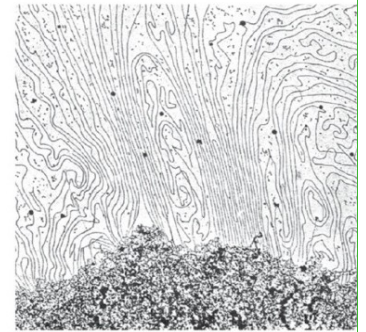




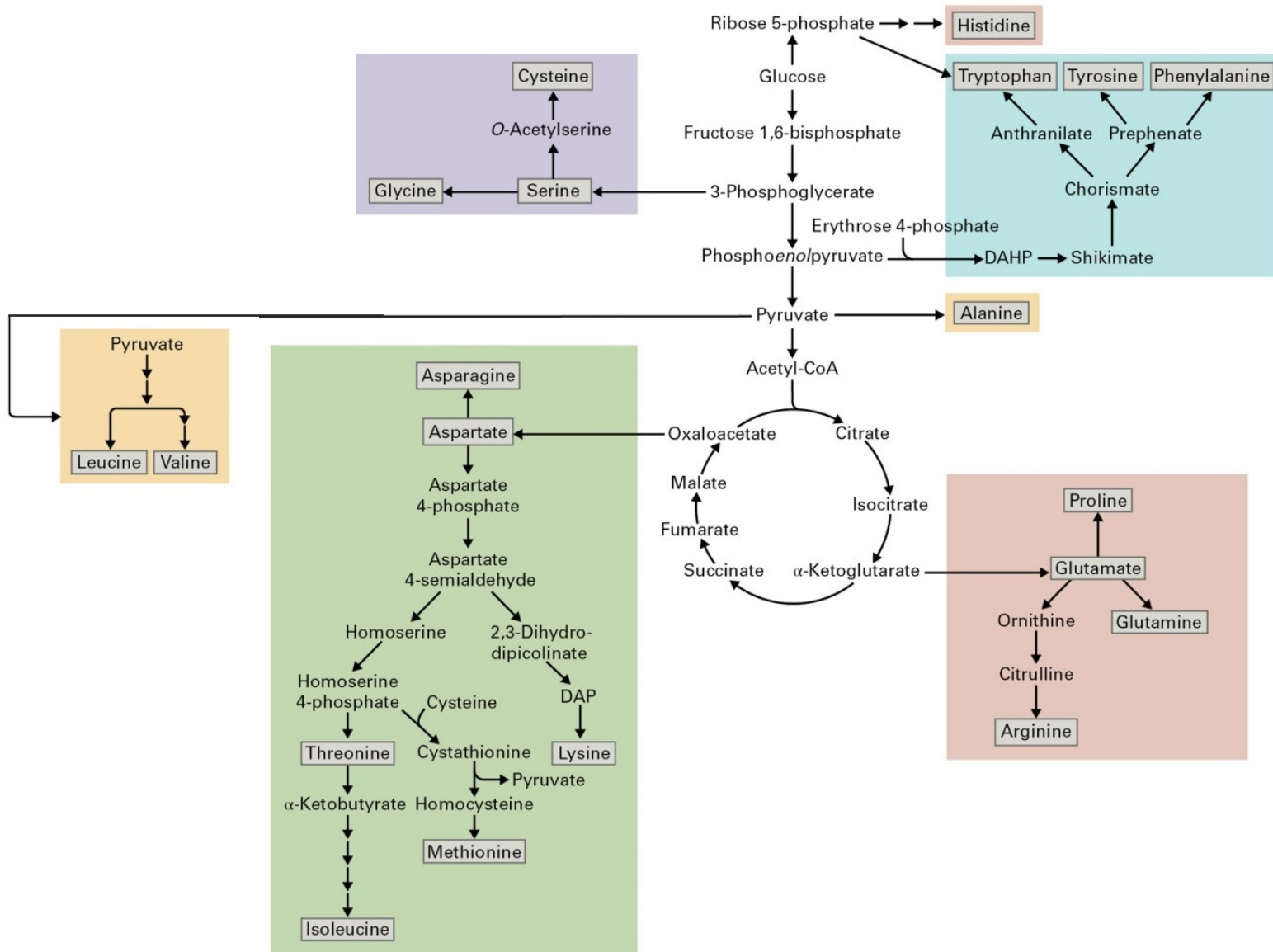
FACULTY
OF SCIENCE
Masaryk University



Genes and Proteins

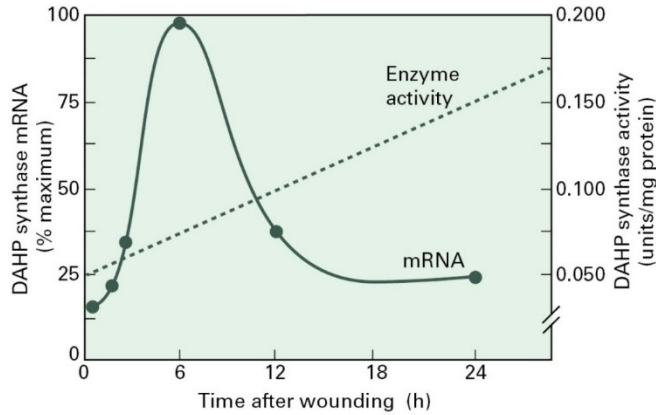
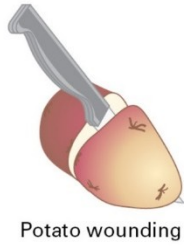


Amino acids

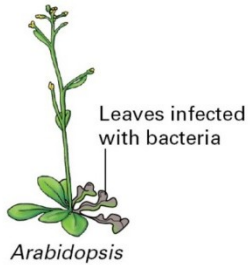


Aromatic amino acids

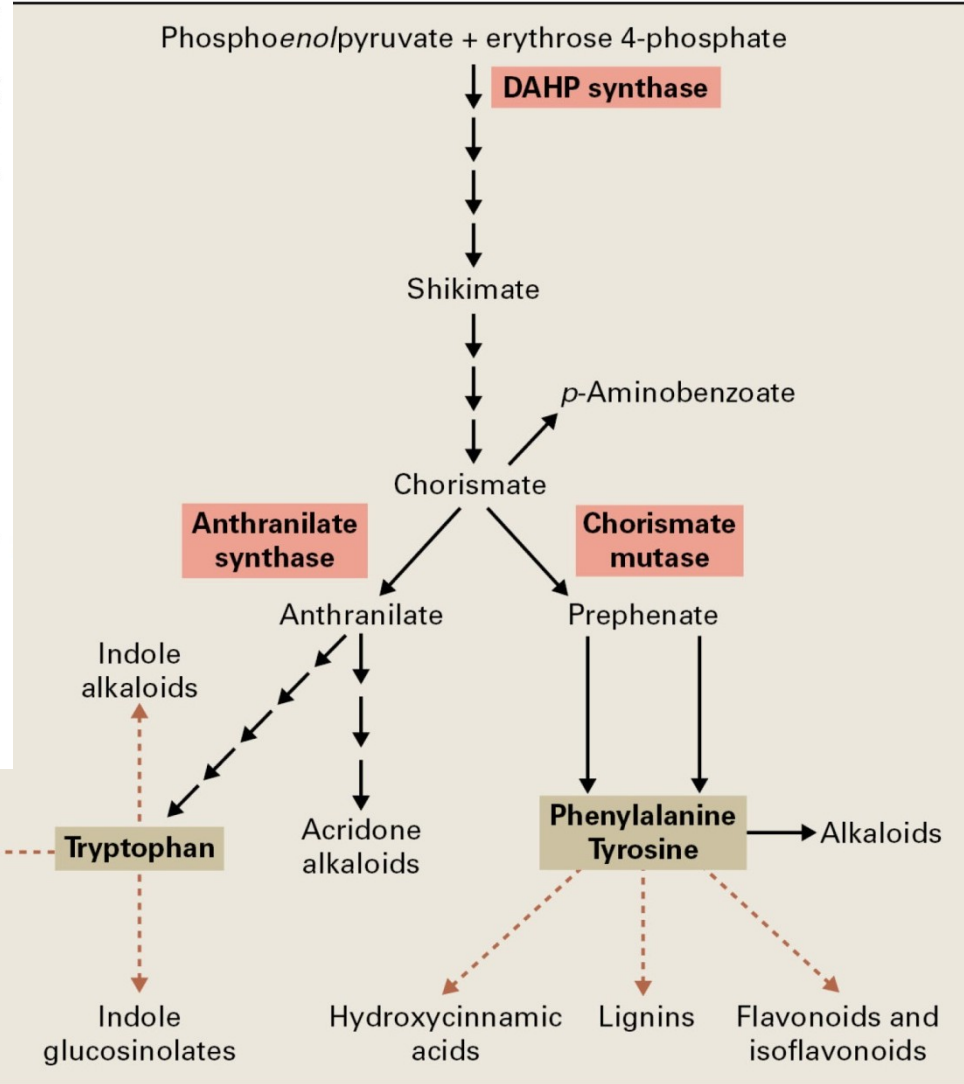
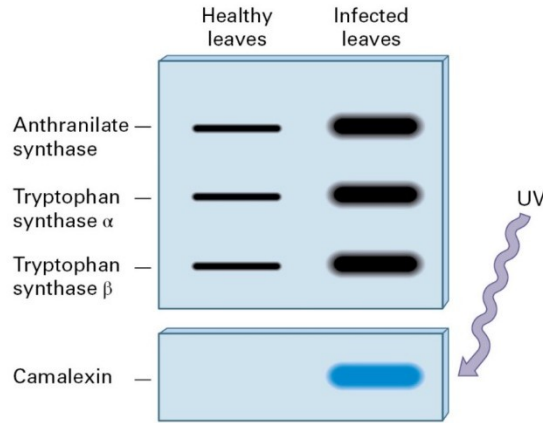
Synthesis of aromatic amino acids



