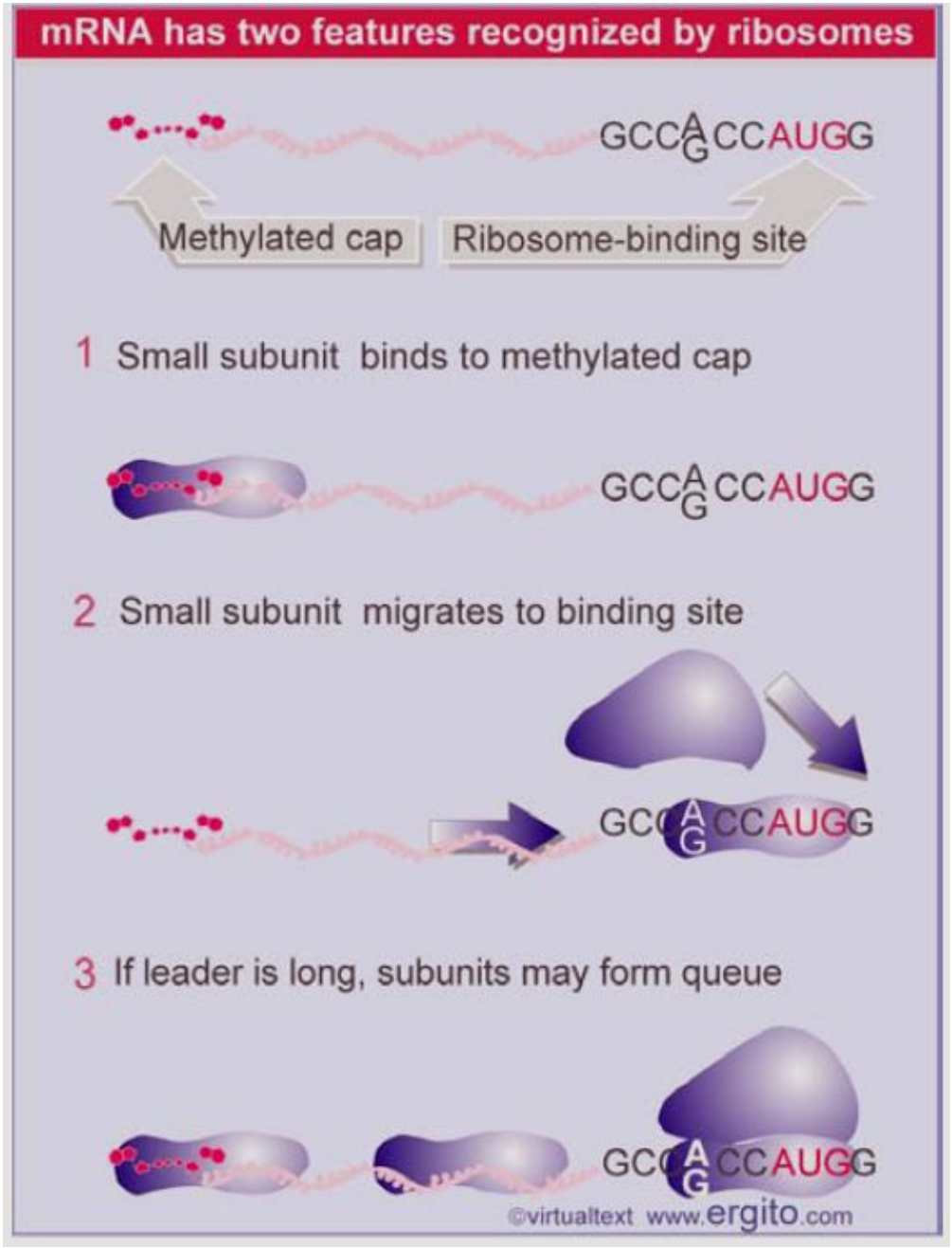


Figure 6.10 Initiation factors stabilize free 30S subunits and bind initiator tRNA to the 30S-mRNA complex.


