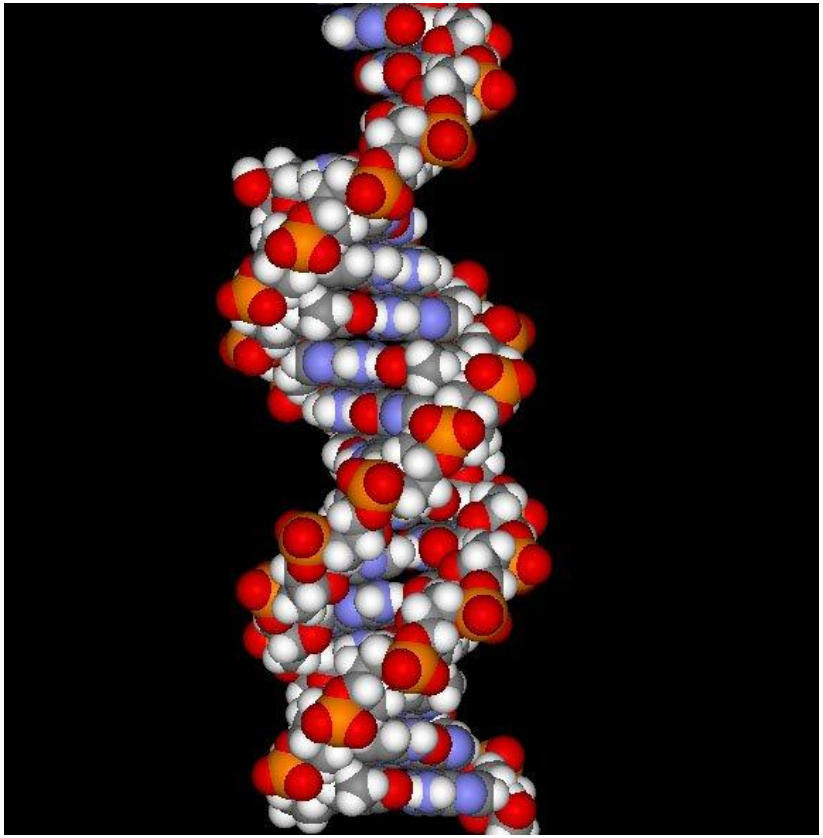
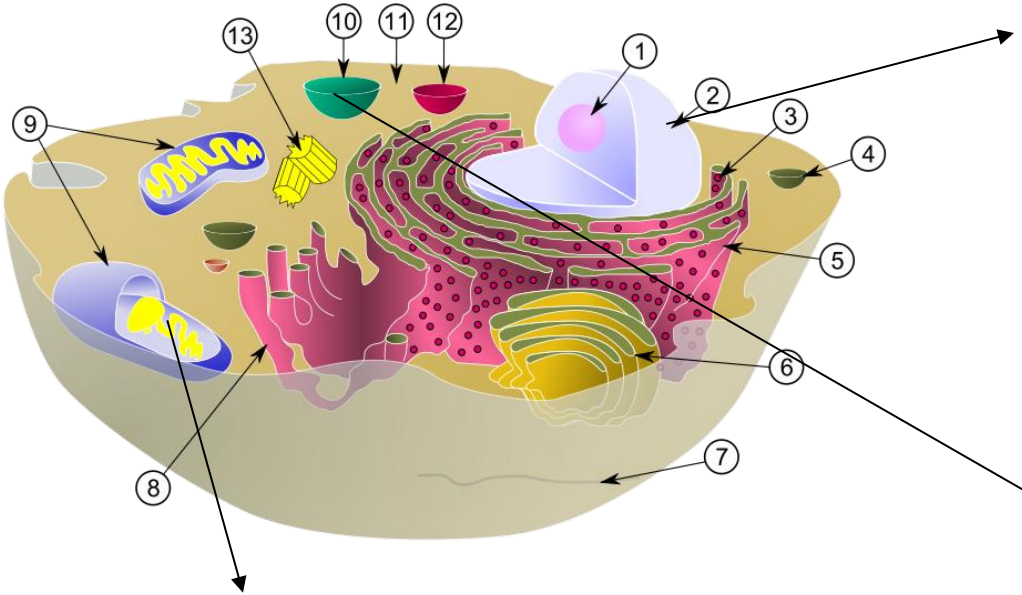
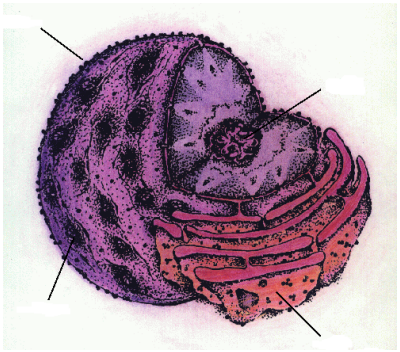
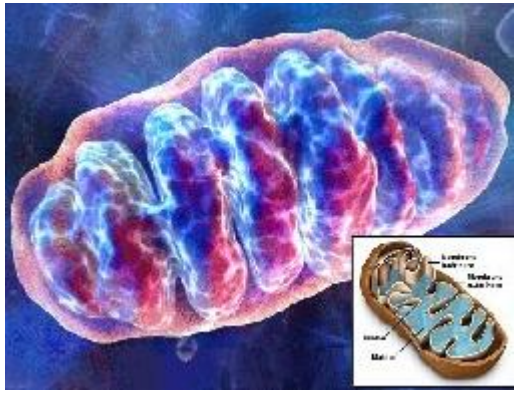
Nukleové kyseliny

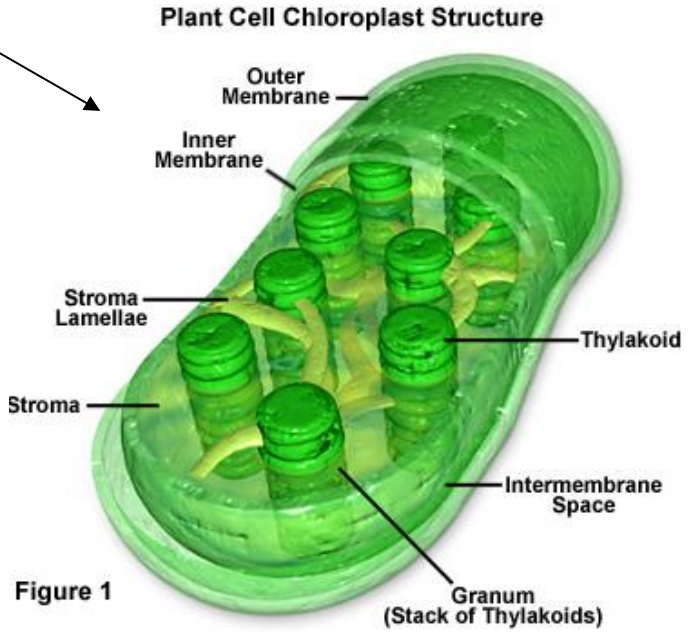


Kde se NK vyskytují?

