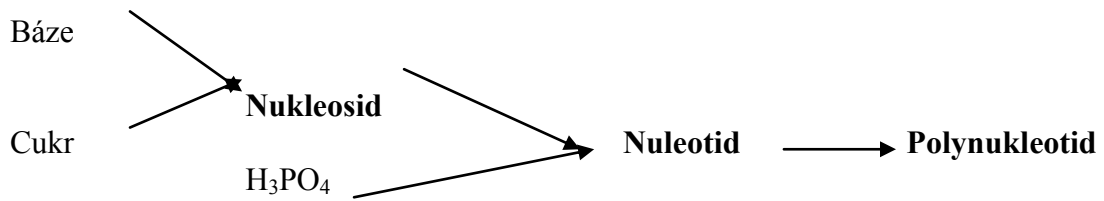


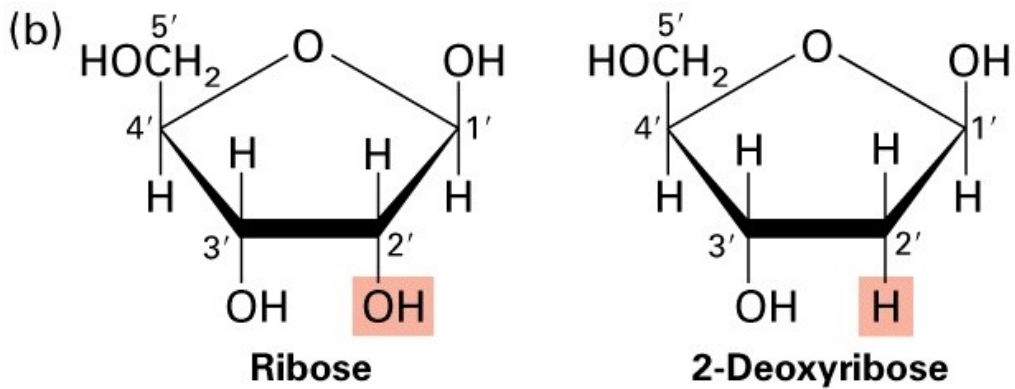
10. Nukleové kyseliny

Složení nukleových kyselin

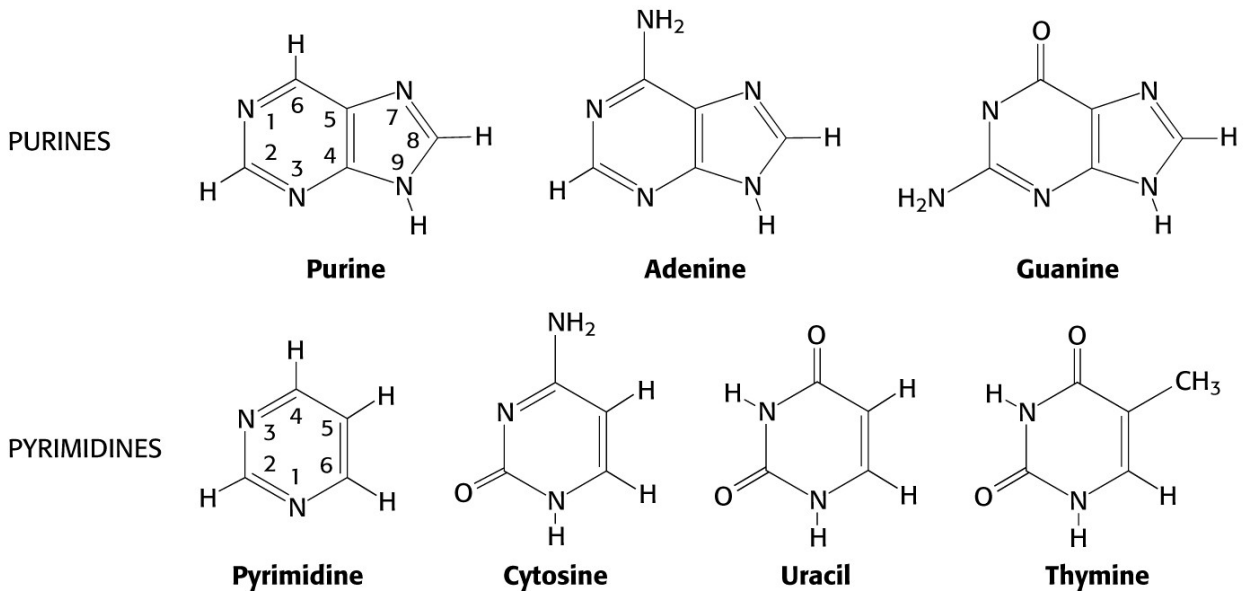
- Dusíkaté báze – purinové, pyrimidinové
- Sacharid – ribosa, deoxyribosa
- H_3PO_4



Cukr: Ribosa u RNA, 2-deoxyribosa u DNA



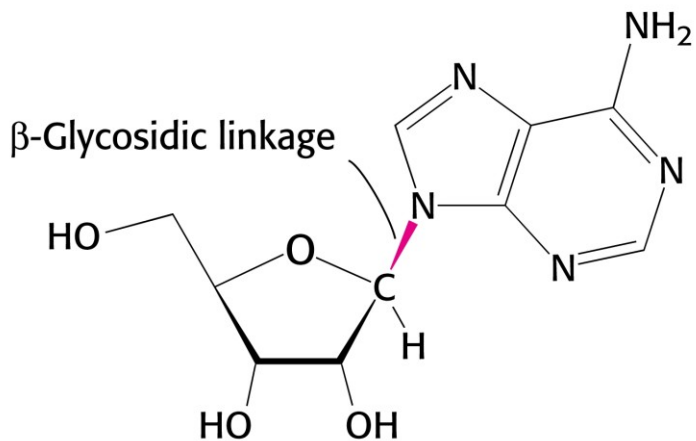
Báze: Deriváty purinu a pyrimidinu



U jednoho typu NA se vyskytují 4, 2 purinové a 2 pyrimidinové – alternují uracil (obsažen v DNA, nikoli v RNA) a thymin (naopak). Mimoto se vyskytují sporadicky neobvyklé báze.