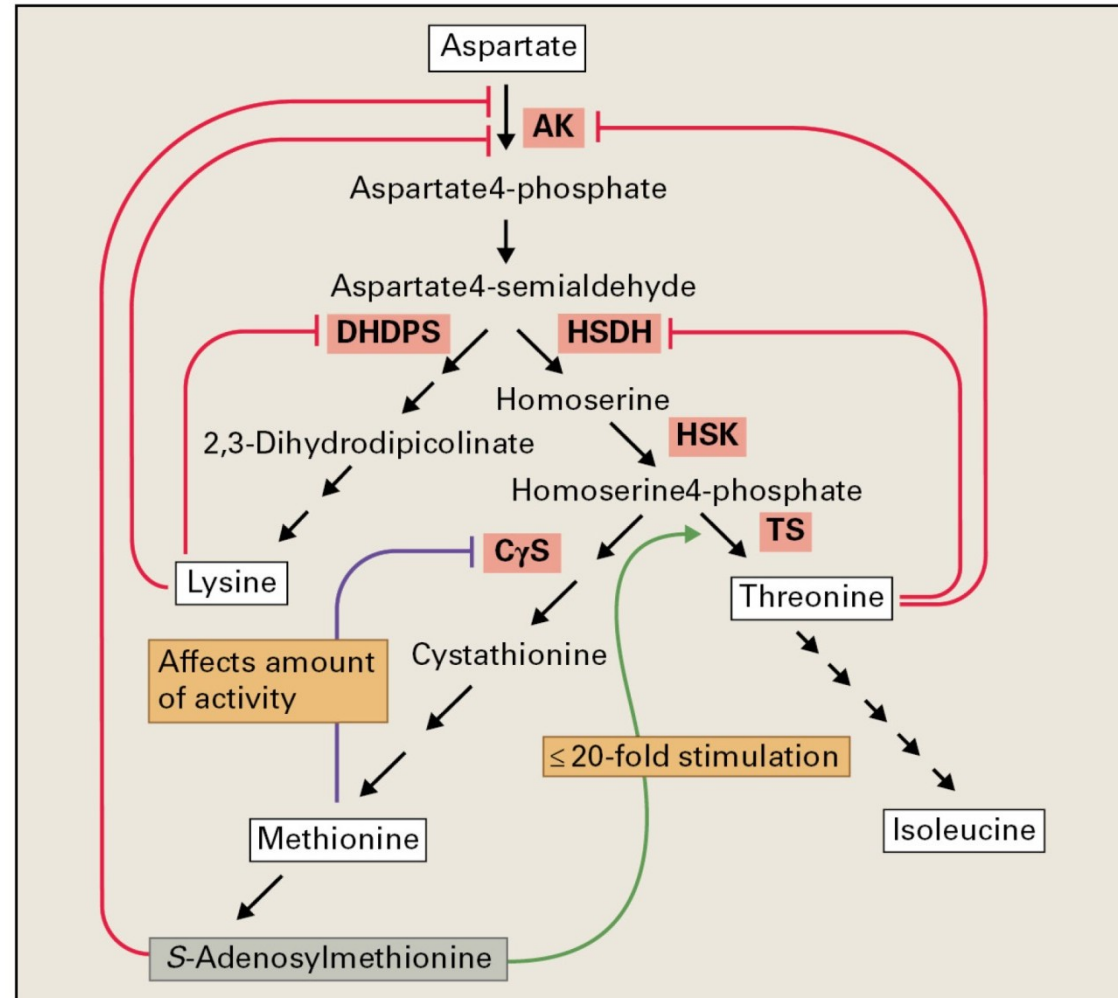
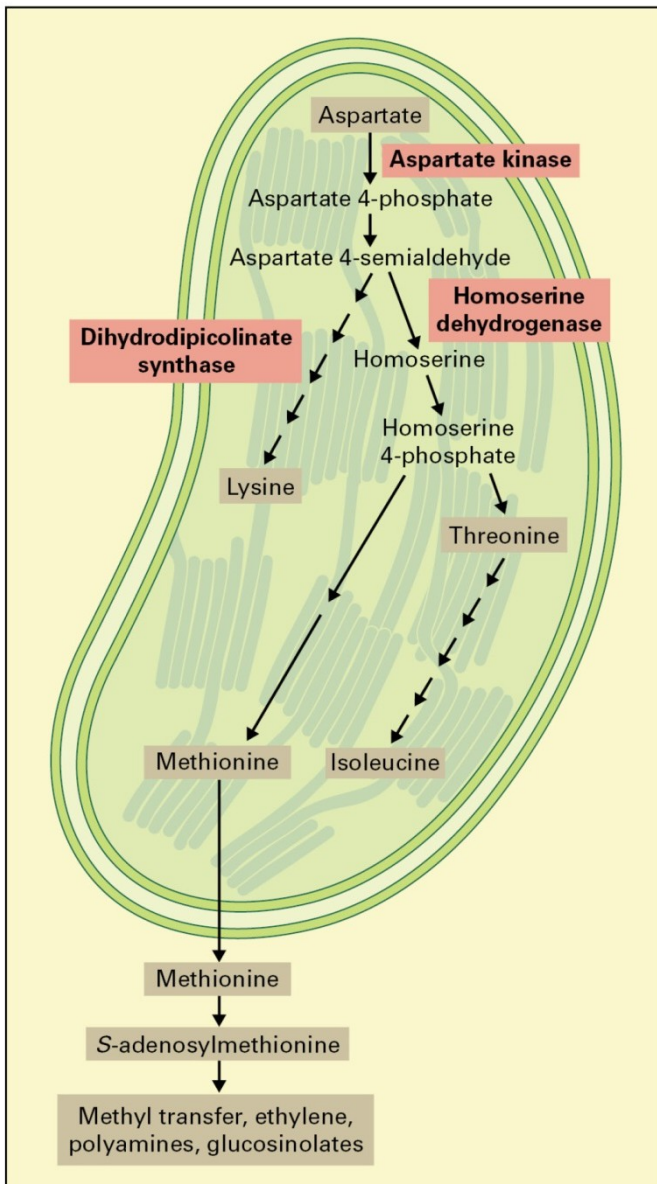
A