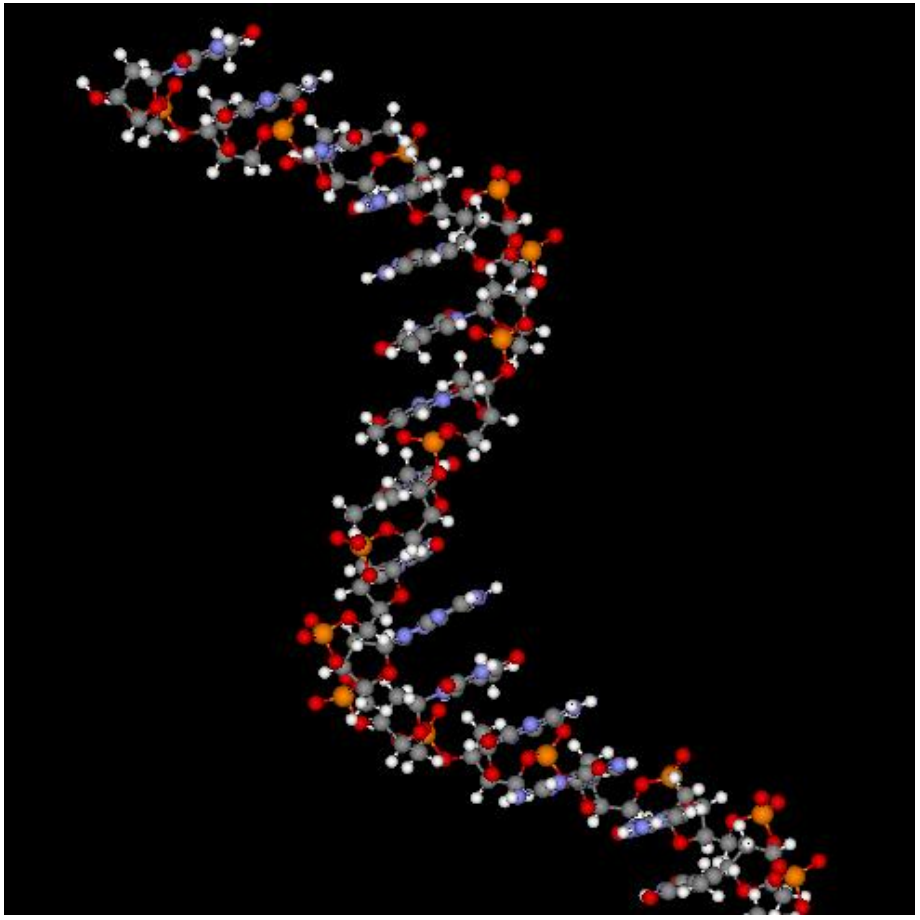


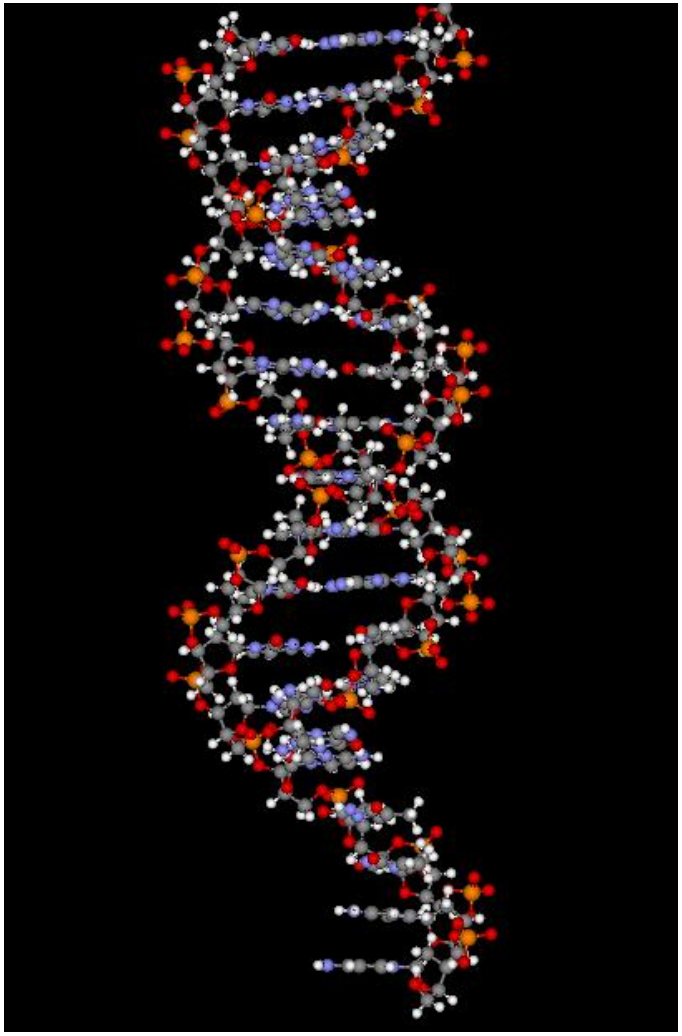




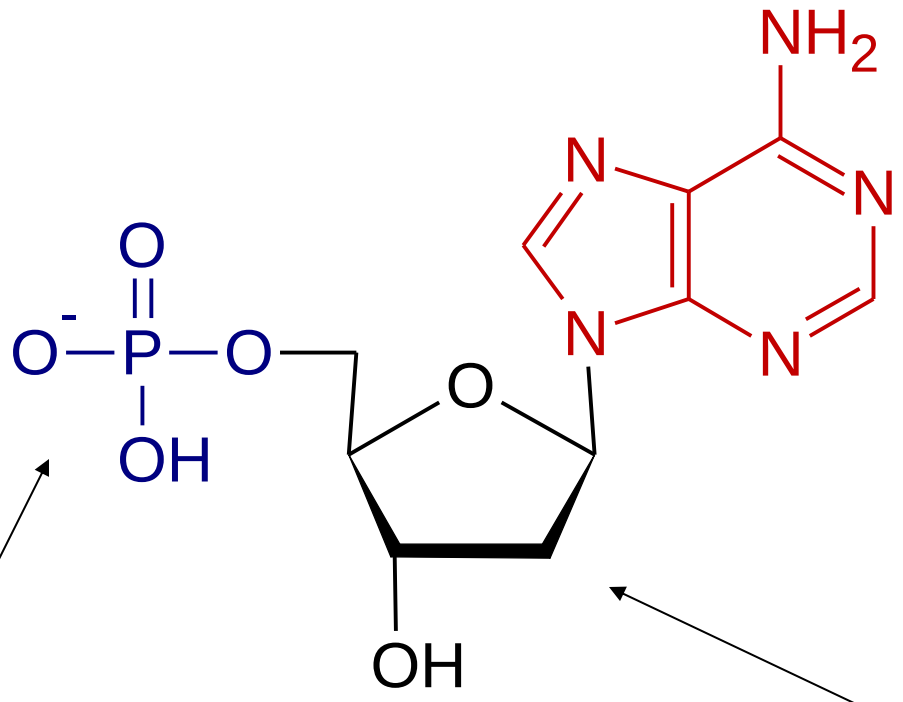


Struktura





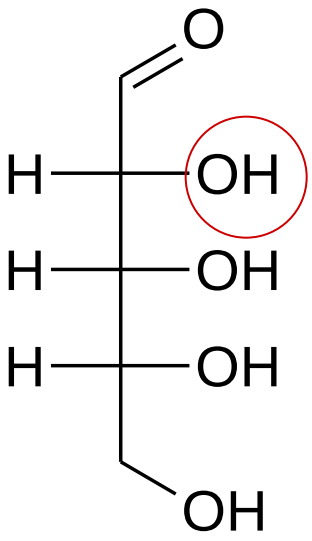
Nukleotid

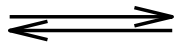


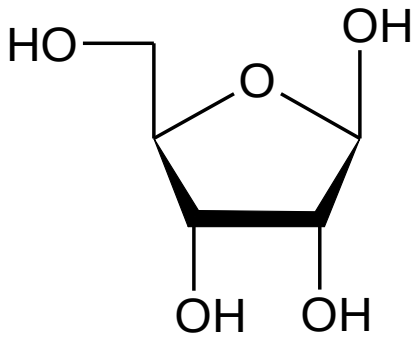
báze

Zbytek kyseliny fosforečné

Cukerná složka

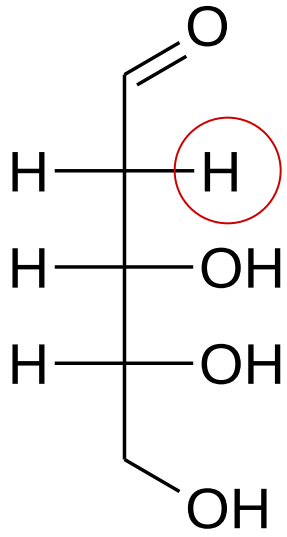


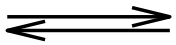


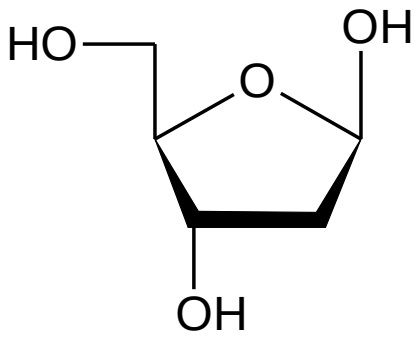


ribosa

β-D-ribofuranosa



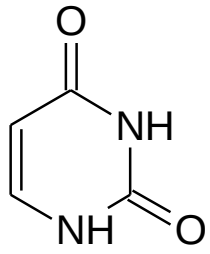




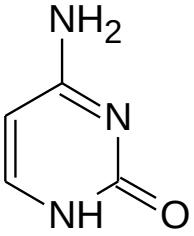
deoxyribosa

2-deoxy-β-D-ribofuranosa

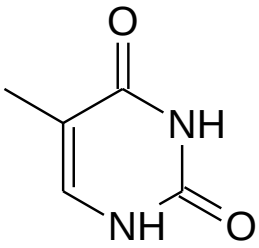
Báze



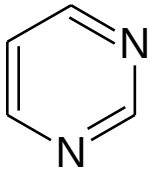
uracil

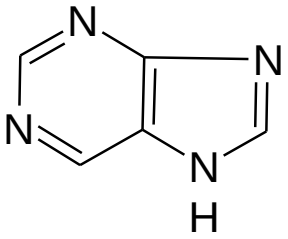


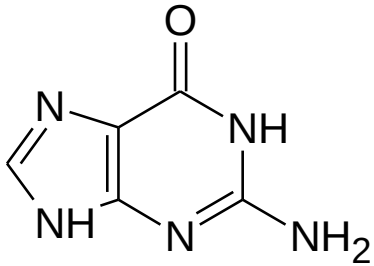
cytosin



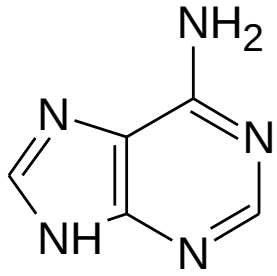
thymin







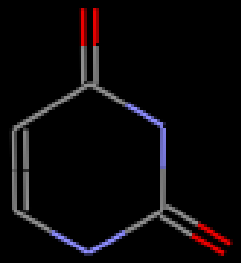
guanin



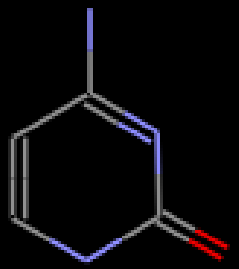