30S subunits initiate; ribosomes elongate
IF-2
fMet
Only fMet-tRNA$_f$ enters partial P site on 30S subunit bound to mRNA
fMet
G
Only αα-tRNA enters A site on complete 70S ribosome
EF-Tu
aa
fMet
AUG
NNN
©virtualtext www.ergito.com


mRNA has two features recognized by ribosomes
GCCA/GCCAUGG
Methylated cap
Ribosome-binding site
1 Small subunit binds to methylated cap
GCCA/GCCAUGG
2 Small subunit migrates to binding site
GCCA/GCCAUGG
3 If leader is long, subunits may form queue
GCCA/GCCAUGG
©virtualtext www.ergito.com

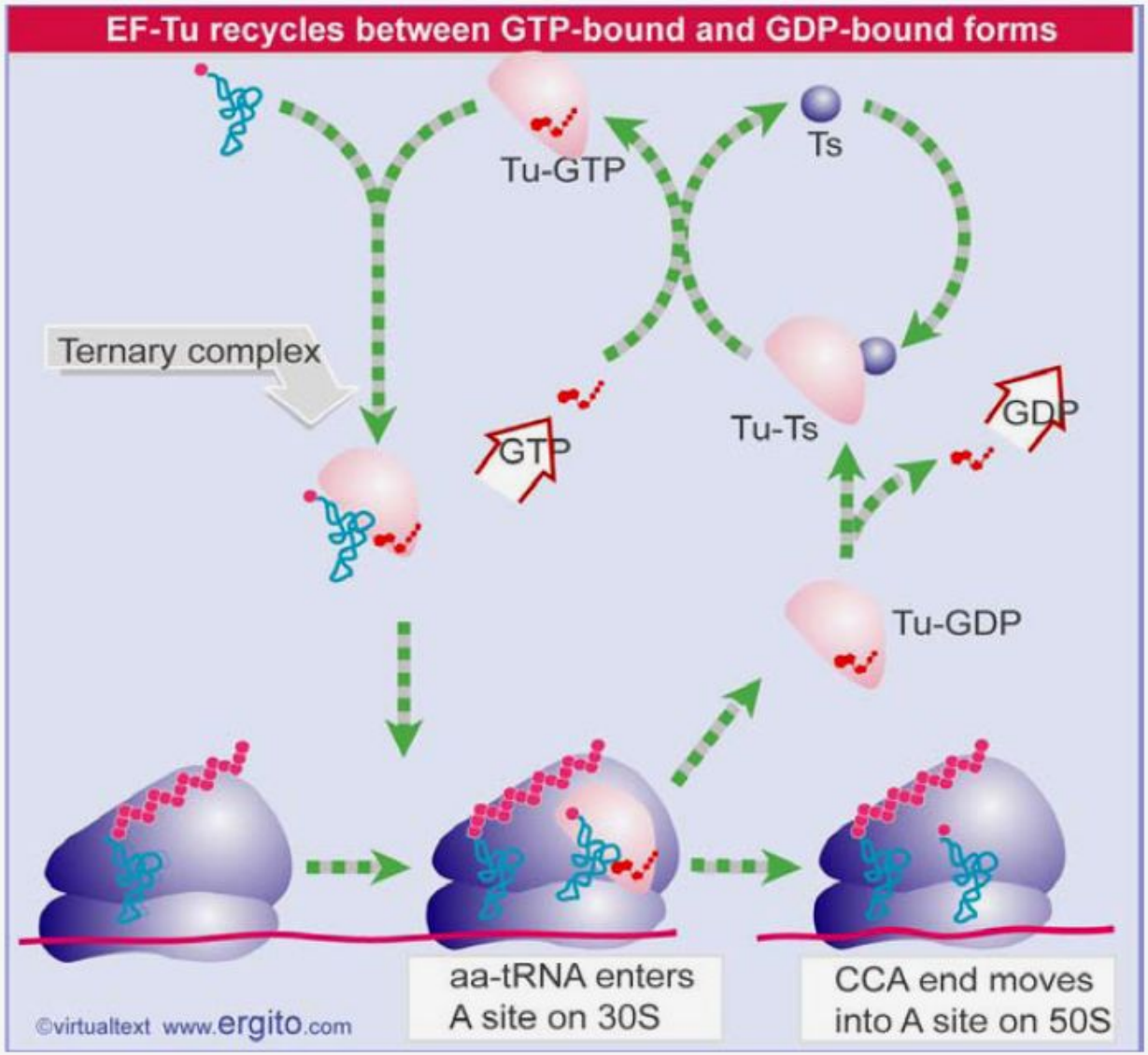


Figure 6.25 EF-Tu-GTP places aminoacyl-tRNA on the ribosome and then is released as EF-Tu-GDP. EF-Ts is required to mediate the replacement of GDP by GTP. The reaction consumes GTP and releases GDP. The only aminoacyl-tRNA that cannot be recognized by EF-Tu-GTP is fMet-tRNA$_f$, whose failure to bind prevents it from responding to internal AUG or GUG codons.