B

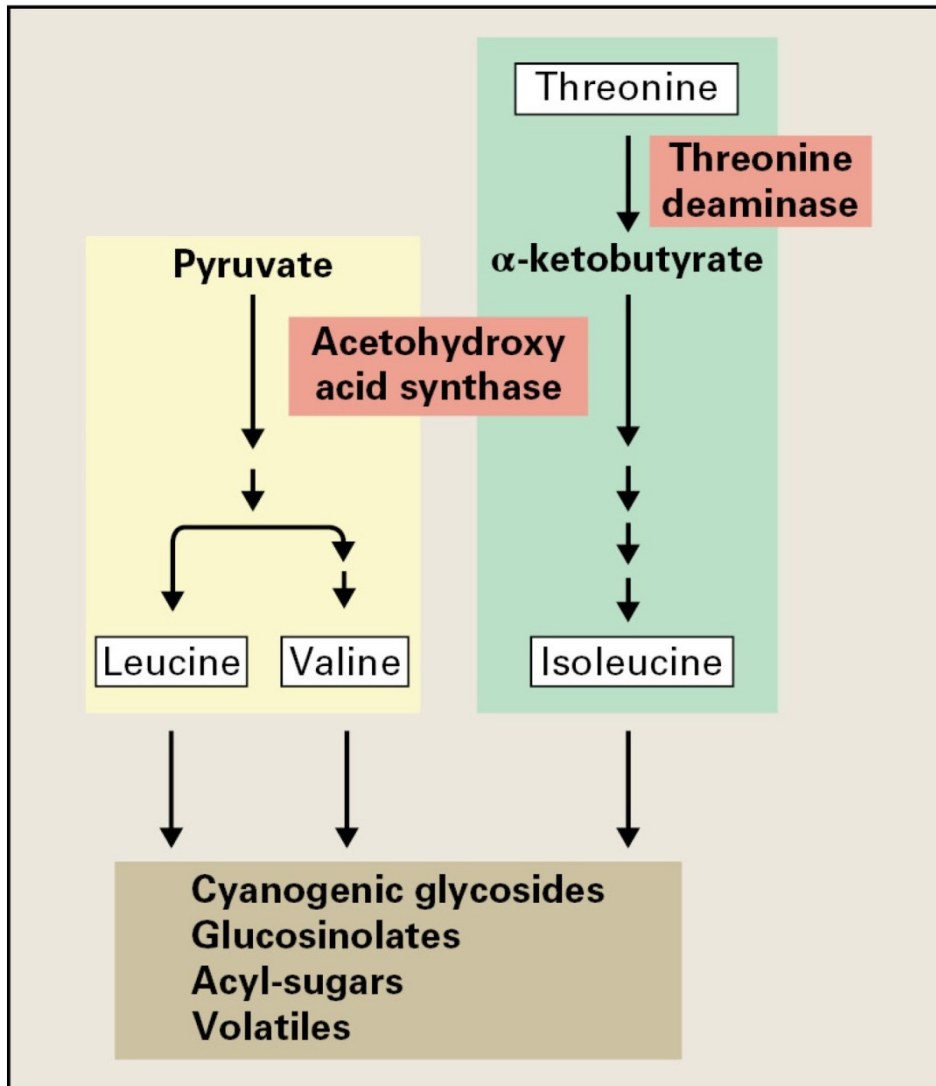


Aspartate-derived amino acids

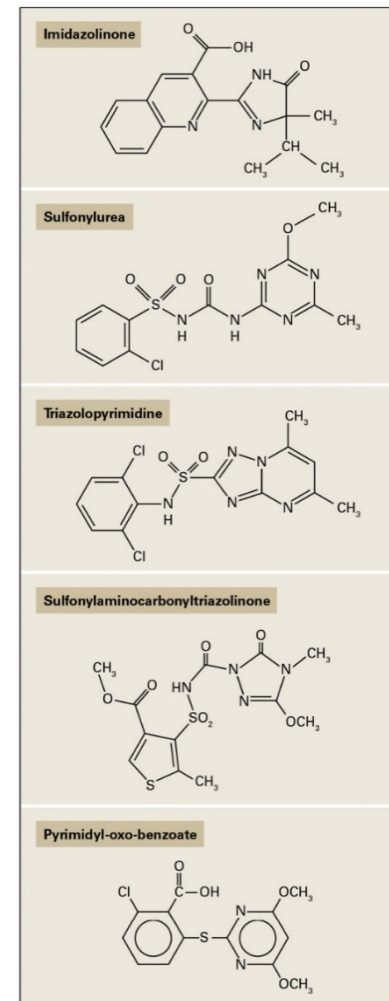


Regulation of threonine, lysine, and methionine synthesis

Branched-chain amino acids

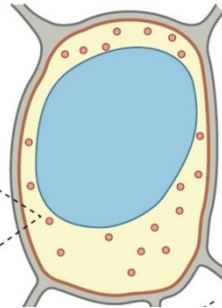


Examples of herbicides that inhibit acetohydroxyacid synthase

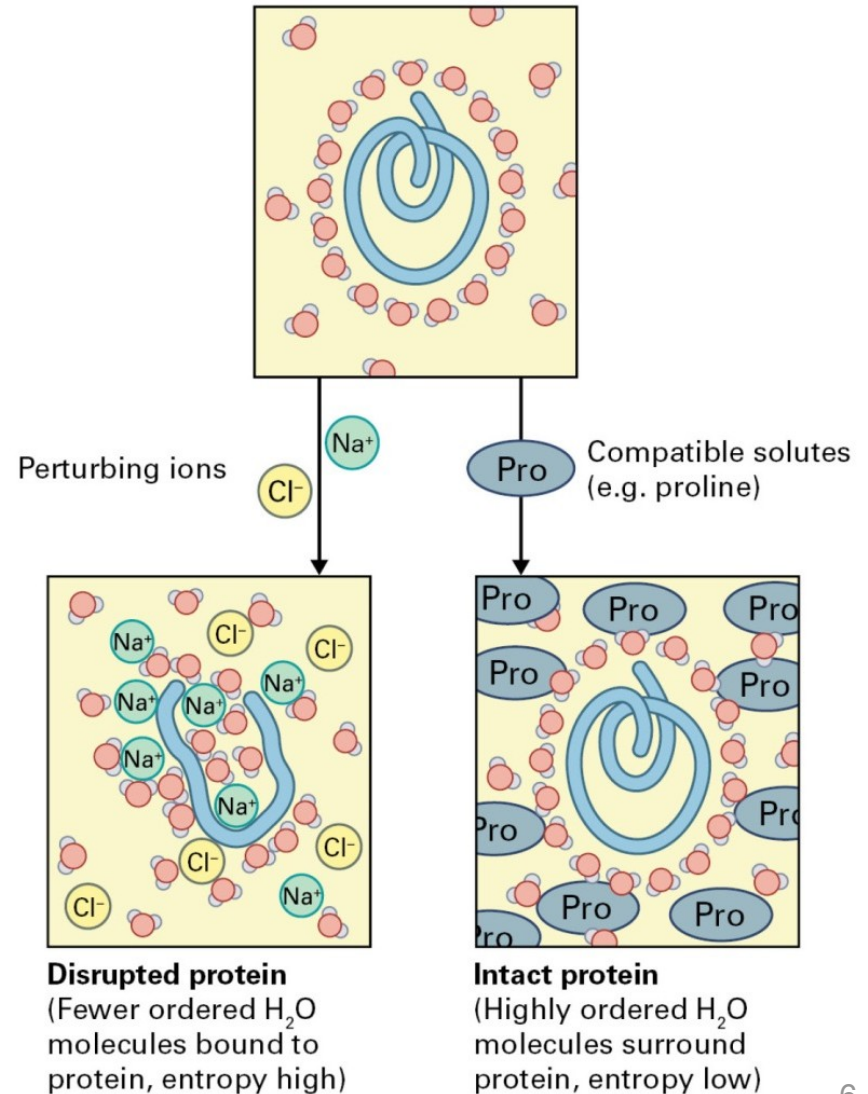
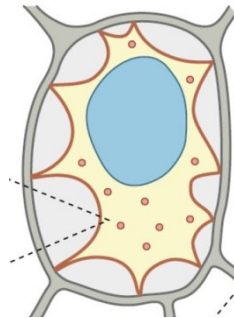


Glutamate-derived amino acids

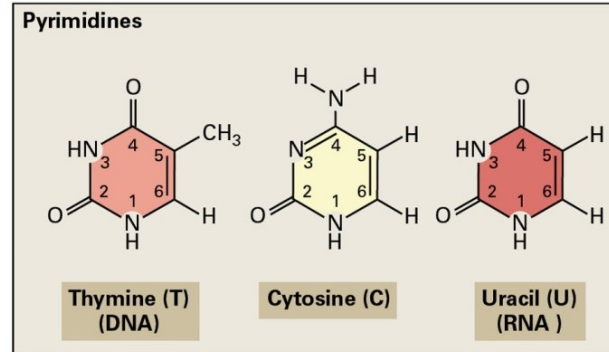
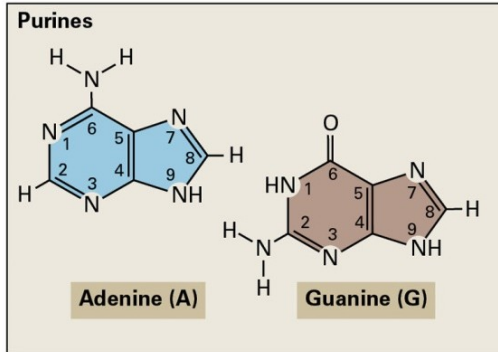
Osmotic adjustment



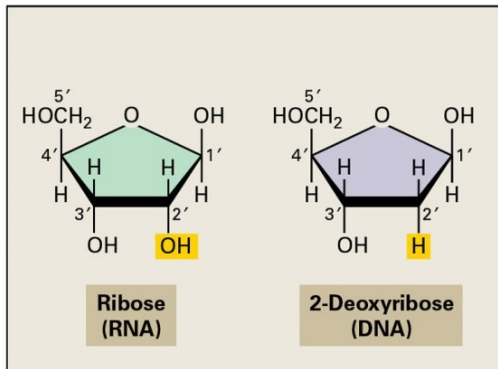
No osmotic adjustment



Nucleic acids

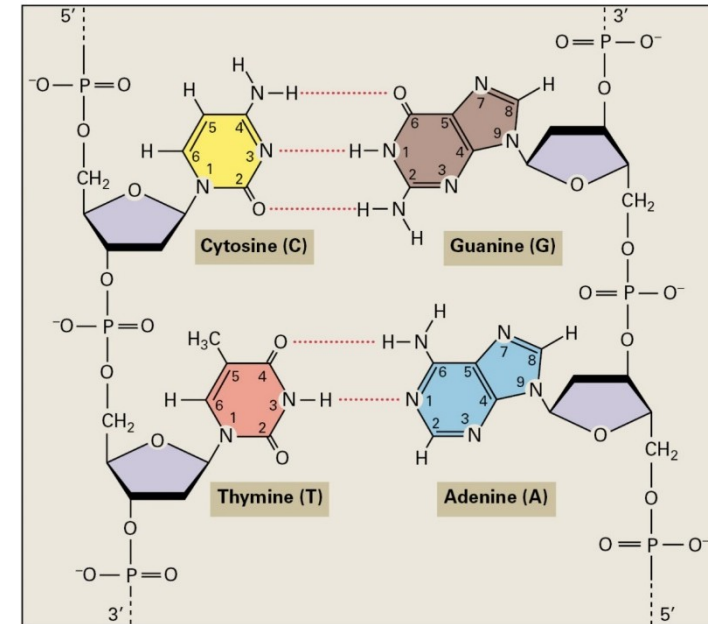
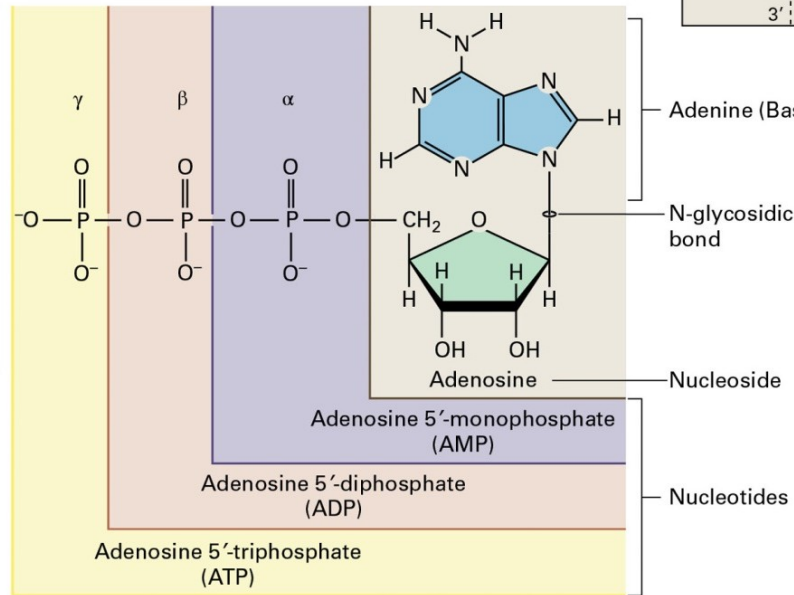