adenin

RNA

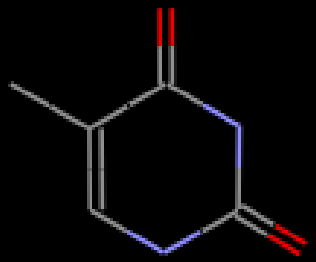
DNA



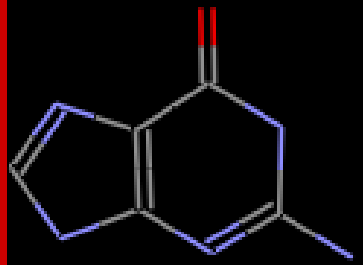
uracil



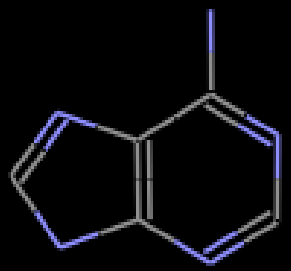
cytosin



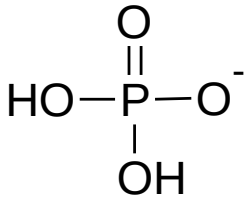
thymin



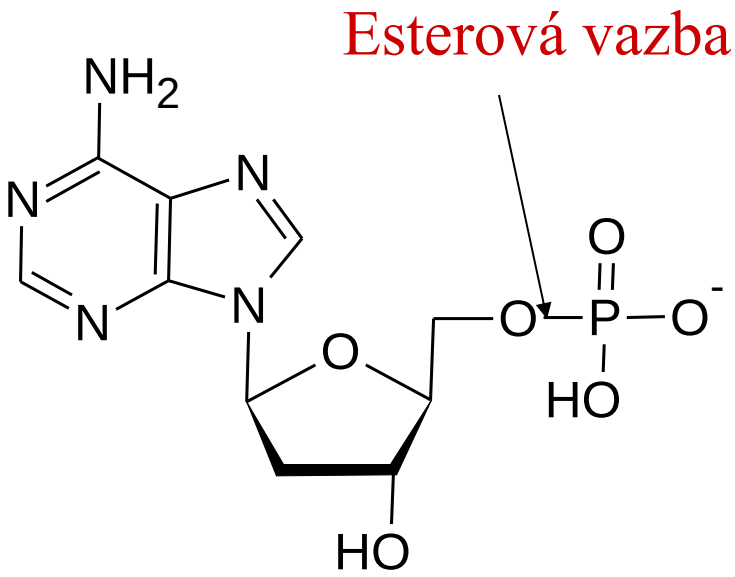
guanin

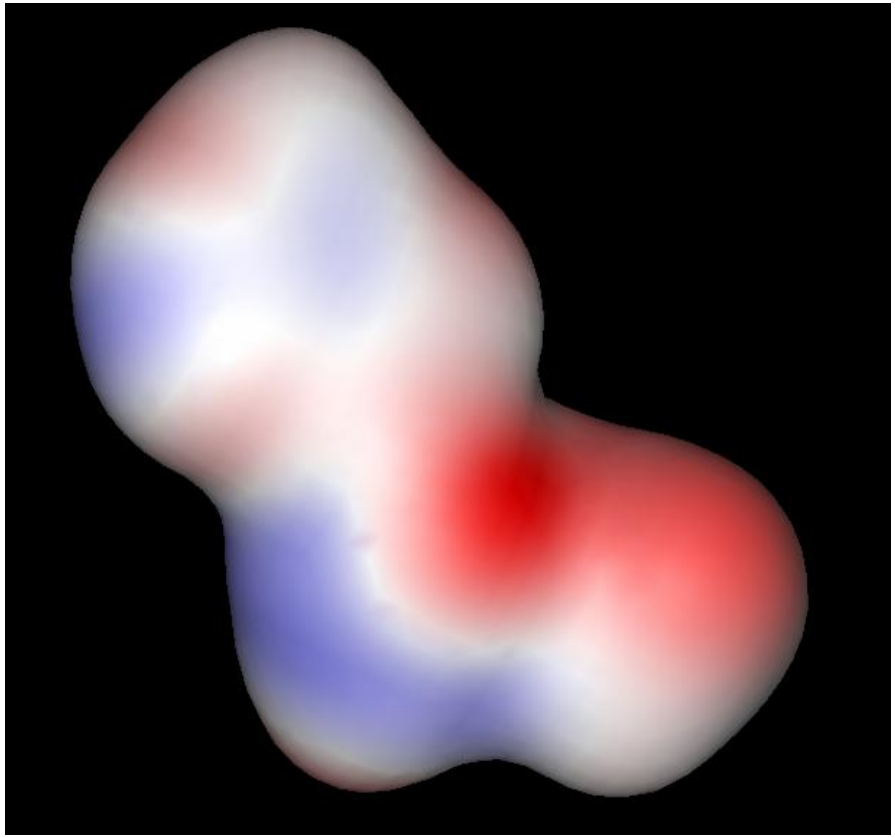


adenin



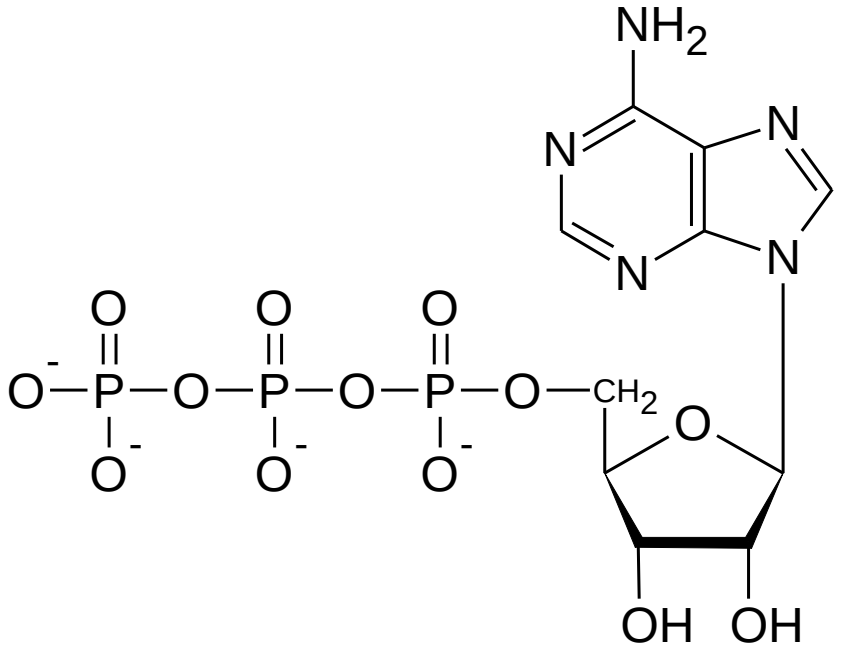
Zbytek kyseliny fosforečné



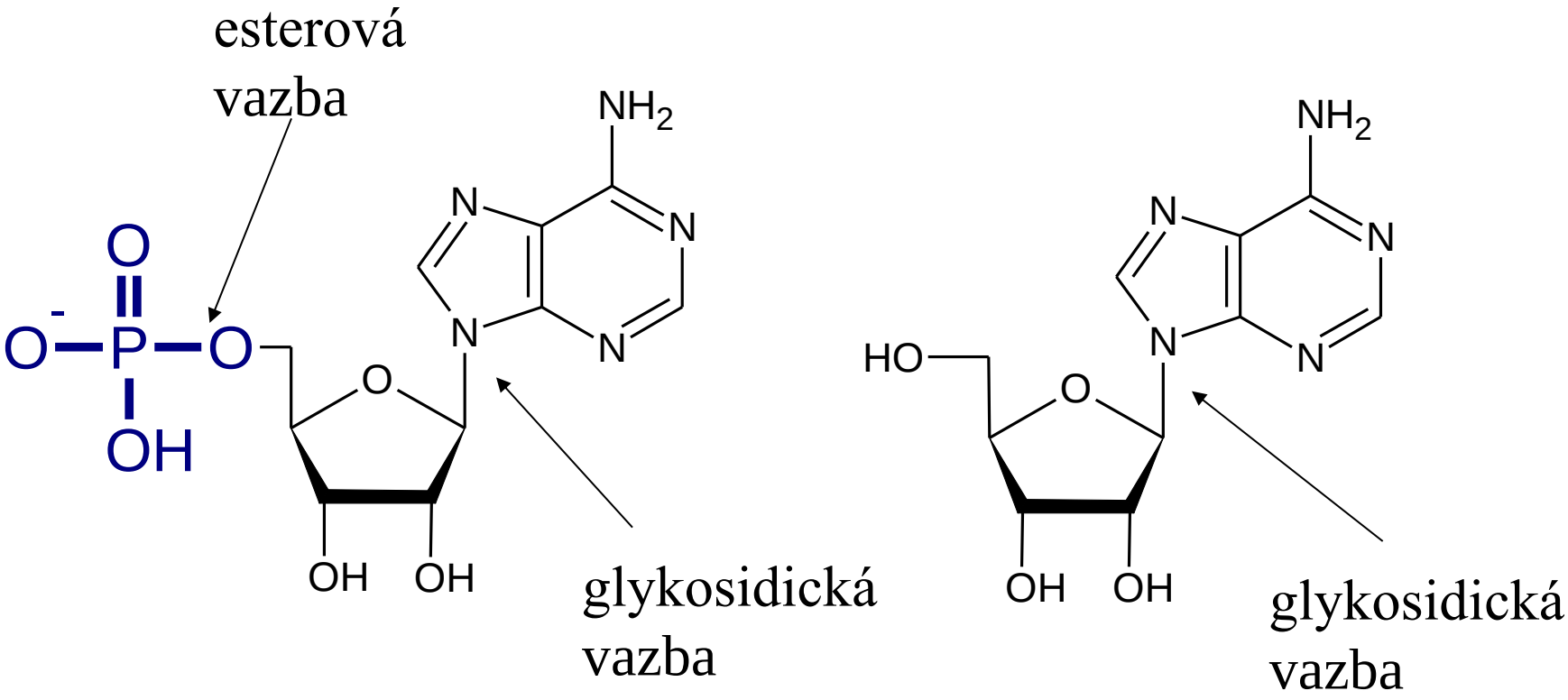


Význam nukleotidů

- Kofaktory enzymů – $NAD(P)^+$
- Stavební kameny NA
- Makroergické sloučeniny – ATP, ADP ...

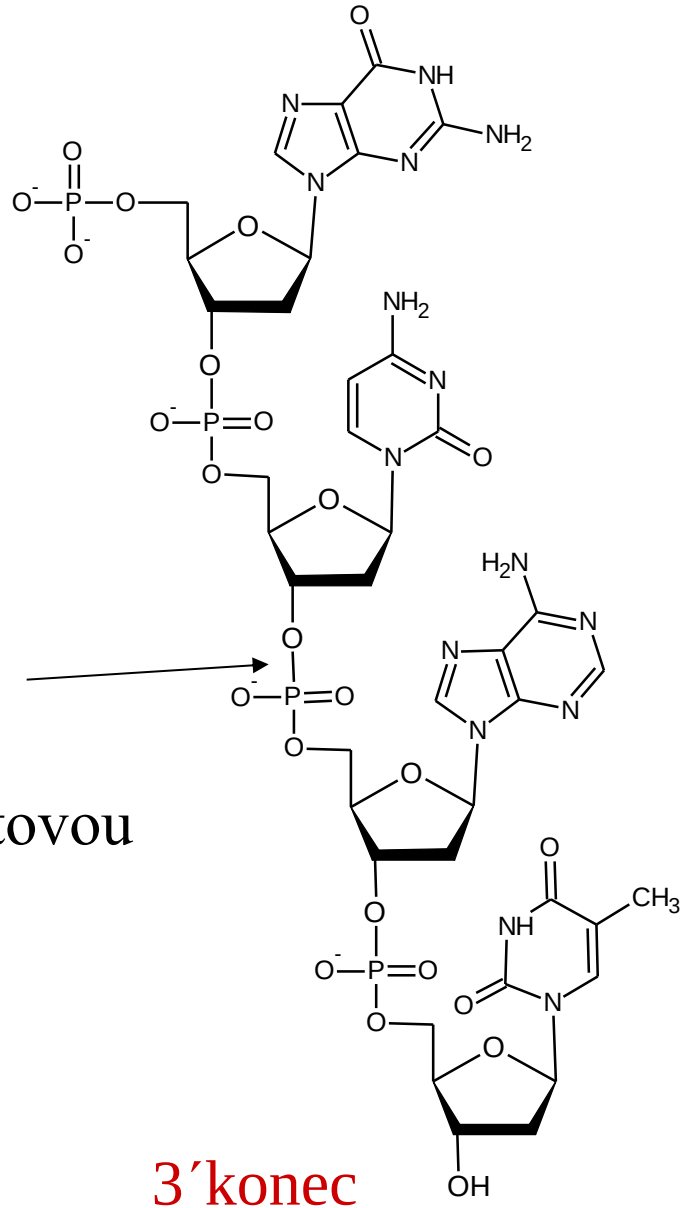


Nukleotid/nukleosid



Polynukleotid

5´konec



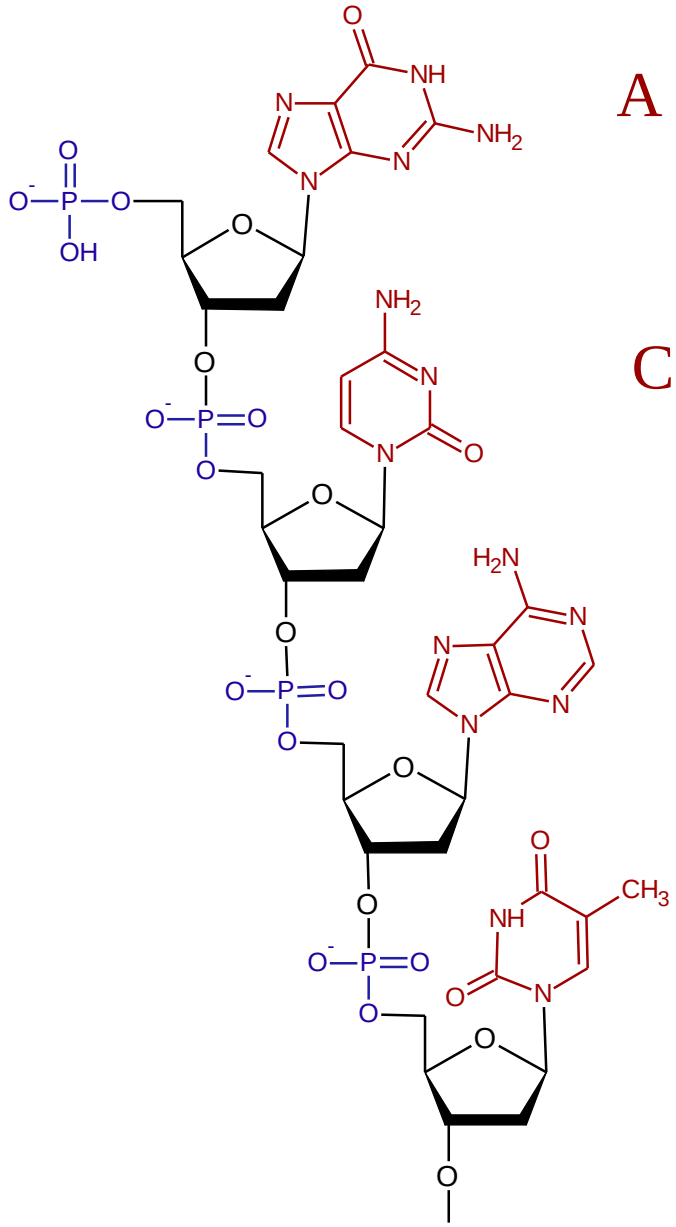
Fosfodiesterová Vazba
vznik mezi fosfátovou a hydroxylovou skupinou

3´konec

DNA

= Deoxyribonukleová kyselina

Primární struktura



- Báze – adenin(A),cytosin(C), guanin(G), thymin(T)
- Cukerná složka – 2-deoxyribosa
- Zbytek kyseliny fosforečné