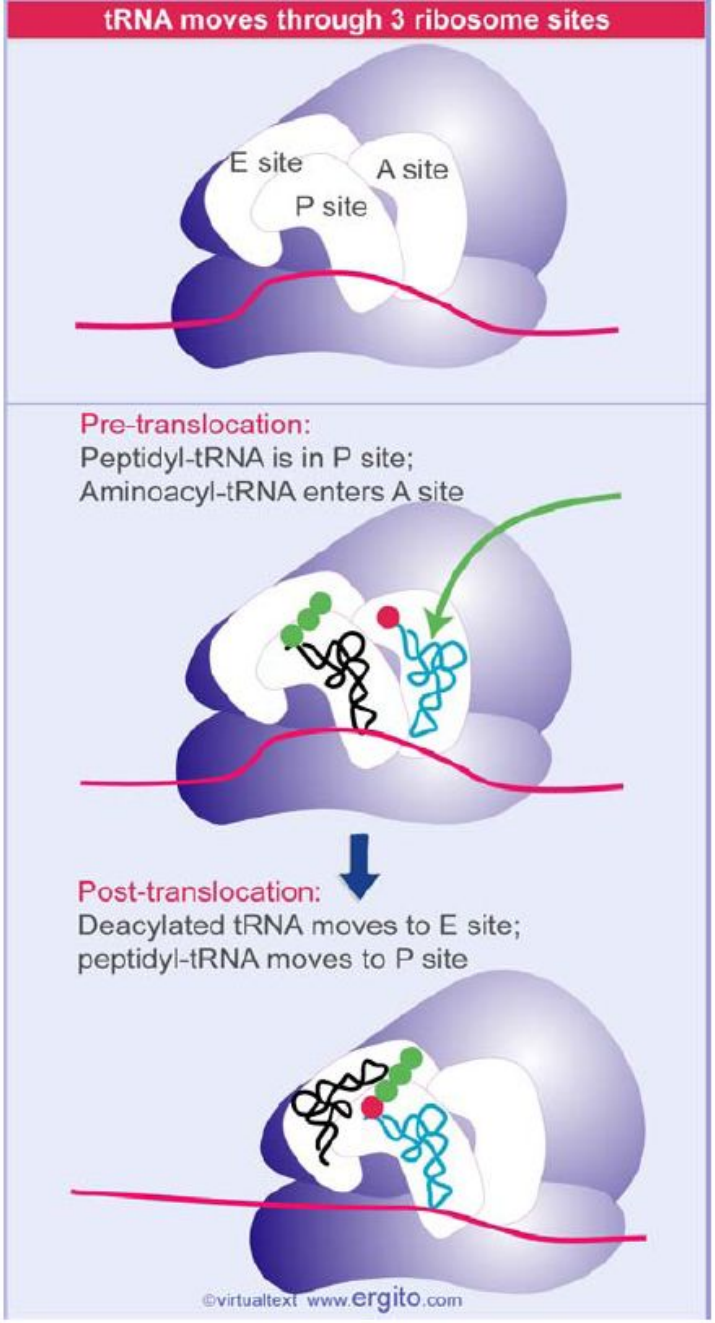


Figure 6.28 A bacterial ribosome has 3 tRNA-binding sites. Aminoacyl-tRNA enters the A site of a ribosome that has peptidyl-tRNA in the P site. Peptide bond synthesis deacylates