A Bases

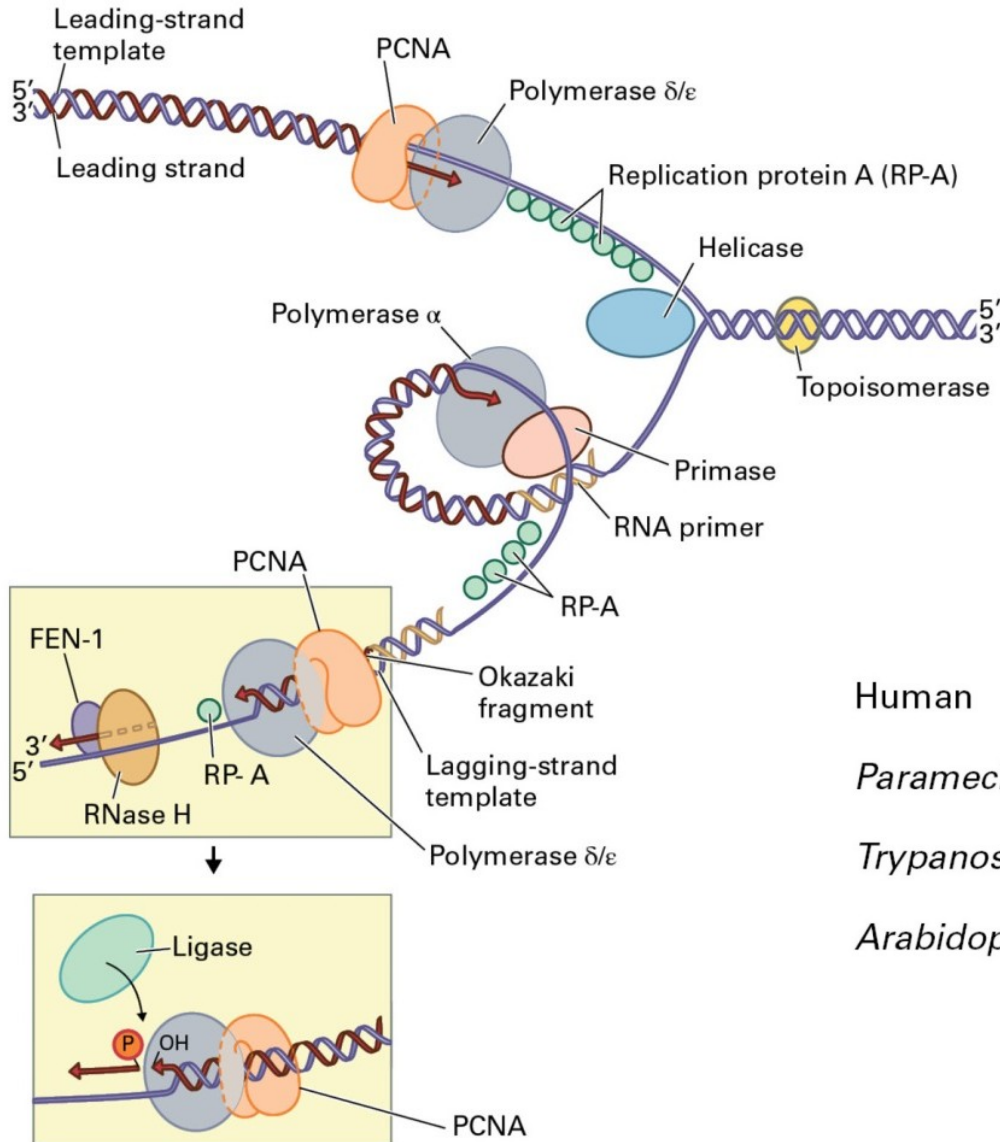


B Pentose sugars

The chemical composition of nucleic acids



Replication of nuclear DNA



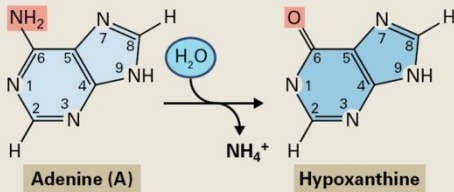
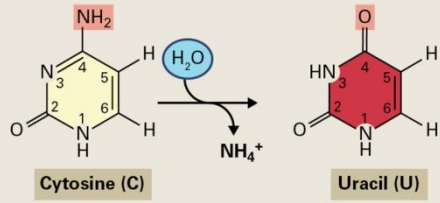
Telomere sequences are conserved

| | |
|--------------------|---------------------------------|
| Human | TTAGGGTTAGGGTTAGGGTTAGGG |
| <i>Paramecium</i> | TTGGGGTTGGGGTTGGGGTTGGGG |
| <i>Trypanosoma</i> | TTAGGGTTAGGGTTAGGGTTAGGG |
| <i>Arabidopsis</i> | TTTAGGGTTTAGGGTTTAGGG |

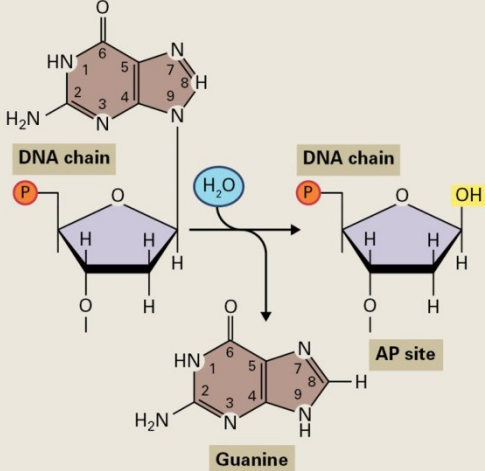
DNA repair

Spontaneous

Deamination

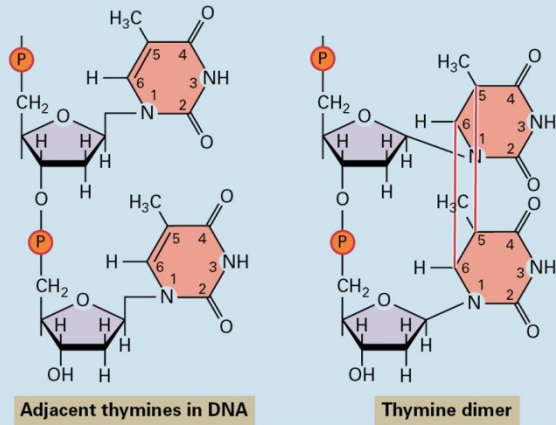


Depurination

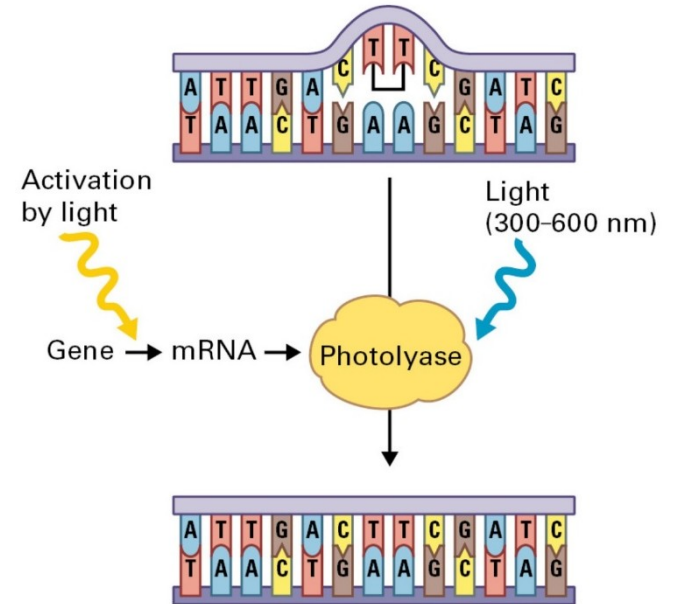
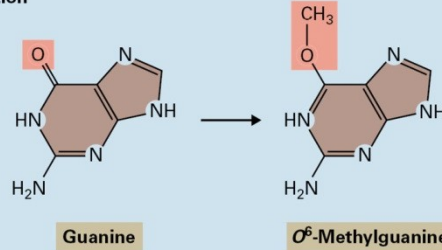


Induced

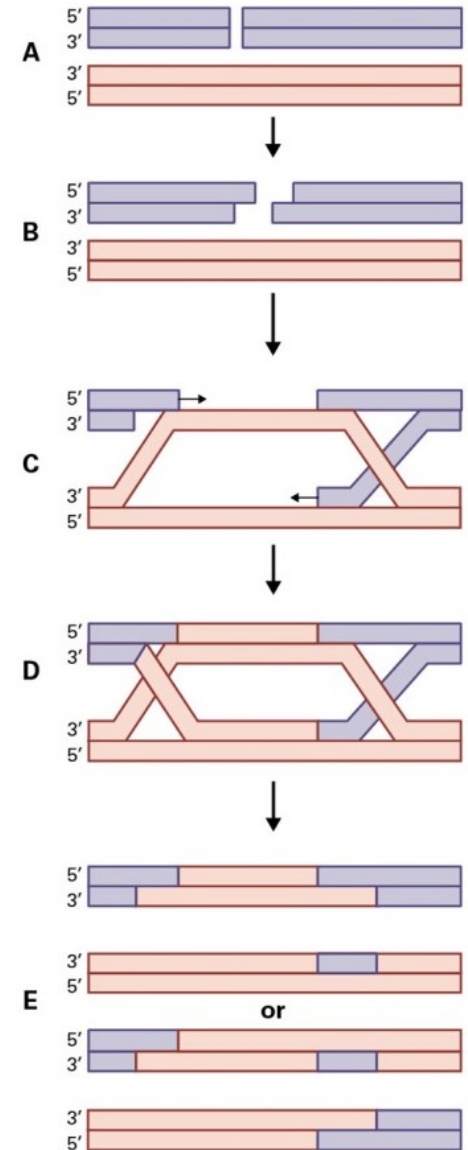
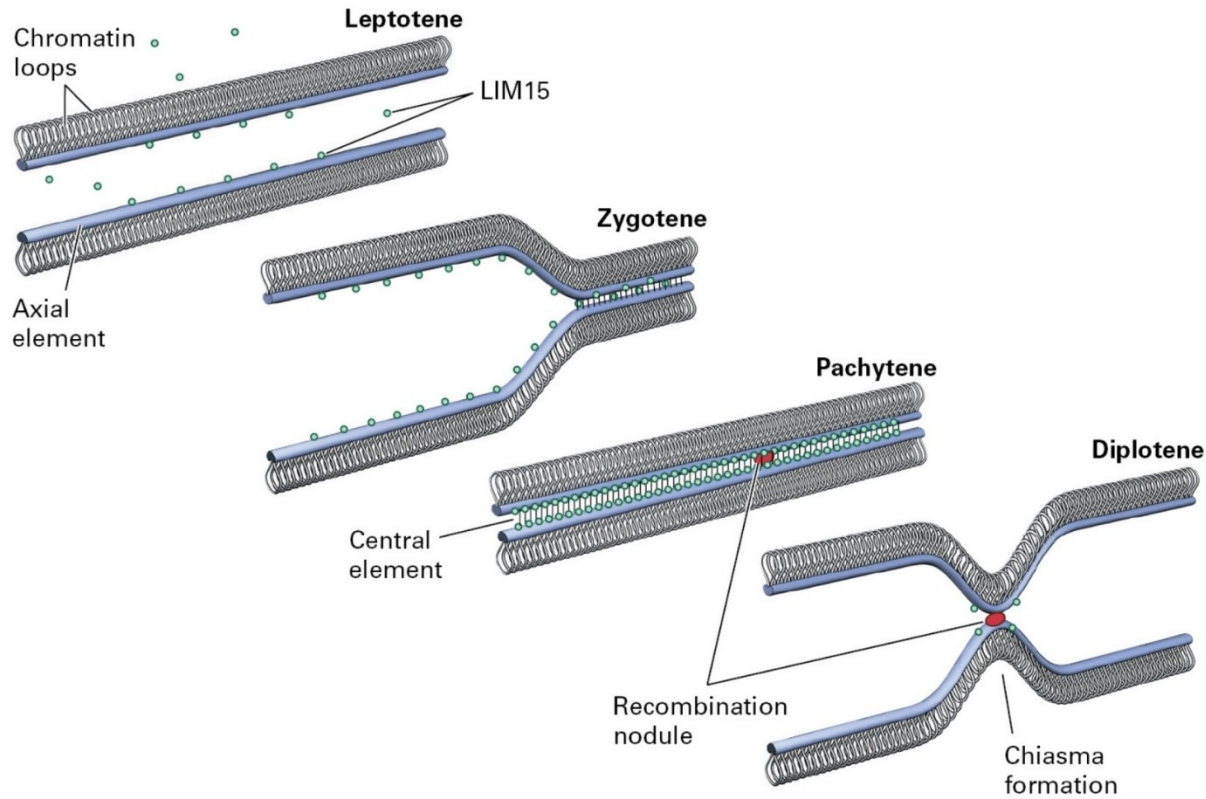
Exposure to UV light