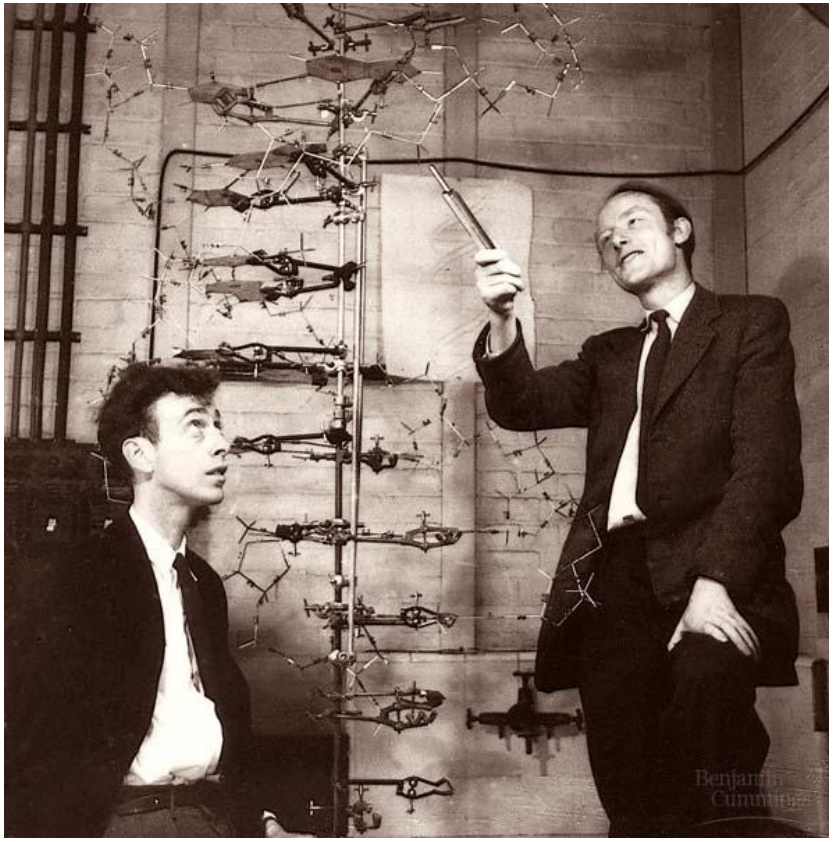
A/T nebo C/G = konstantní = 1

- **Erwin Chargaff (r. 1949)**

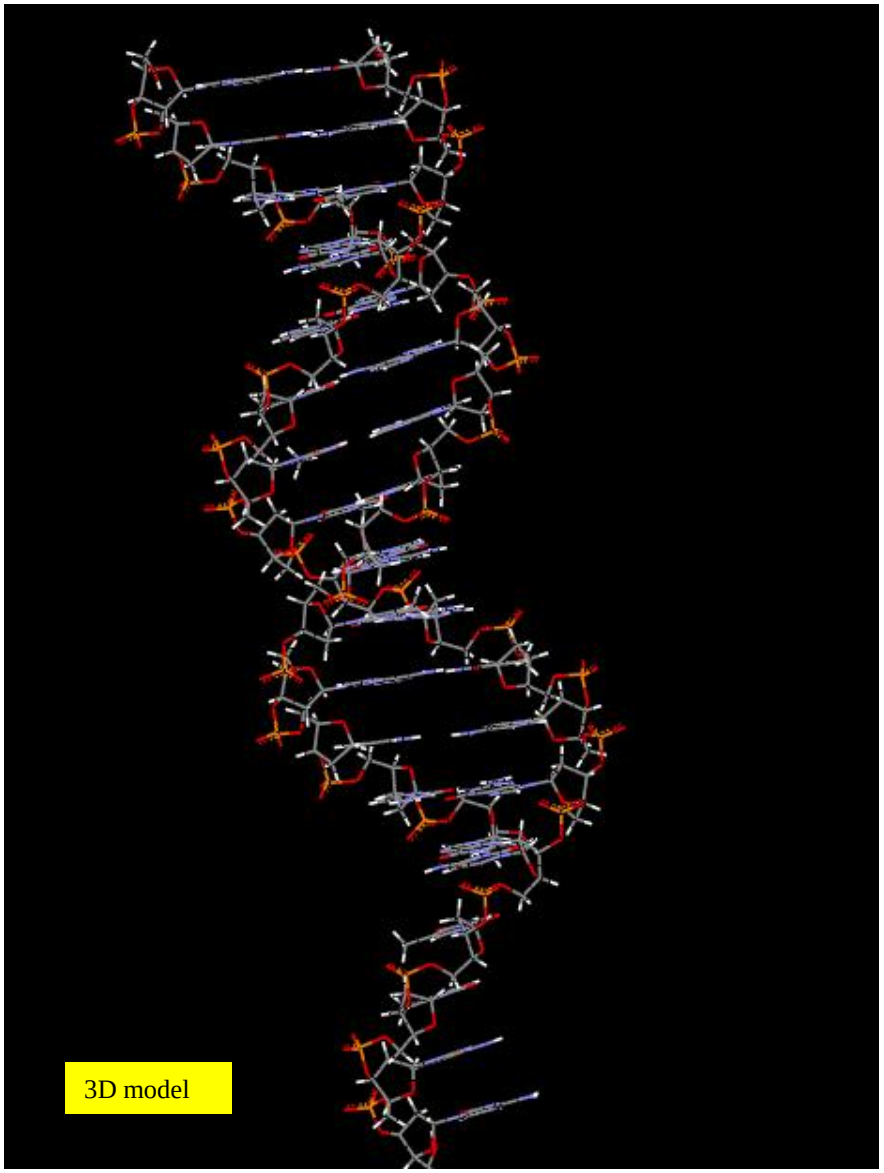
  = v DNA je stejný počet adeninových a thyminových bází a stejný počet guaninových a cytosinových bází

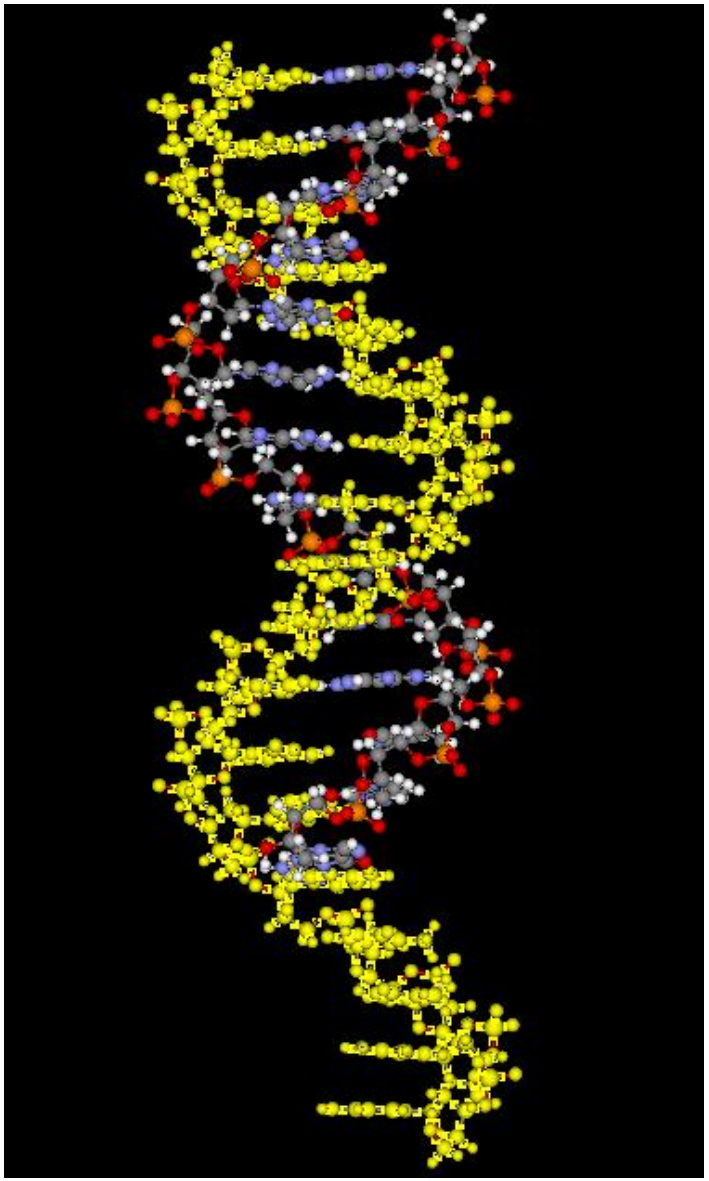
Historie

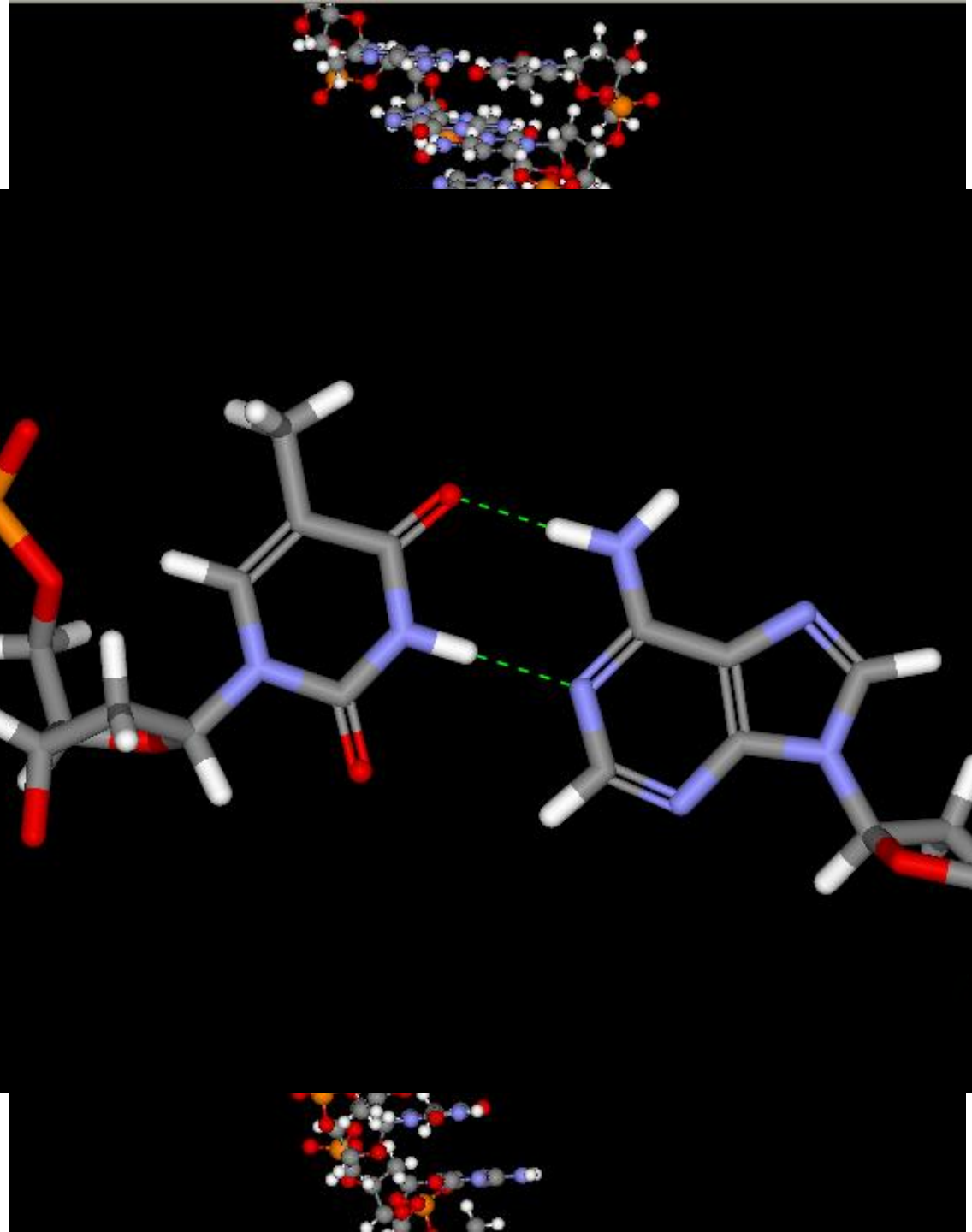
- James D. Watson a Francis H. Crick
  - 1953 – Přeložili strukturní model dvoušroubovice DNA
  - 1962 – Nobelova cena
  - F. Crick – další výzkum v oblasti proteosyntézy a genetického kódu