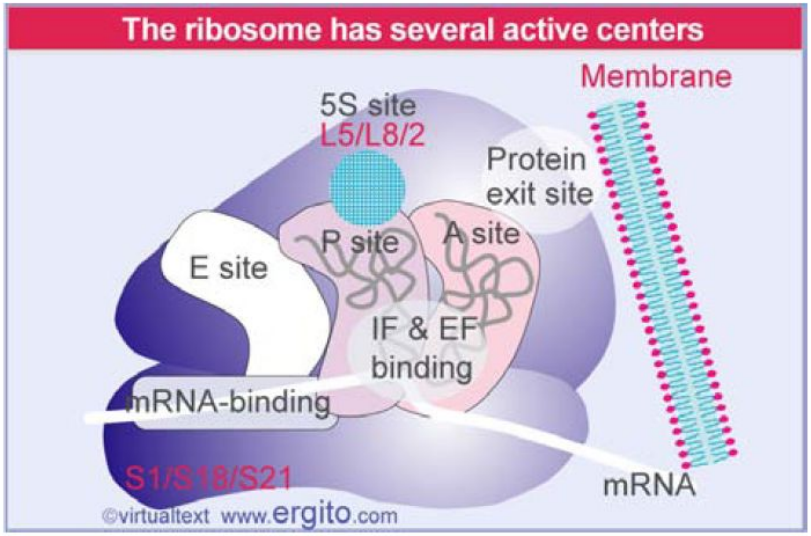


Figure 6.44 The ribosome has several active centers. It may be associated with a membrane. mRNA takes a turn as it passes through the A and P sites, which are angled with regard to each other. The E site lies beyond the P site. The peptidyl transferase site (not shown) stretches across the tops of the A and P sites. Part of the site bound by EF-Tu/G lies at the base of the A and P sites.