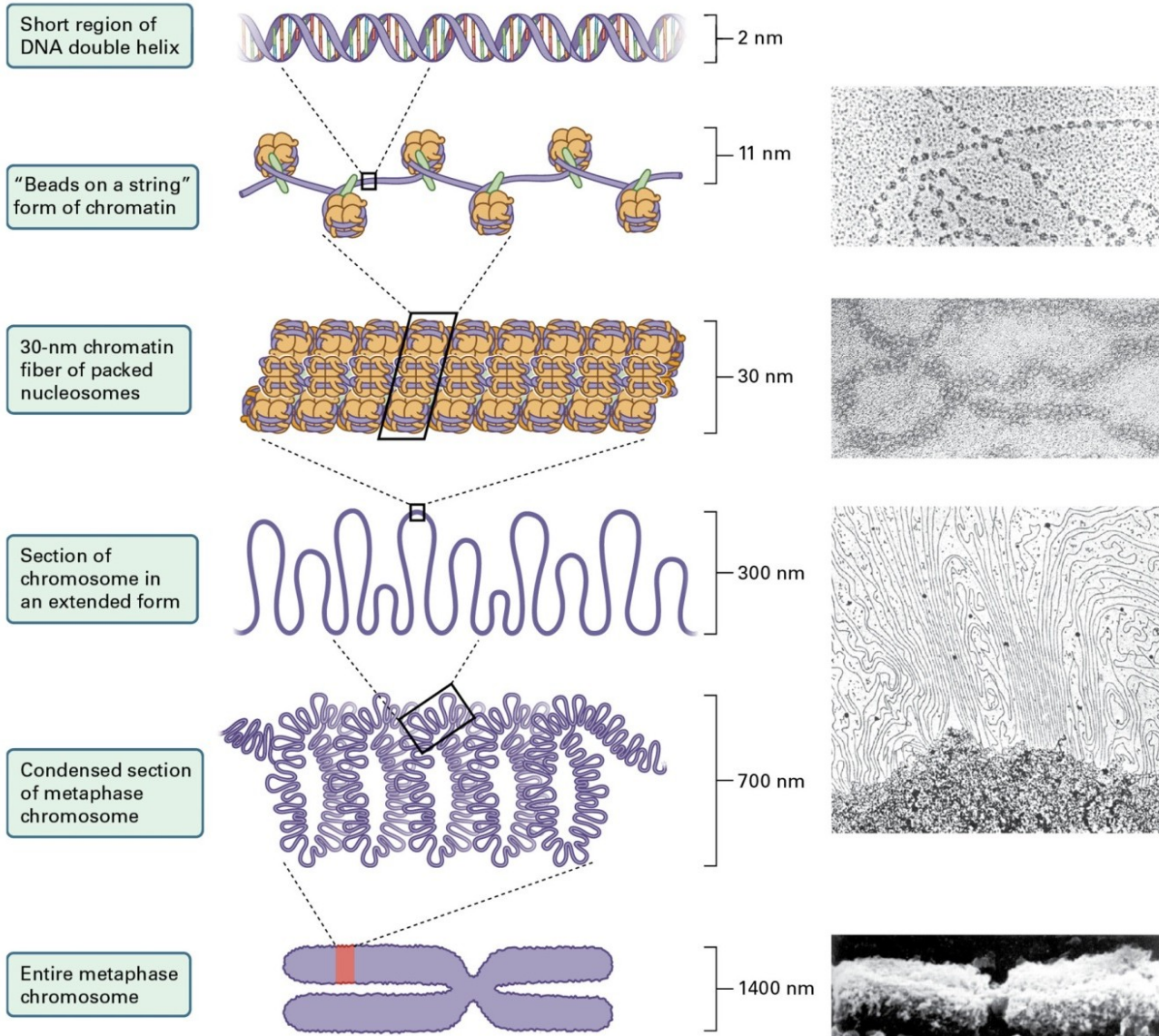
Alkylation



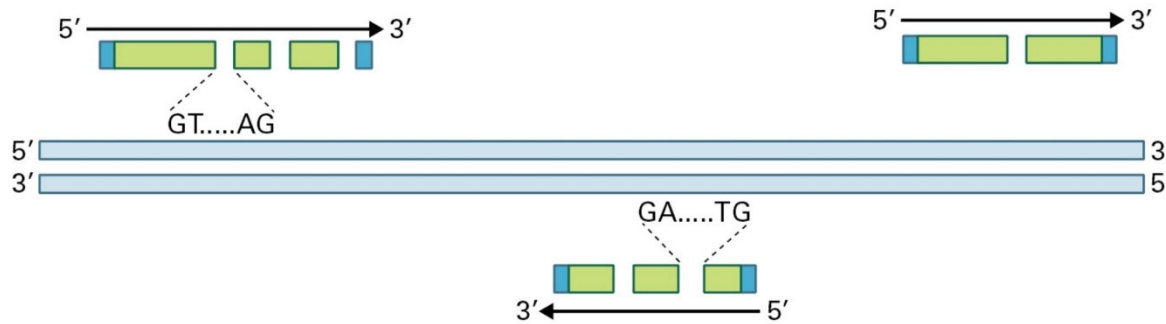
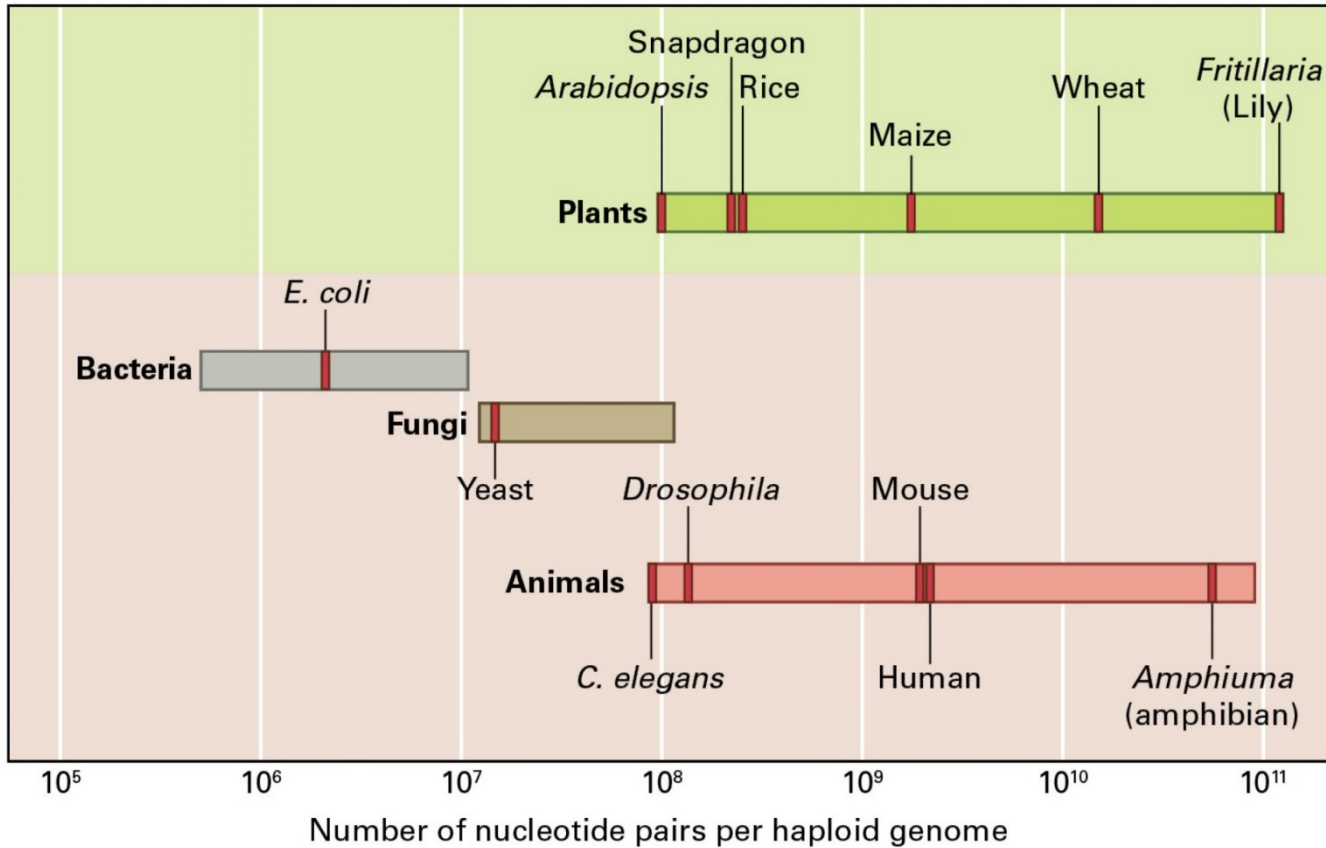
DNA recombination