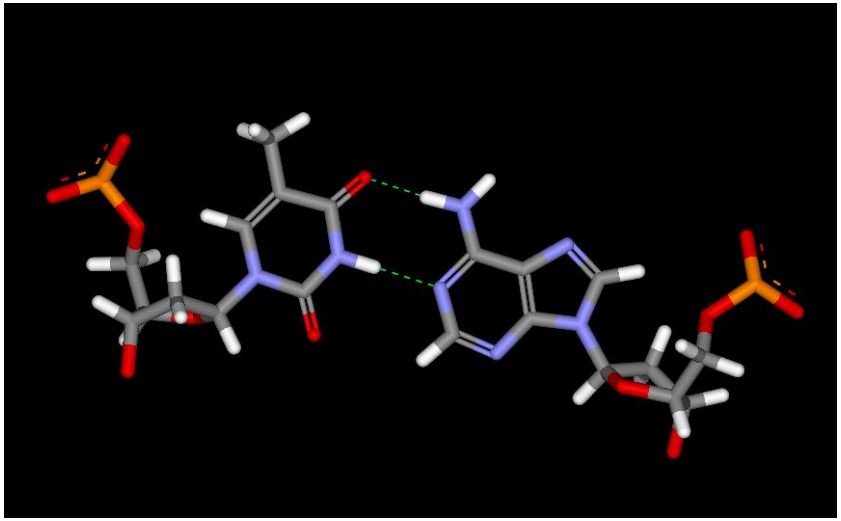
Sekundární struktura

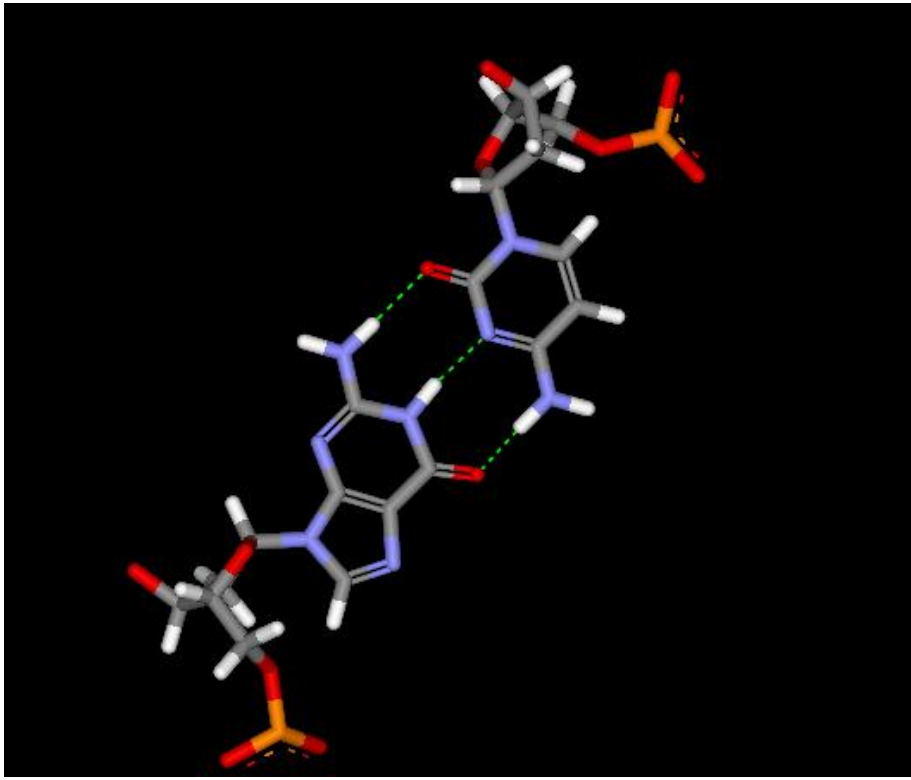




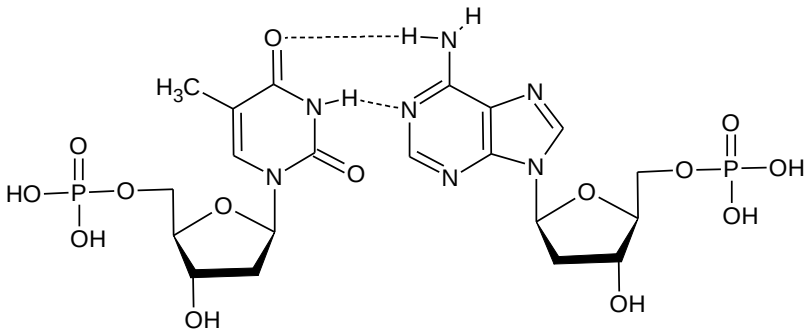


Vodíkové můstky

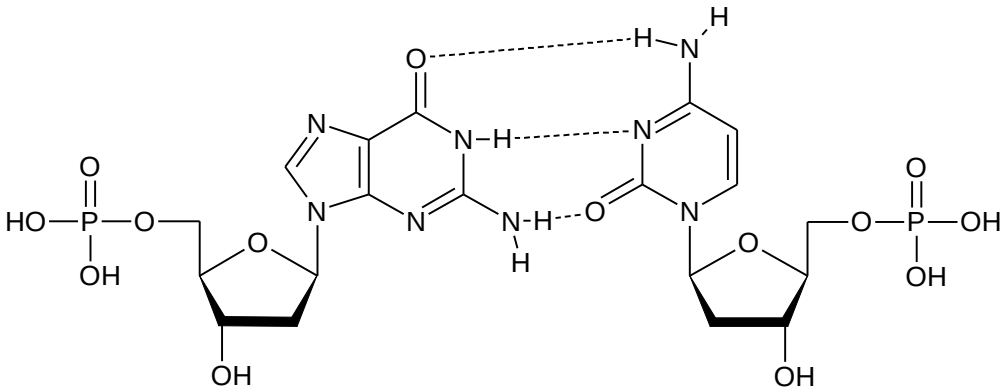


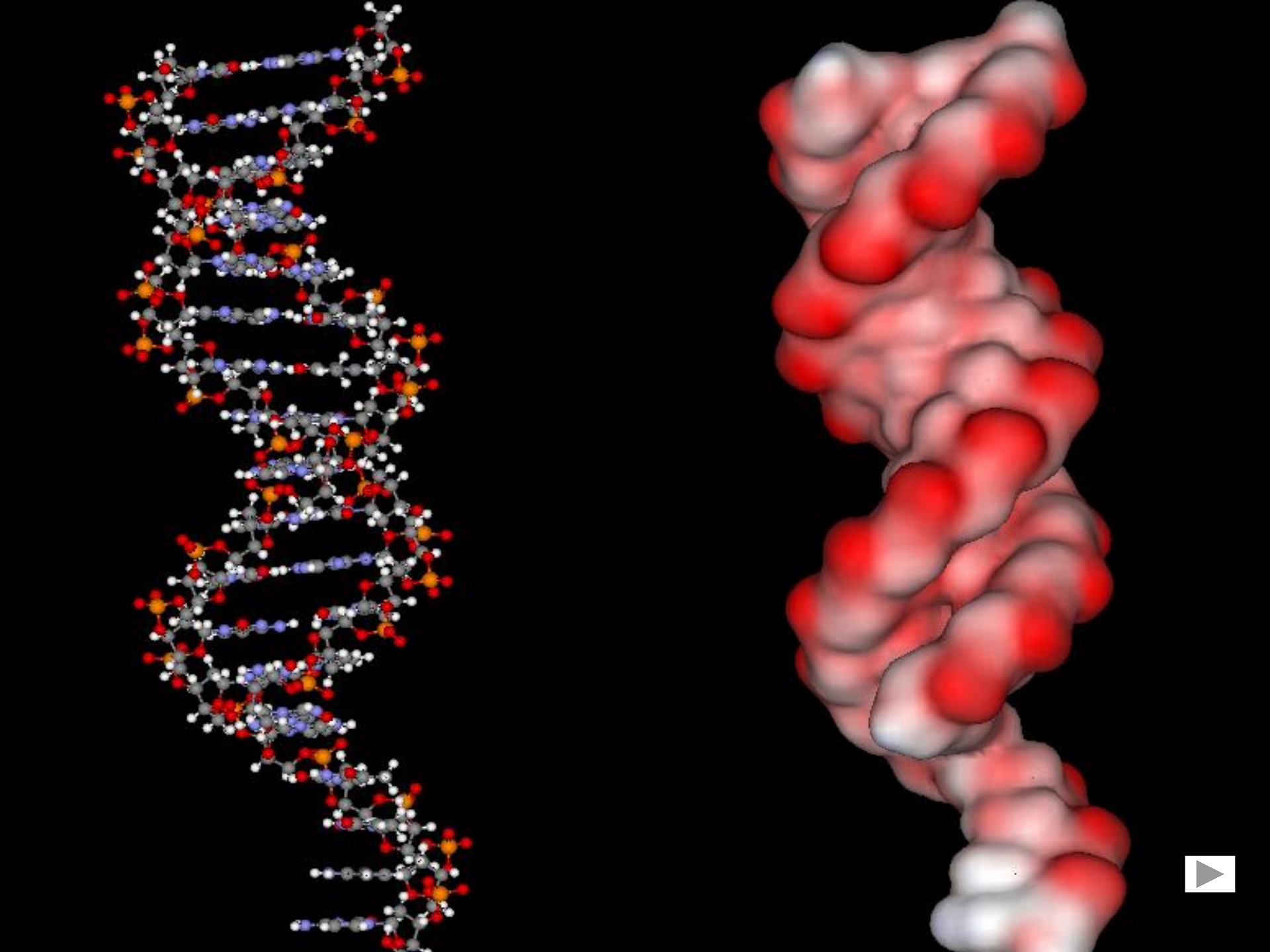


T : A

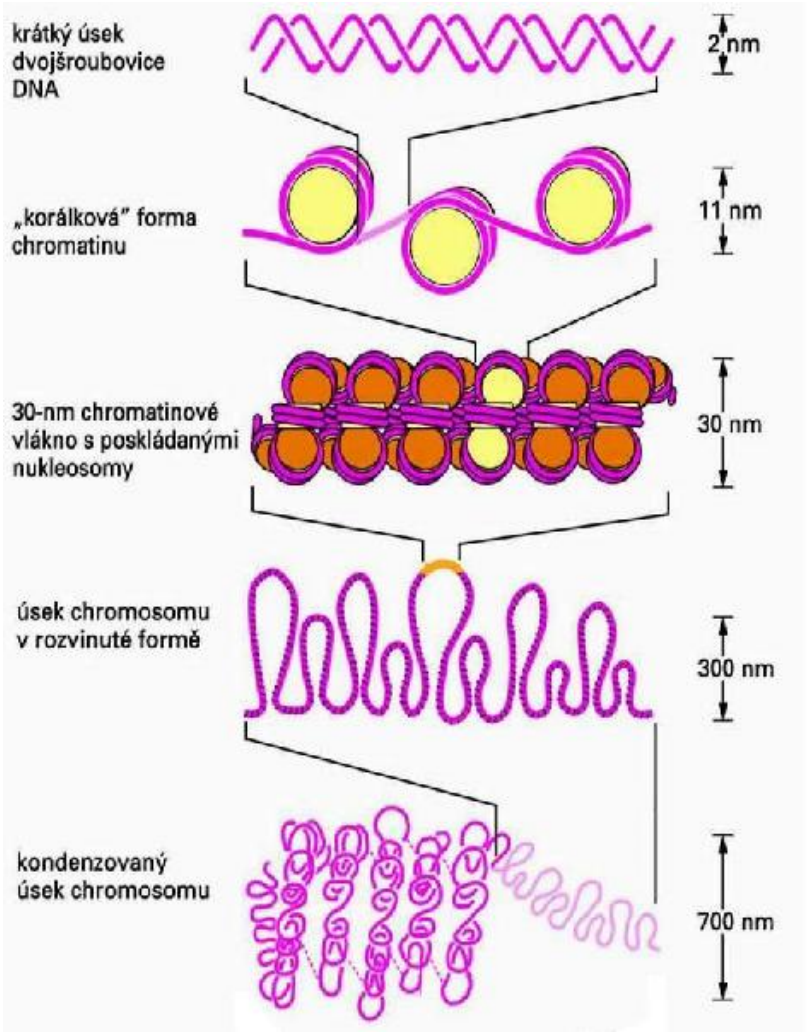


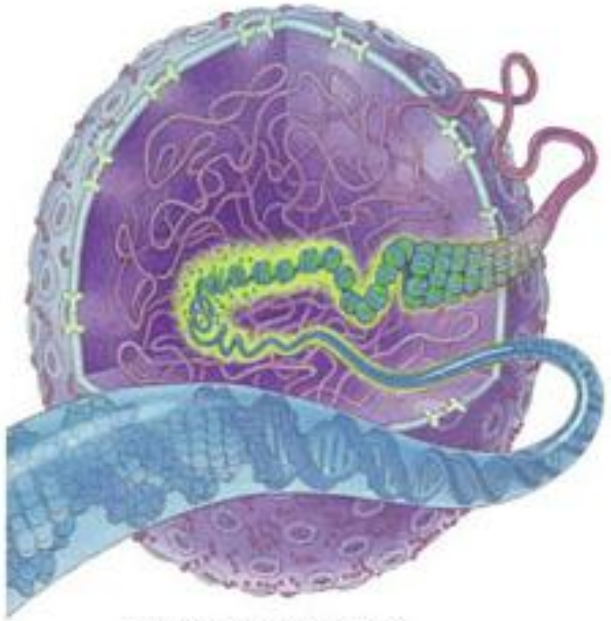
G:C

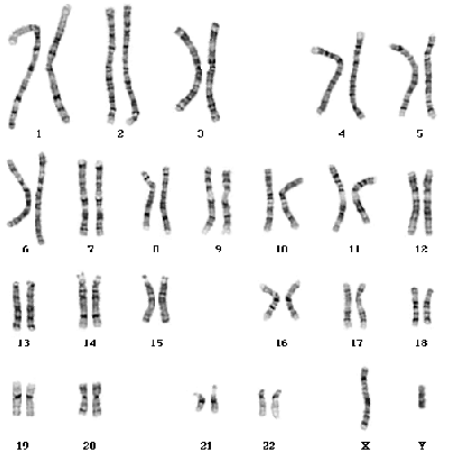




Celková délka molekul DNA v jedné lidské buňce je 1 m!
Jak se vejde do buňky která má rozměry cca 10 μm?