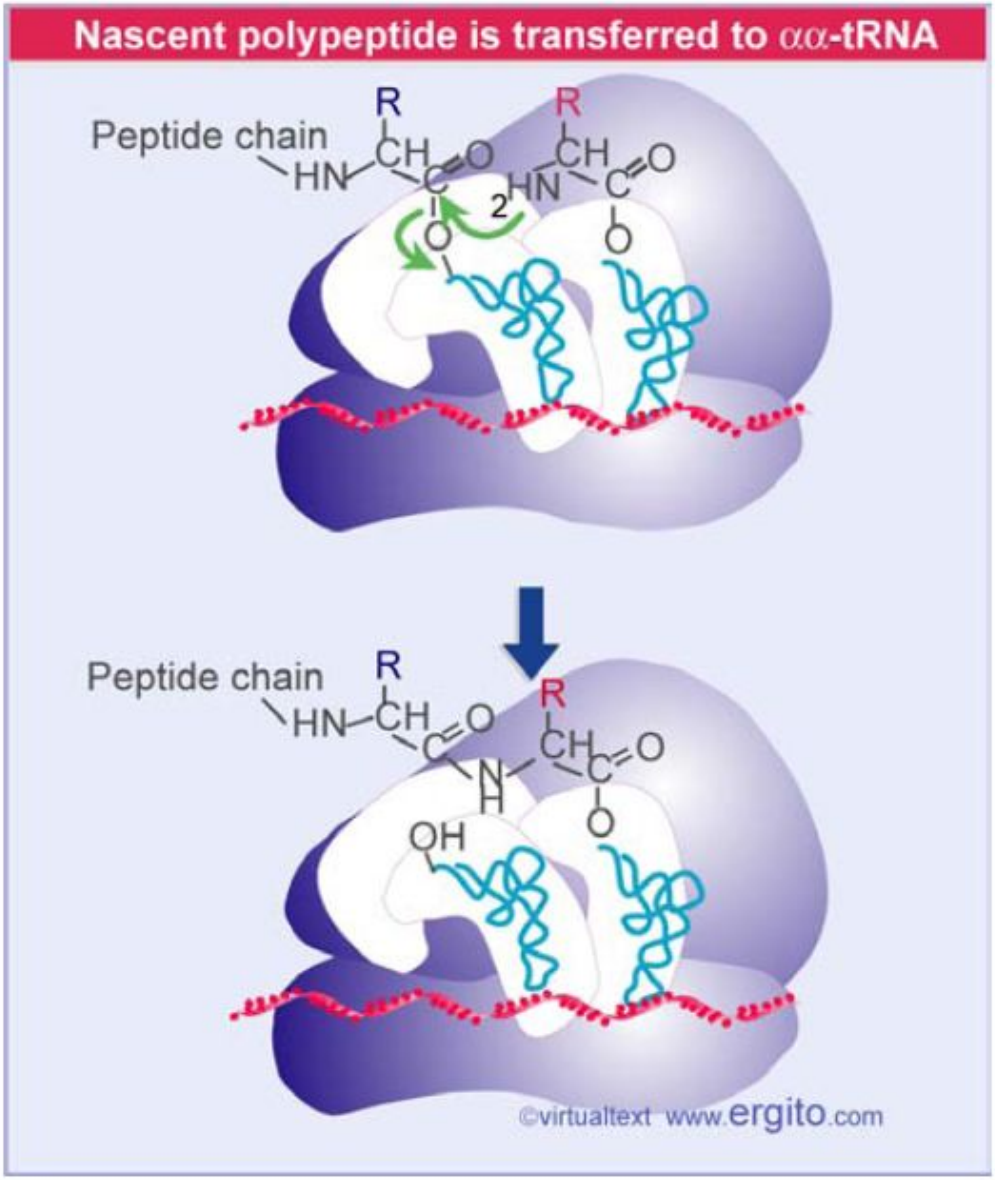
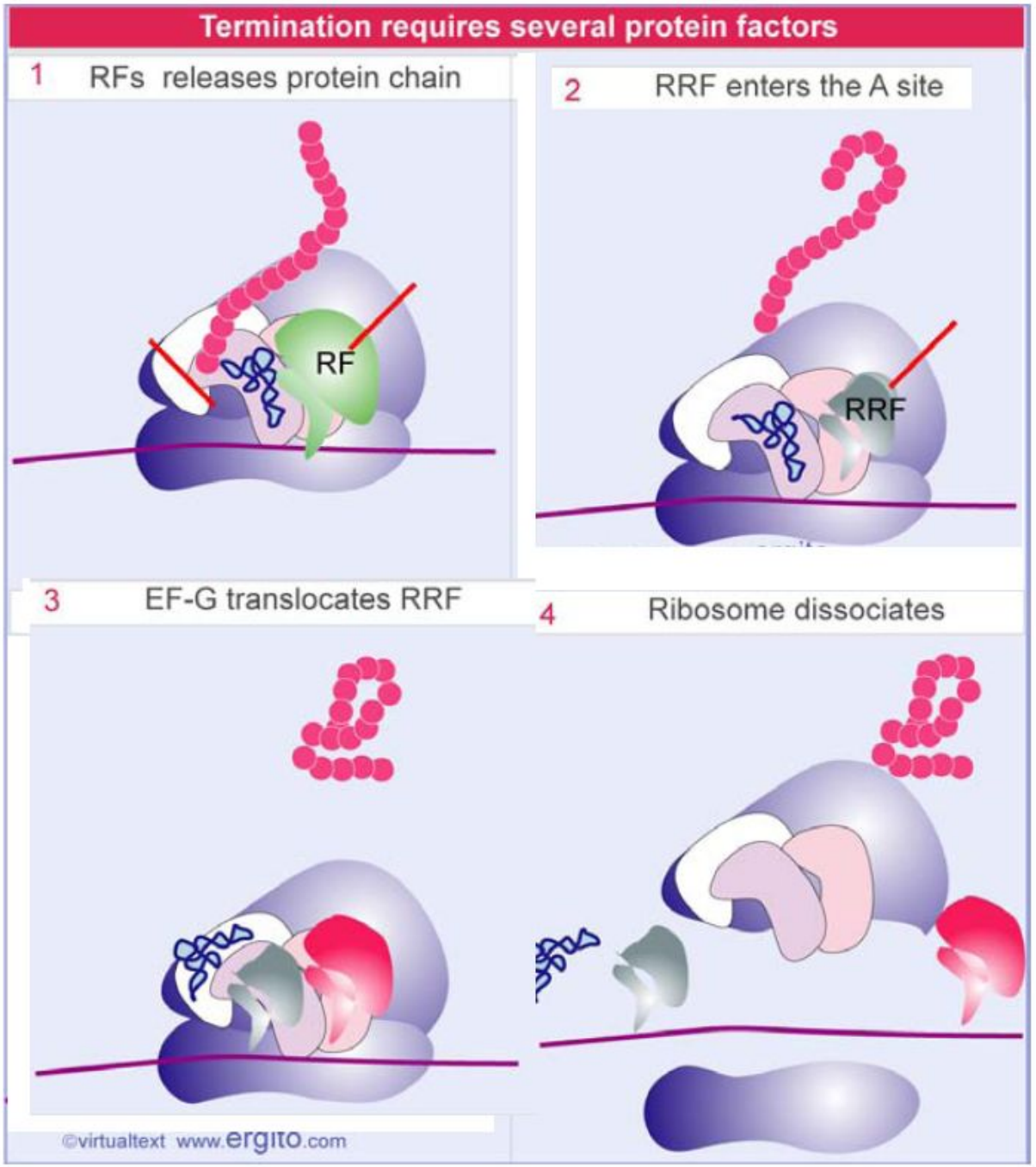