Structure and organization of nuclear genome



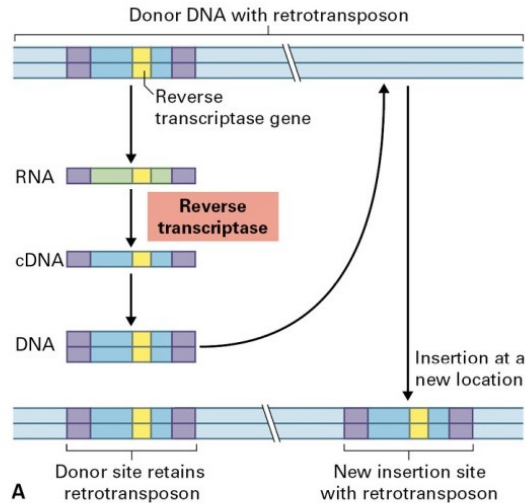
Structure and organization of nuclear genome



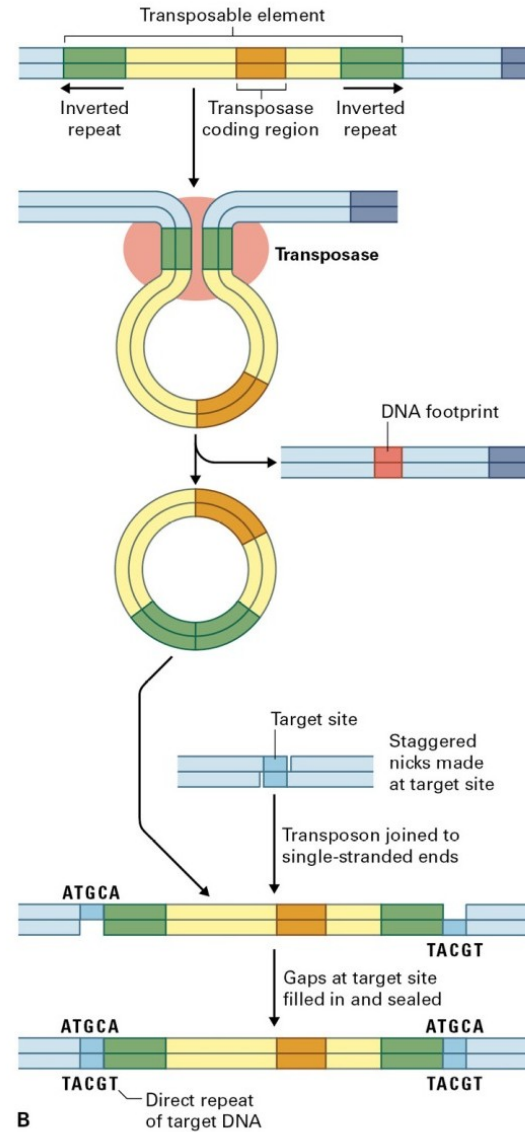
Genes are found on either DNA strand, but rarely in the same region on both strands.

Transposable elements

Mechanism of retrotransposon transposition



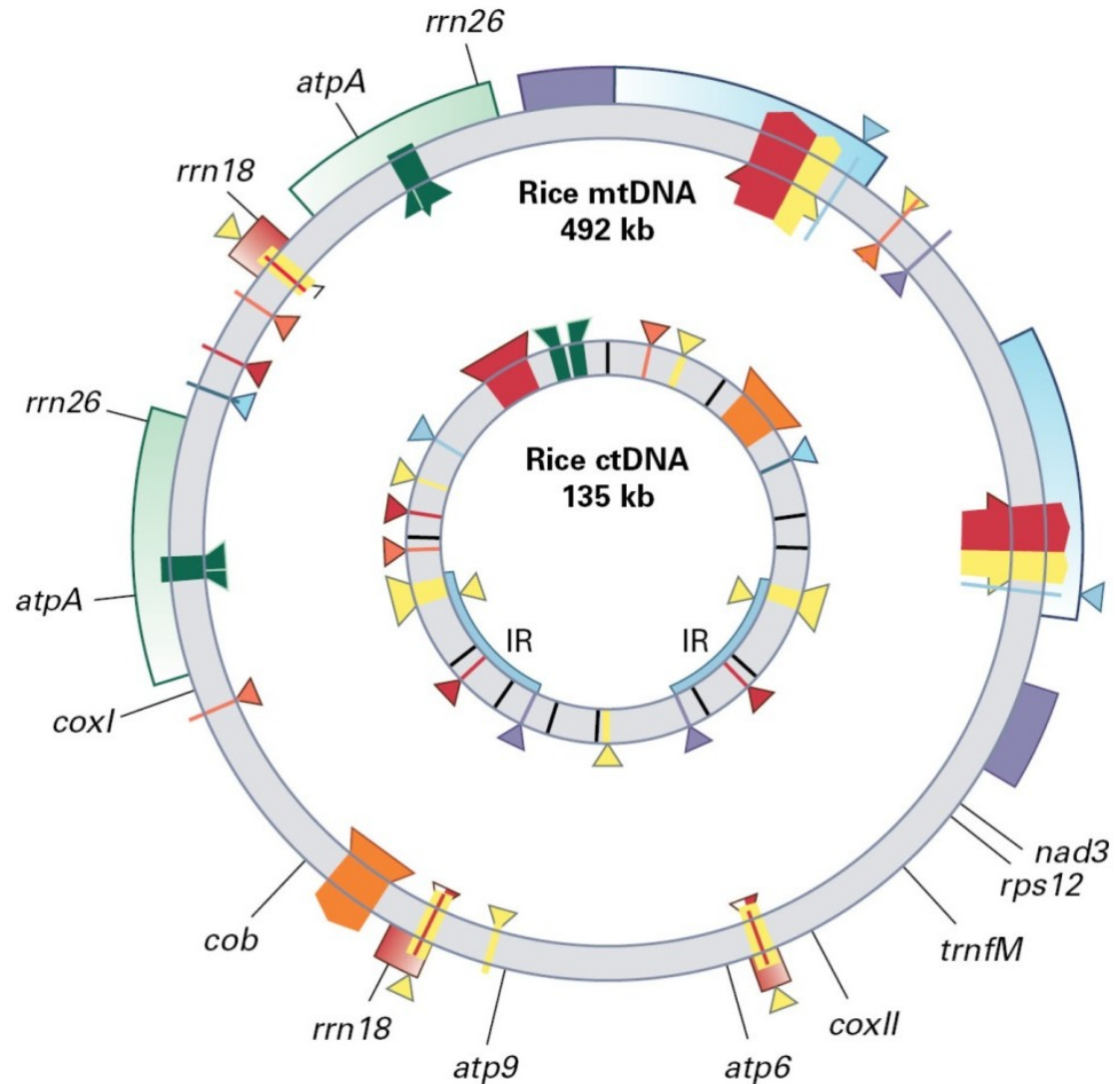
Structure and transposition of a class II transposable element



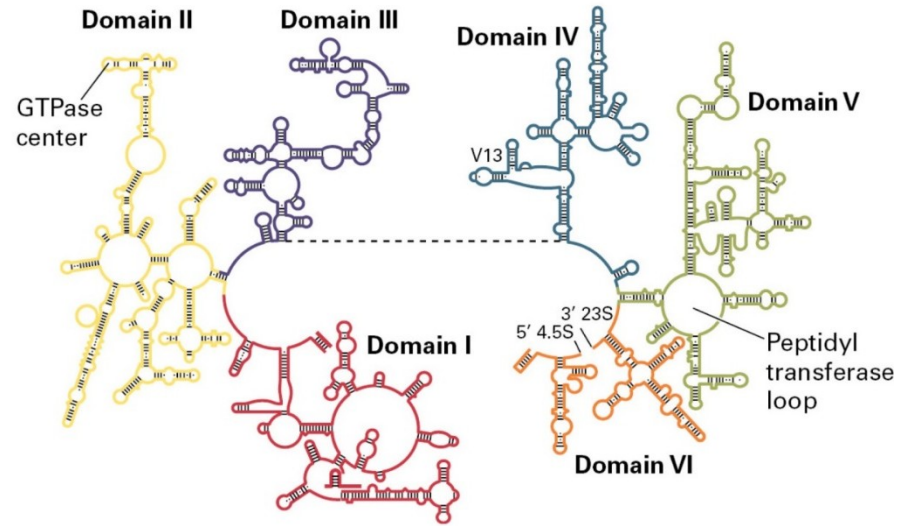
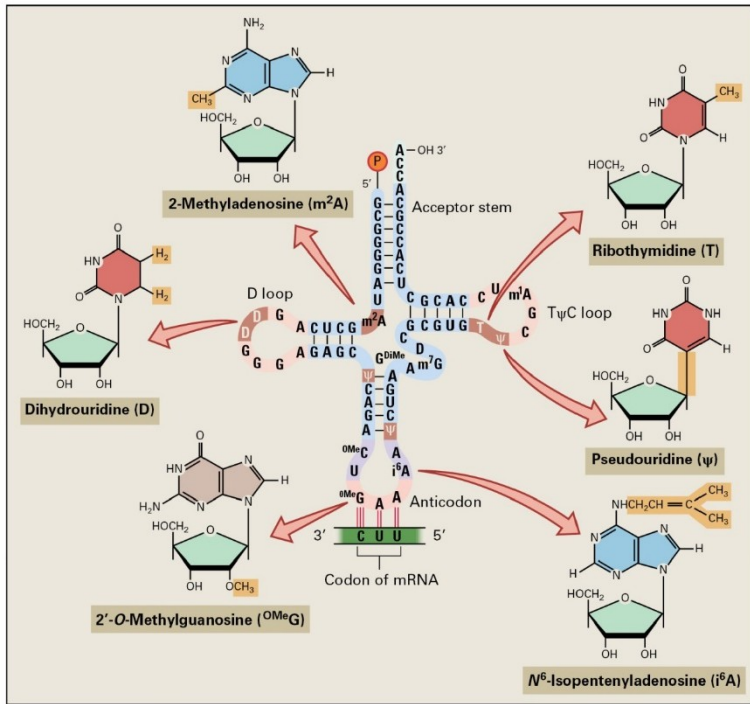
Organelar DNA

Comparison of mitochondrial and chloroplast DNA sequences from rice.