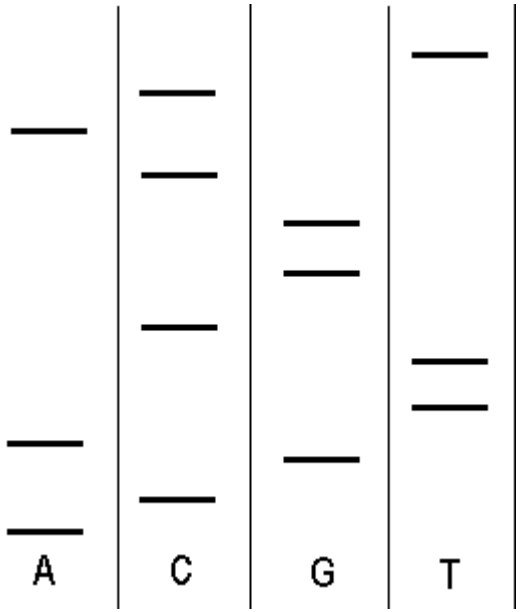
Funkce DNA

- Uchování genetické informace
  - je biochemicky zapsaná zpráva, umožňující živé buňce, resp. organismu, jenž ji obsahuje, realizaci určité vlastnosti (znaku)
- co to je gen
  - Součástí chromozomů, 1 lidský chromozom může obsahovat až 32000 genů,
  - 1 gen často reprezentuje 1 molekulu proteinu nebo molekulu RNA

Současnost

- GGATAGCATAGTAAACAAGTAAAATACTCATGGAGCAGGAAGAATAACATTTT
AGCTATTAGTAAAAAGCATTTTGTTATACAACTTCTGAATAATTTTCTTTTAAAA
TTATATTTATAAGGGCCTTTGTTTTTTGGTTAAATTTACAATATATGTTAGAAGA
AATCTGATTAATTTTAT TTTTACTTCTTTTTGCAG**CAGTAAGATTAAGAAAATT**
GTGCATTCAATTGTATCATCCTT TGCATTTGGGTATGTGAGACACAGAAAAC
ACCATGTATTAAATATATCTGAGACTTGGCT GGGTGTGGTGGCTCACGCCTGTA
ATCCCAGCACTCTGGGAGGCCGAGGCGGGCGGATCAC ATGAAGTCAGGAGTTC
AAGACCAGCCTGGCTAACATGGTGAAACCCCATCTCTACTAAAAATACAAAAAT
TAGCCAAGCATAATGGTGGGTGCCTGTAATCCCAGCTACTCAGGAGGCTGAGGC
AGAAGAATCGCTTGAACCGAGGAGGCATAGGTTGCAGTGAGCTGAAATTGCAC
CAT TGCACCTCAGCCTTGGTGACACAGCAAGACTCCATGTAAAAAAAAAAAAA
AAATGAGTCT CATATATATCTATACATACATATATATATATGAGACTTAATA
CTTCAATGAGAAACACTGAAATAAAATAACAAAAAAGCATTTCCACTGTCCATC
AGTTGCTAAGTAGCCATGTGCCCCATCTAATGTAATCTAATTTATCATGGAATTT
TGGTTTAAGCTGGACATTAAGAATTGCAAATAAATGGCTTTTGCCTAAGATTAAT
AGTAACATATTGTTTTTCTTCCATCTGCAAAA GTAACATTAATGAAAATCAAAT
GTTAAAATTCTGTAATTATTAGTAAAGTGTTTTATTAG TACCTTATACATCTGGA
ATTACTCTTTAATTCTGGAAACTATTTATTTAGACTACATAAG AGTAAGATTTCA
TACTATATGATATAGATTTATGCAATATAATTGTTTCCTTTTGAATTA ATAATAT
TTGAATTTGAGCTGCAAGTTTTTAAAAAAGTACTTCAAAGACTAATTCACCTTCA
TAGATTAGGCAAATAGTCGAATCAATTTATGGAGAATGTATTTGGAATATGTAA
CAGC AAGTGGCAGGAGGTACTTTAGAGTTCAAGACTCATGTGCCCATCACTCTG
CTCGAAGCAC CCATAAAGATGAAATCATGGACTTGTTGAAAATGTCACTGATGA
AAAATCTTGGTCTTTTAAGAGCTTATGTTACTCATGCTTTCATTTGGTTTTTATTA
ATAAATTCTTTAGAATTATCCAGATTAATGAGGGTTTATTTTTTATGAGAAGTTG
GTATAAACTTCTTATGAAATTCTCACATTTTAAGAAGAGTTTGTAAACAGACACA
GGTGATTTTAATTCAGTTTTACTTTTTCTCTCTTGAGGTGTTGGTCTGATGTGTCT
ACTATAAAAGGCCATGATAATATCTTCTGAAGTGGTTTGGTGAGAATTTTGTTTA
TTAAGAACTGCTTCTATTGGGTGAAAACAGTGATTTTTCTGAGATTCTAAGGCAT
TACAGTTTTTCCTGCCACTGGGCAGCTTAATACTAAATAATAACATTTTGGTACC
TGATCAGTGGCTTAAATATAGTATAGCTATAGGGACAAATGCCCCTTTATCTTTG
CATTTATTTATTTATTTATTTATTTATTTATTTATTTATTTATTTATTTTTAG**A**
CTATTTGGAGTTTTCCTCGTCTTACTGGATGTCACTCTCGTCCTTGCCGACC
TAATTTTCACTGACAGCAAACTTTATATTCCTTTGGAGTATCGTTCTATTTC
TCTAGCTATTGCCTTATTTTTTCTCATGGATGTTCTTCTTCGAGTATTTGTA
GAAGGGTAAGTTTGATTATTTTTATAATAAGAACCACTTTGGGAGGCTGAGGTG
GGAGGATCCCAAGGTCAGGAGTTCGAG

- Kompletní sekvenace lidského genomu



Současnost

Genové inženýrství

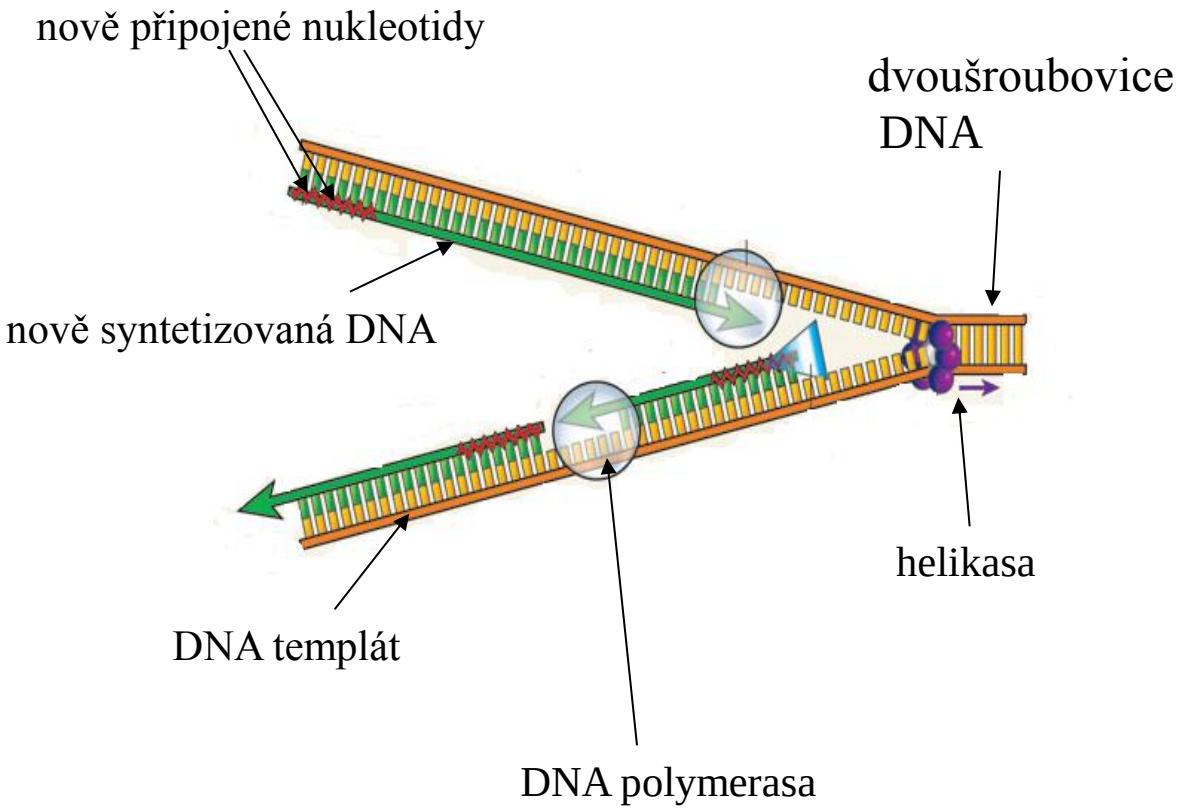
- Úprava (modifikace), umělá syntéza a přenos částí DNA (genů)

GMO

- Zlepšení vlastností organismů (odolnost vůči škůdcům, chorobám, větší výnosnost, nutriční hodnota, léčba chorob ….)