Figure 6.26 Peptide bond formation takes place by reaction between the polypeptide of peptidyl-tRNA in the P site and the amino acid of aminoacyl-tRNA in the A site.


Termination requires several protein factors
1 RFs releases protein chain
RF
2 RRF enters the A site
RRF
3 EF-G translocates RRF
4 Ribosome dissociates
©virtualtext www.ergito.com

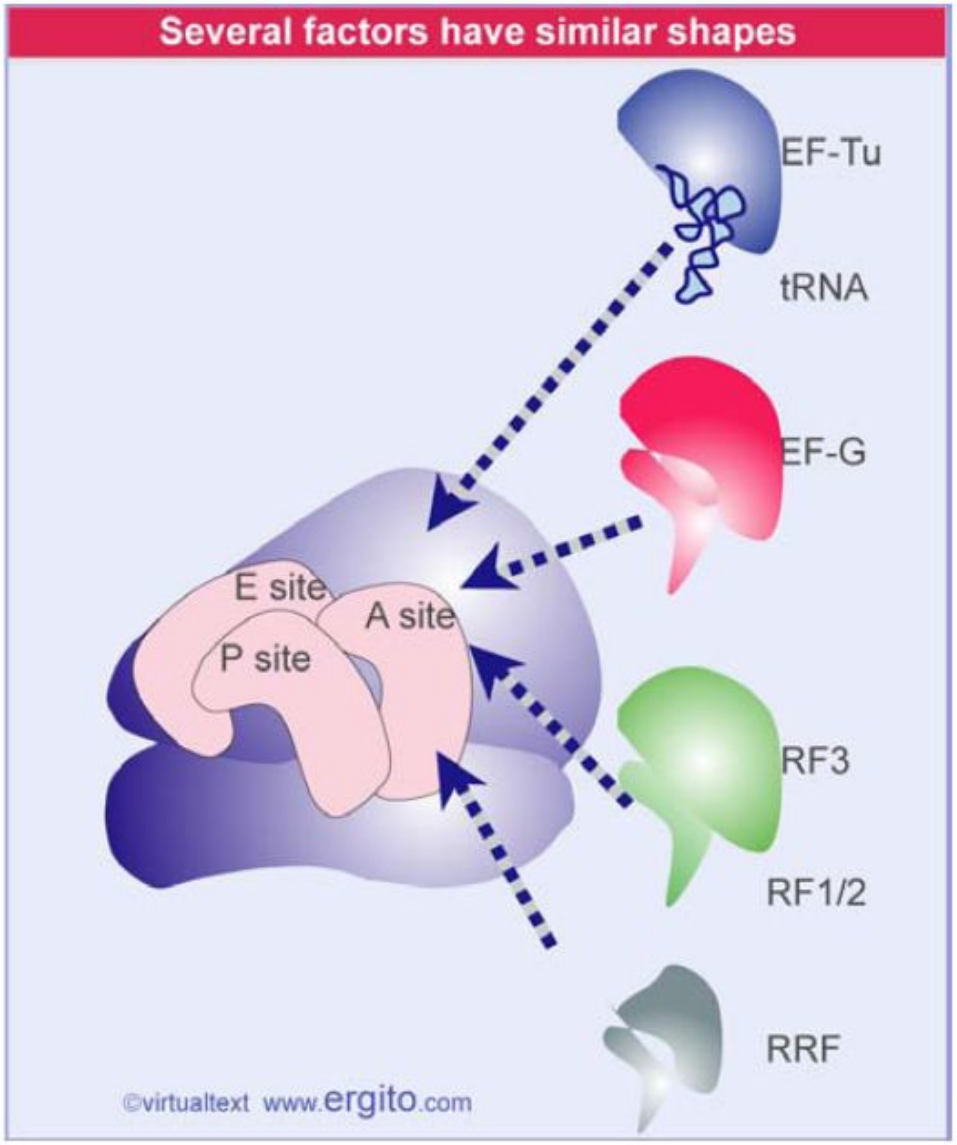


Figure 6.32 Molecular mimicry enables the elongation factor Tu-tRNA complex, the translocation factor EF-G, and the release factors RF1/2-RF3 to bind to the same ribosomal site.