The colored boxes represent DNA sequences that have been transferred from chloroplast genome to the mitochondria.

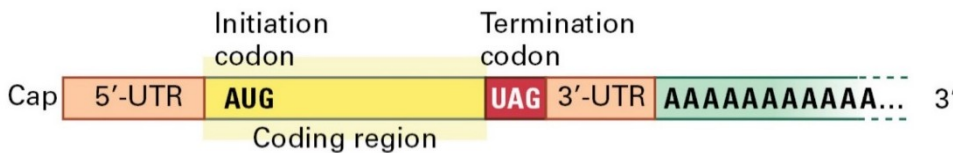


RNA



Ribosomal RNAs can fold into complex secondary structures by pairing of complementary sequences.

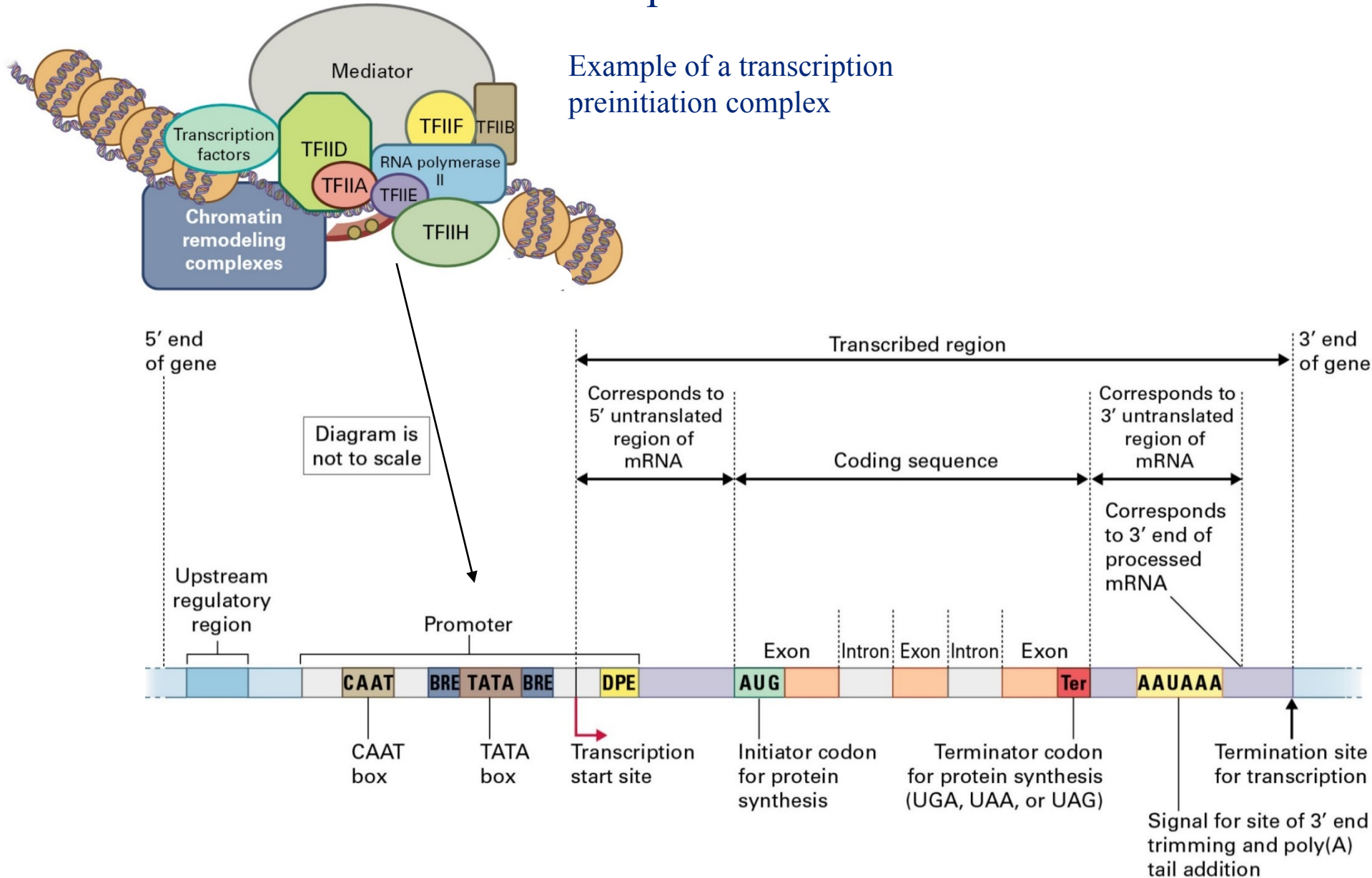
A notable feature of all tRNA molecules is the presence of unusual bases.



Structures of typical mature nuclear-encoded and chloroplast mRNAs differ.

Gene expression

Example of a transcription preinitiation complex

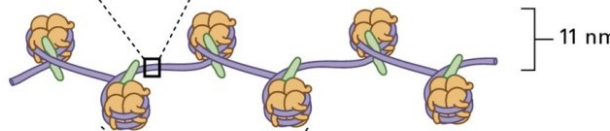


Chromatin and regulation of gene expression

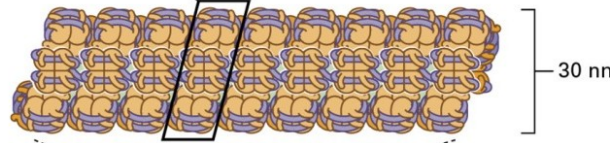
Short region of DNA double helix



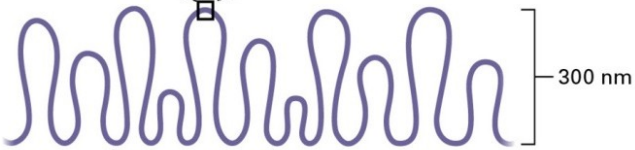
"Beads on a string" form of chromatin



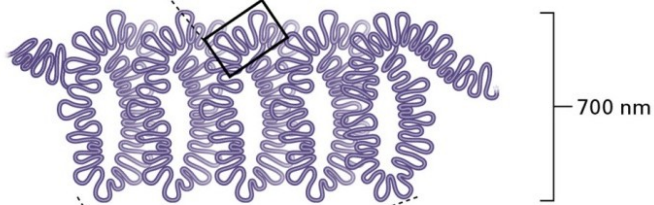
30-nm chromatin fiber of packed nucleosomes



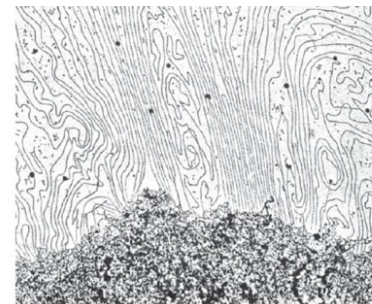
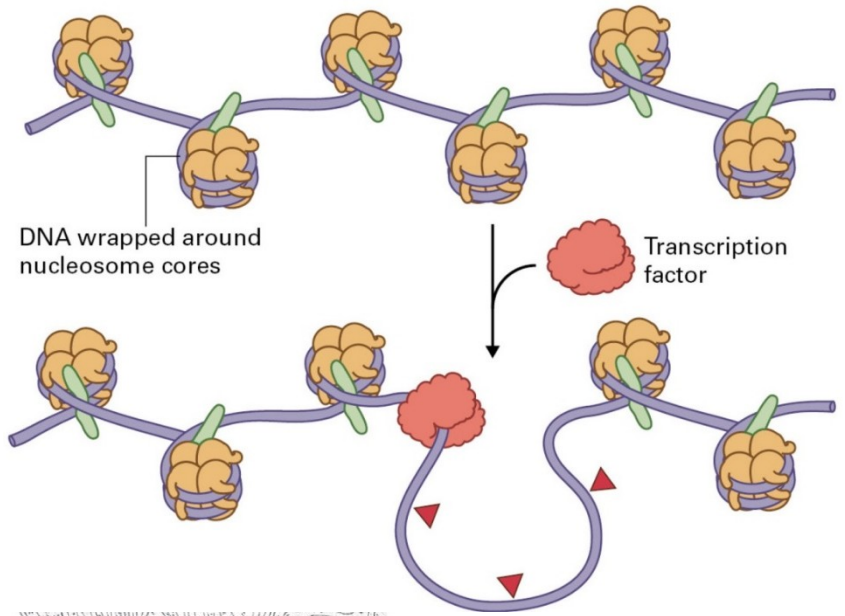
Section of chromosome in an extended form