Syntéza DNA

- DNA templát
- nukleotidy
- DNA polymerasa
- helikasa



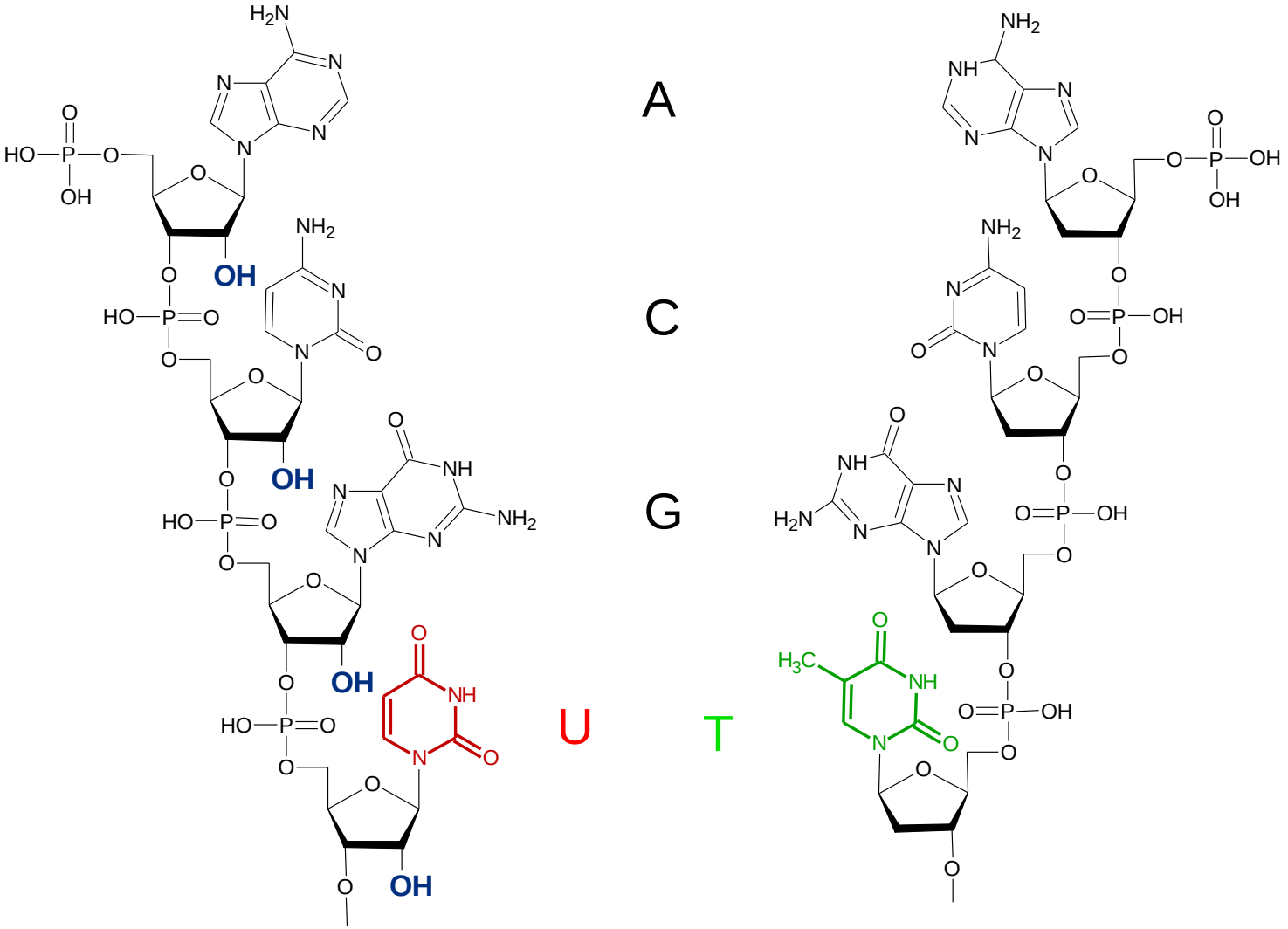
PCR

- Polymerázová řetězová reakce
- Využití v kriminalistice, léčbě či k zjišťování (detekci) chorob
- http://highered.mcgraw-hill.com/olc/dl/120078/micro15.swf

RNA

=ribonukleová kyselina

DNA nebo RNA?

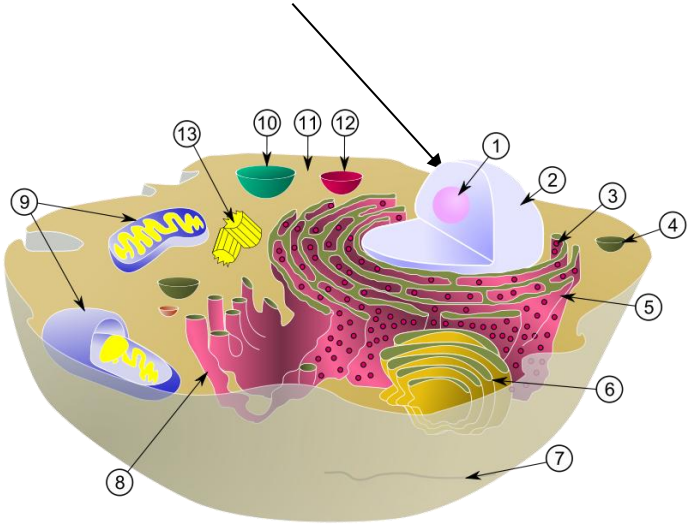


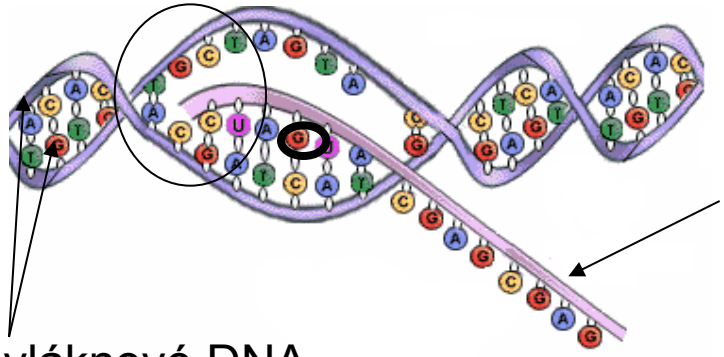
Druhy a funkce RNA

- mRNA
  - mediátorová („messenger“) RNA
  - zprostředkovává přenos genetické informace z DNA na bílkoviny
- tRNA
  - transferová RNA
  - zajišťuje přenos aminokyselin na místo syntézy bílkovin
- rRNA
  - ribosomová ribonukleová kyselina
  - je stavební složkou ribosomů, na kterých se uskutečňuje syntéza bílkovin

mRNA

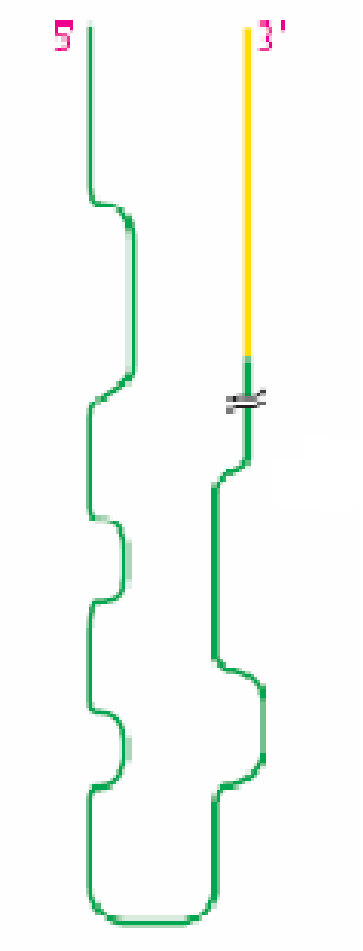
Jádro (přepis DNA do jednovláknové mRNA)