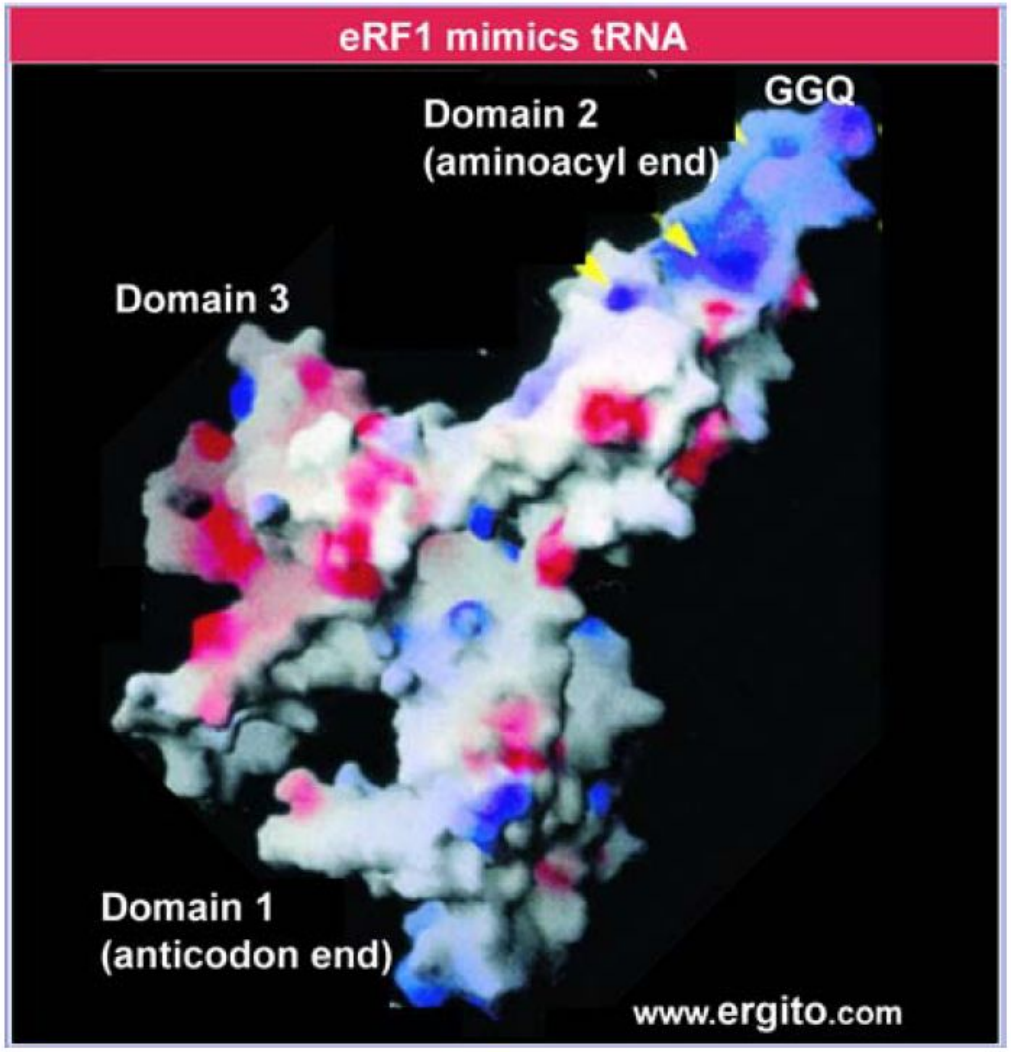


Figure 6.33 The eukaryotic termination factor eRF1 has a structure that mimics tRNA. The motif GGQ at the tip of domain 2 is essential for hydrolyzing the polypeptide chain