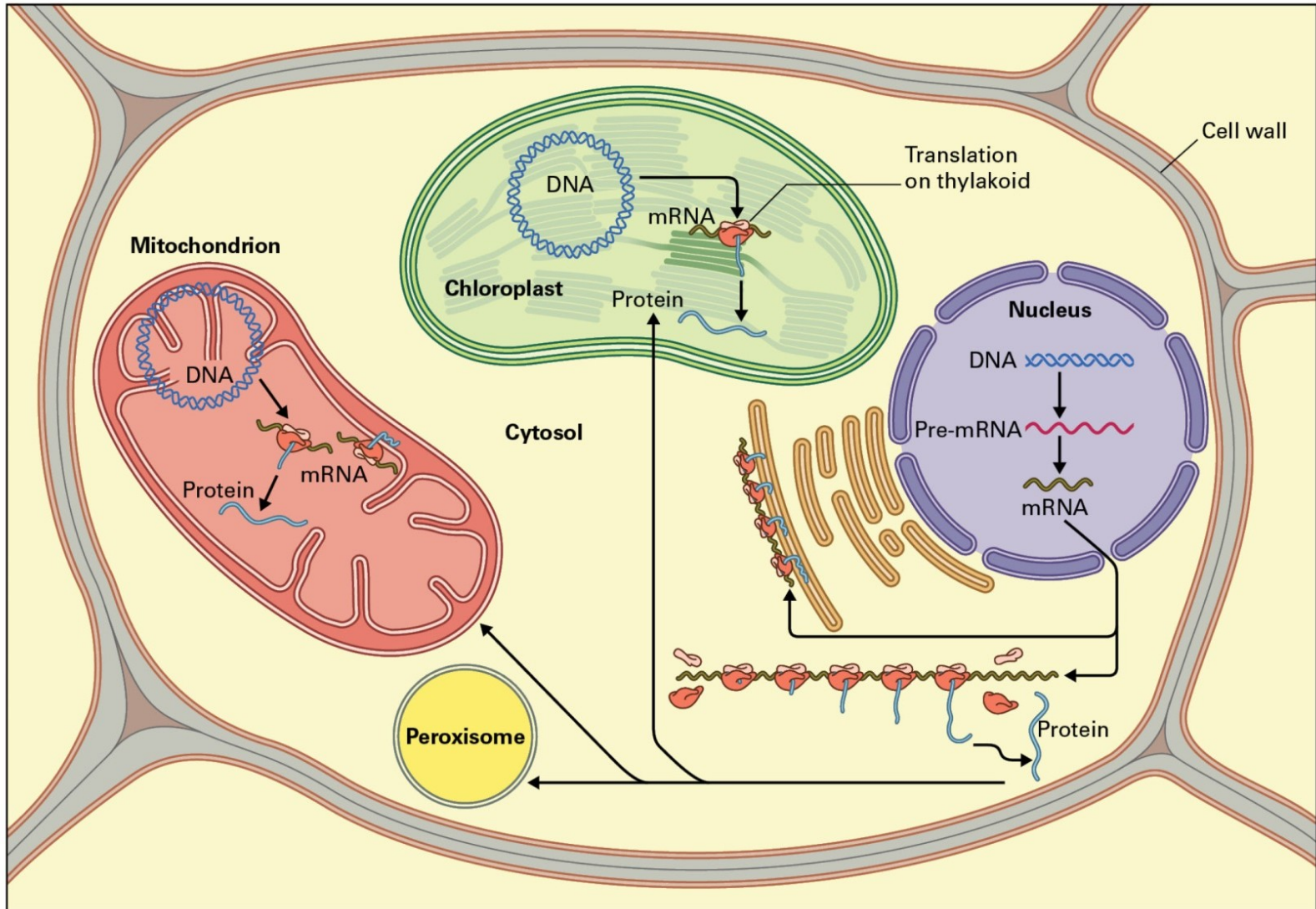
Condensed section of metaphase chromosome



Entire metaphase chromosome

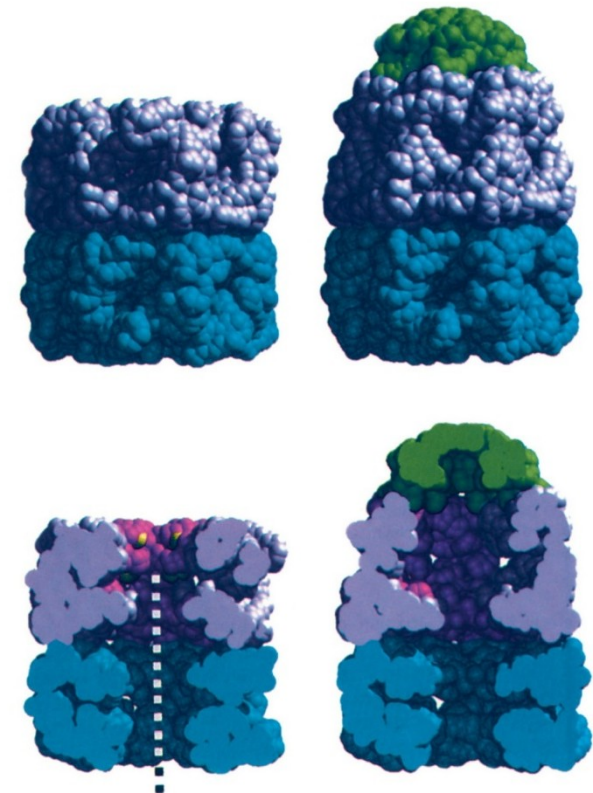
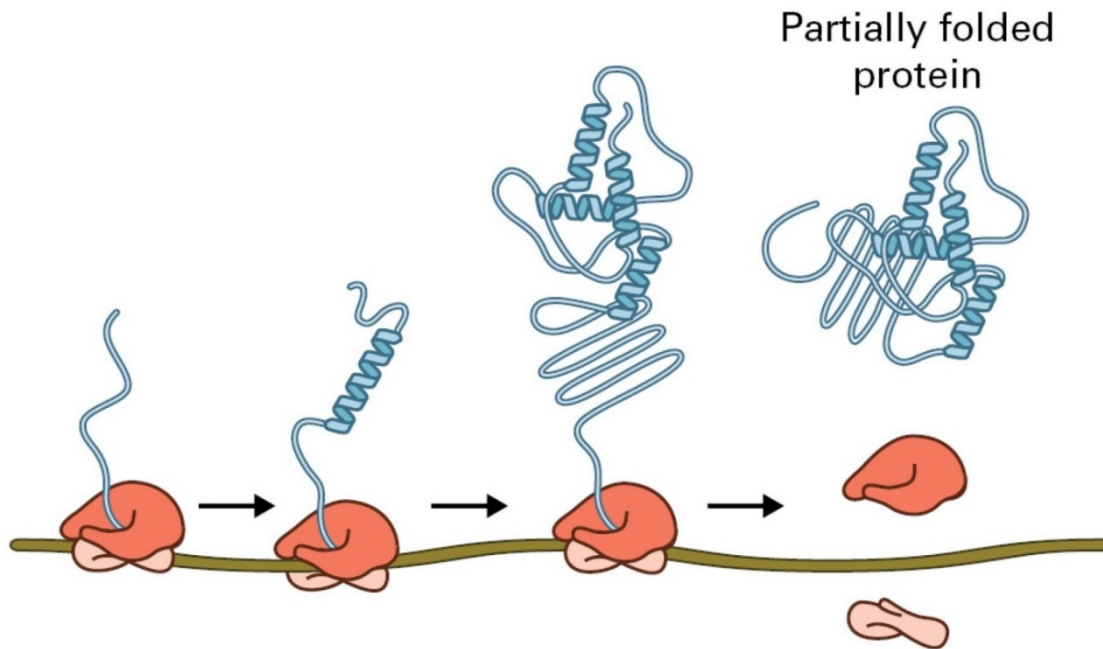


Protein synthesis

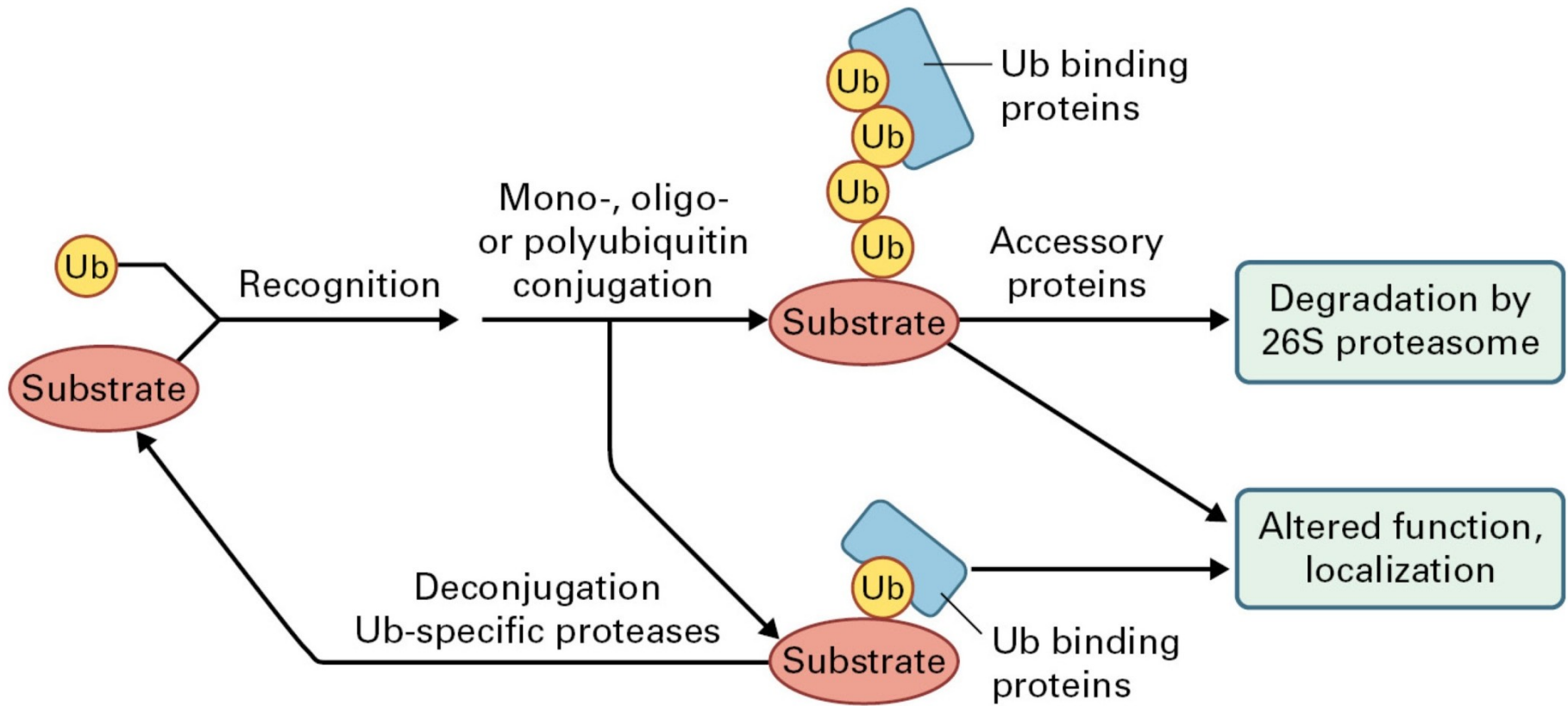


Post-translational modification of proteins

Structures of chaperonins illustrating the central cavity in which folding takes place



Protein degradation



Ubiquitin pathway