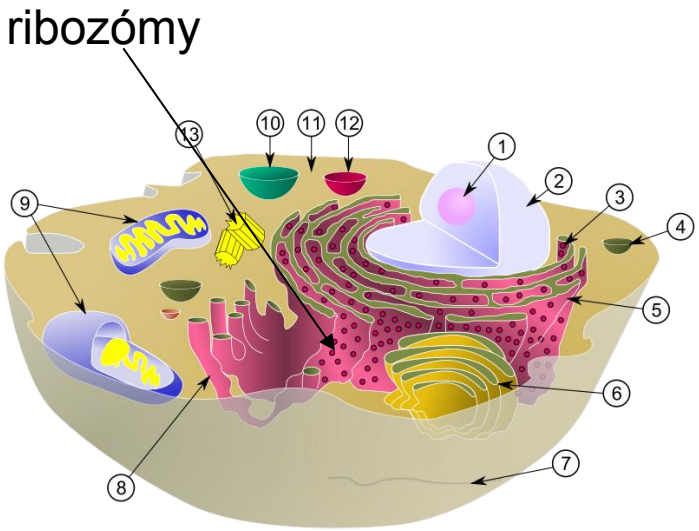


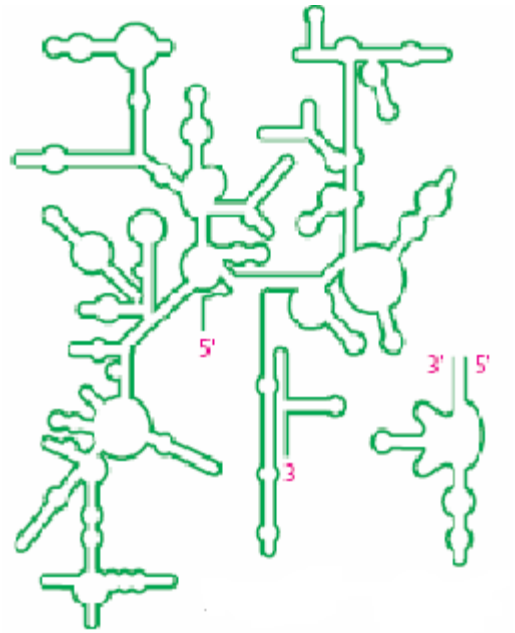
mRNA

Dvouvláknové DNA

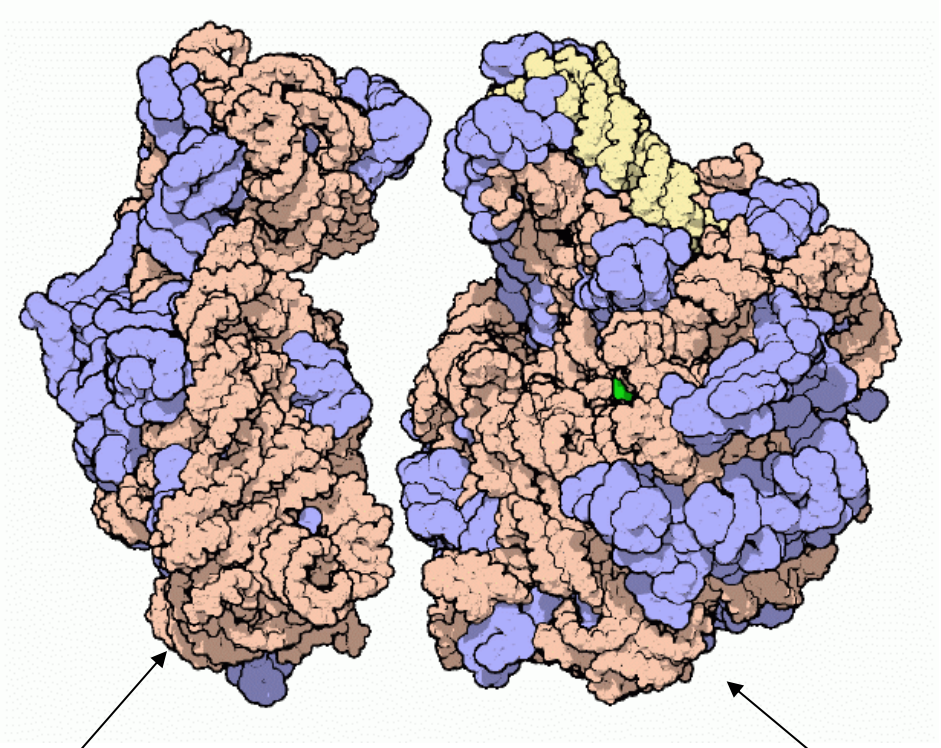


rRNA





Ribosom

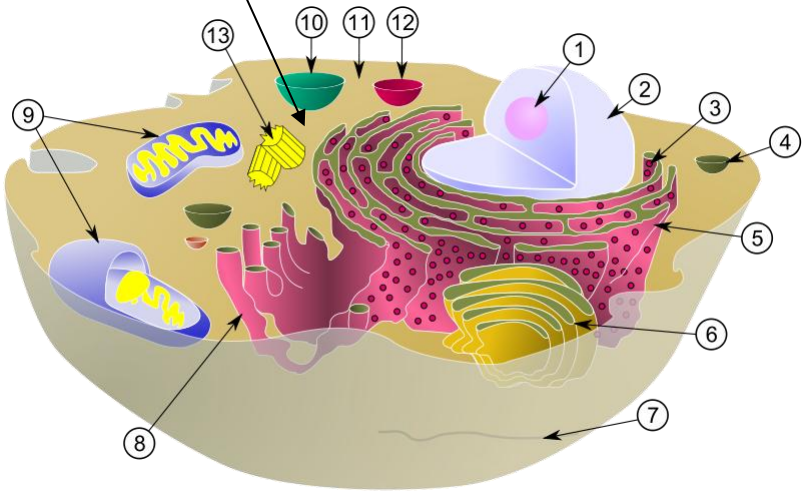


malá podjednotka

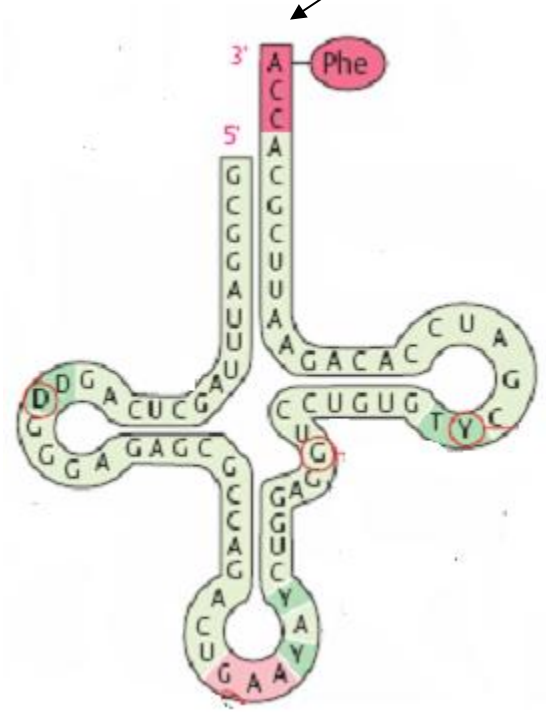
velká podjednotka

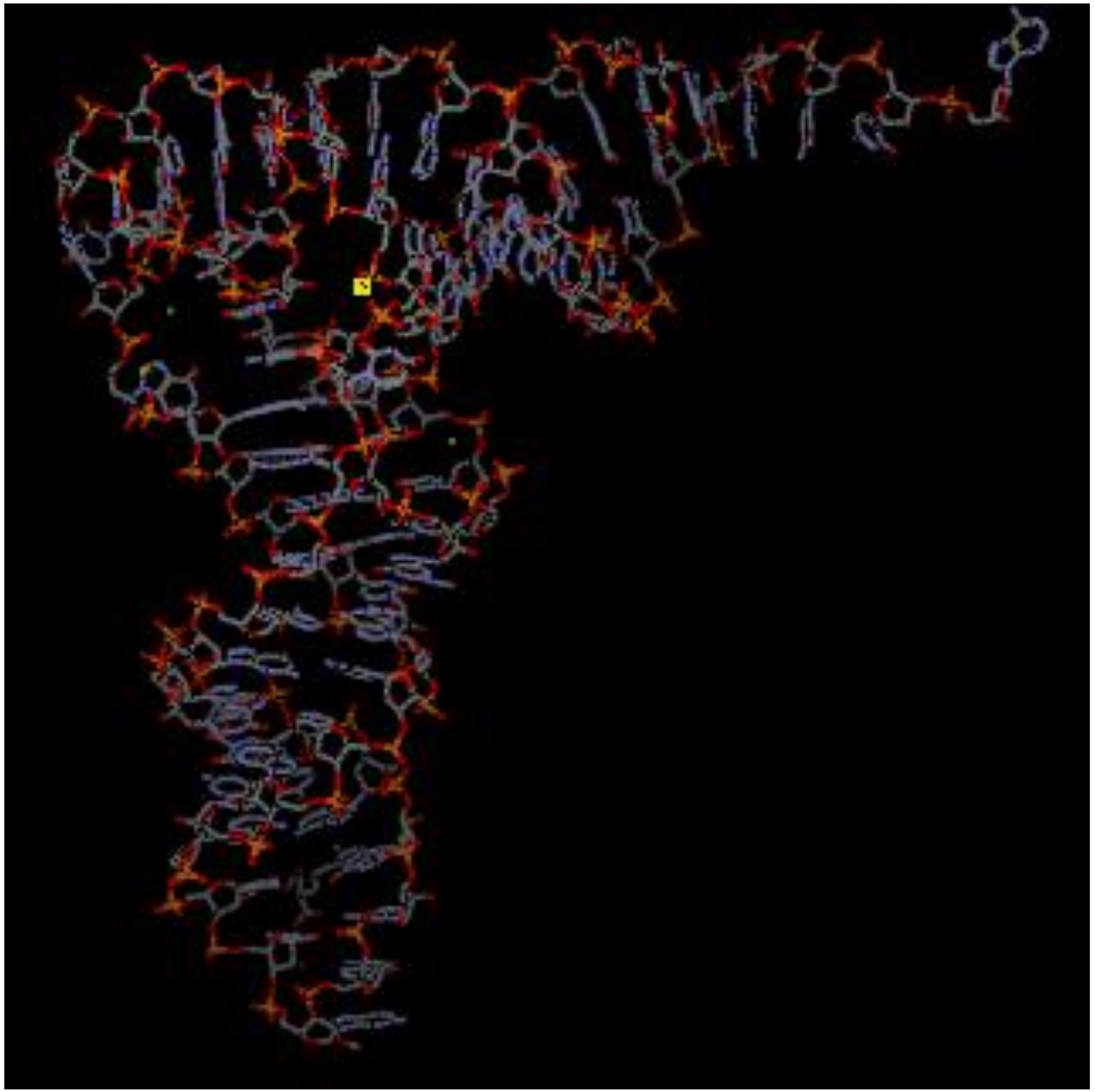
tRNA

V cytoplasmě naváže
AMK a přenáší je na ribozóm

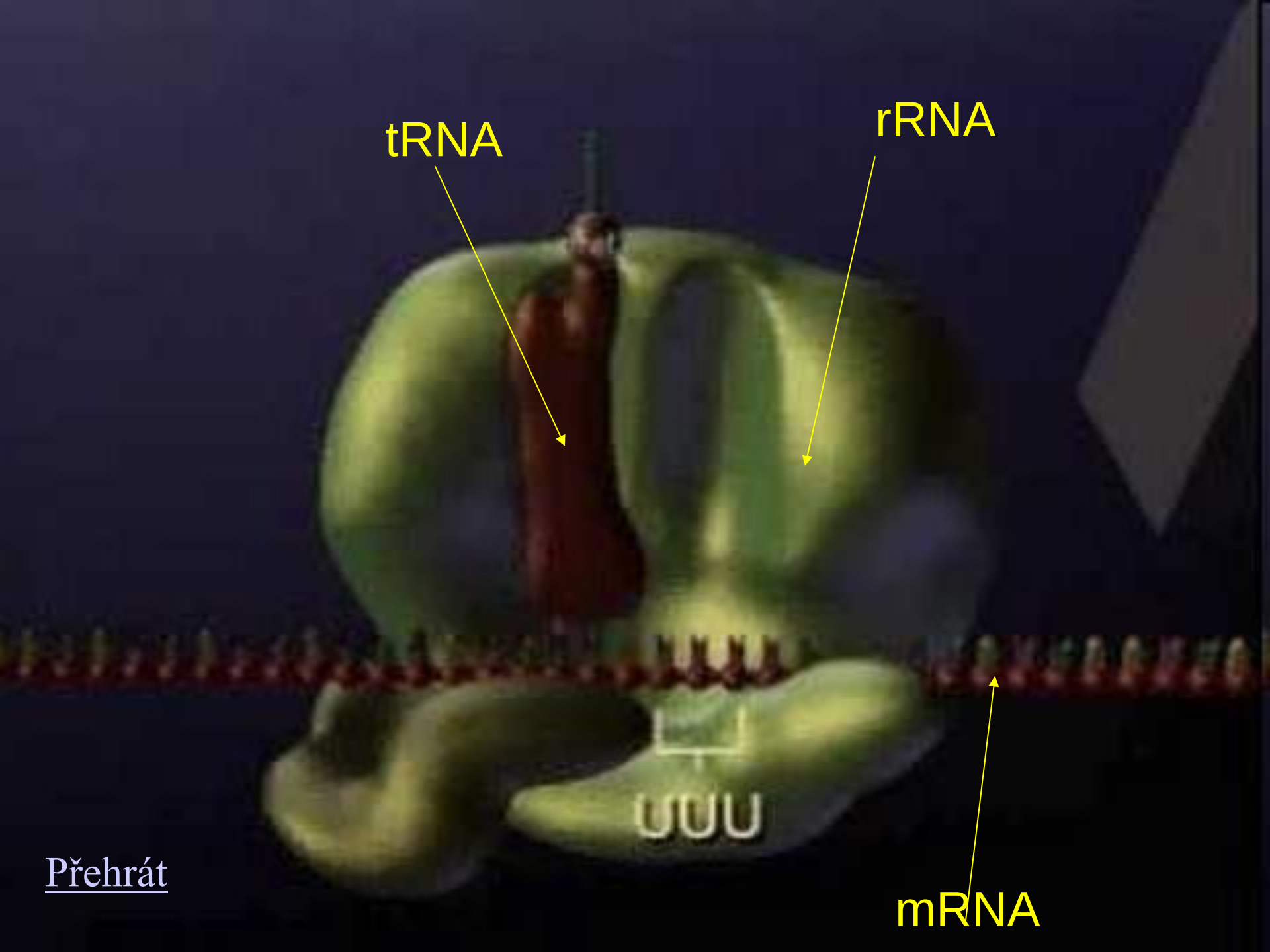


Místo, kde se váže AMK

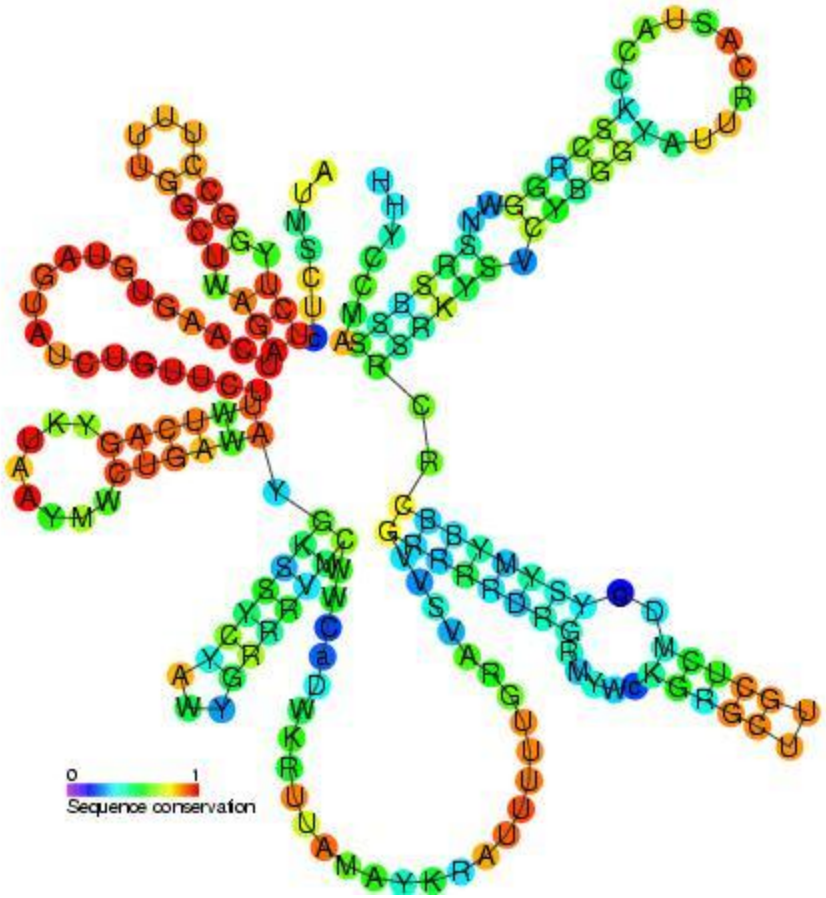




Otevřít 3D model



Přehrát


0
1
Sequence conservation