Vazba báze na sacharid je N-glykosidická

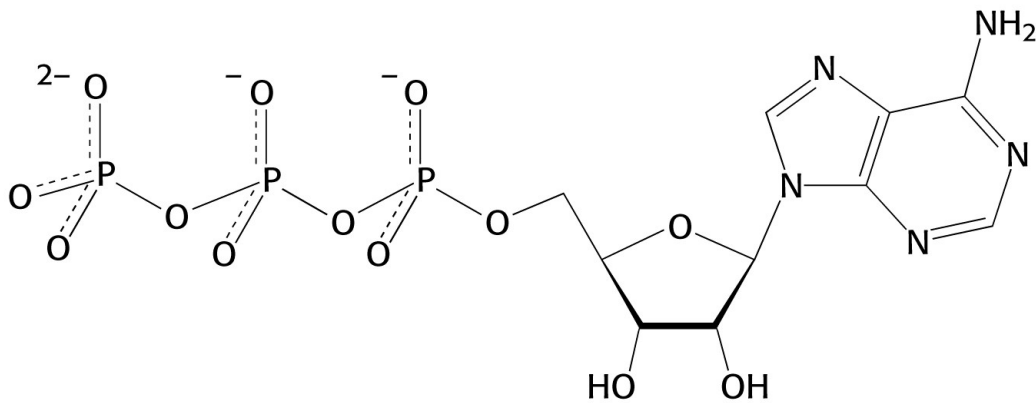
Vznikají (deoxy)**nukleosidy** – adenosin, guanosin, cytidin, uridin, thymidin – podle typu báze. Výjimečně se lze setkat s jiným typem vazby – pseudouridin.



Vazbou fosfátové skupiny na 5' –OH cukru (esterová vazba) vznikají (deoxy)**nukleotidy** – (deoxy)**adenosinmonofosfát** – (d)**AMP**, (deoxy)**guanosinmonofosfát** – (d)**GMP**, (deoxy)**cytidinmonofosfát** – (d)**CMP**, **deoxythymidinmonofosfát** – **dTMP** a **uridinmonofosfát** – **UMP**.

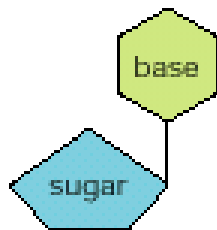
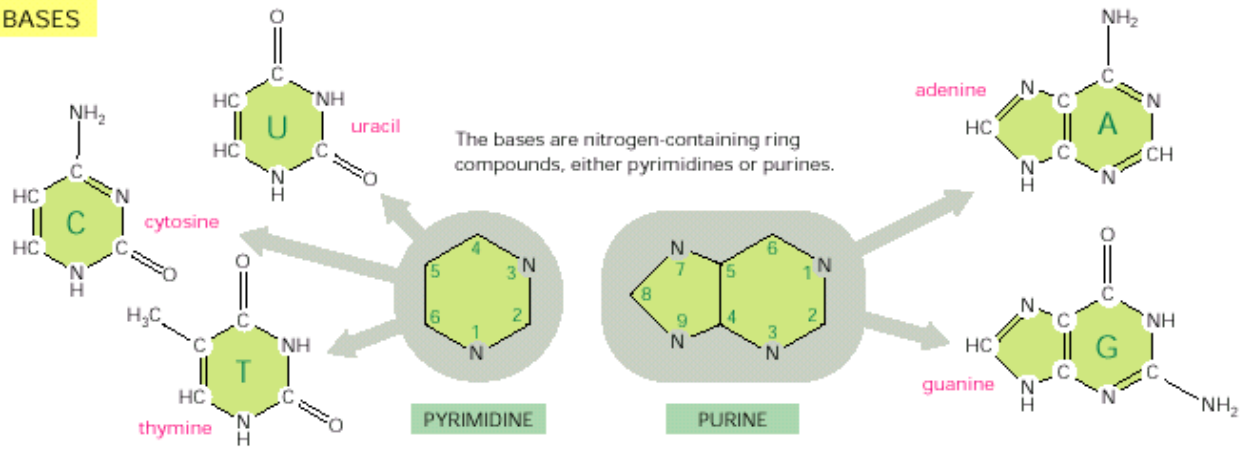
Jinými názvy nukleotidů jsou jejich pojmenování jako kyseliny – např. AMP = **kys. adenylá**, **adenylát**.

Esterově vázaná fosfátová skupina může být substituována dalšími fosfátovými zbytky (anhydridová vazba) a vznikají di- a trifosfáty, nejčastěji se setkáme s adenosintrifosfátem – **ATP**, dále jsou to **GTP**, **CTP**, **dTTP** a **UMP** event. deoxy**NuTP**.

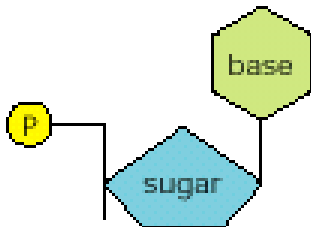


5'-ATP

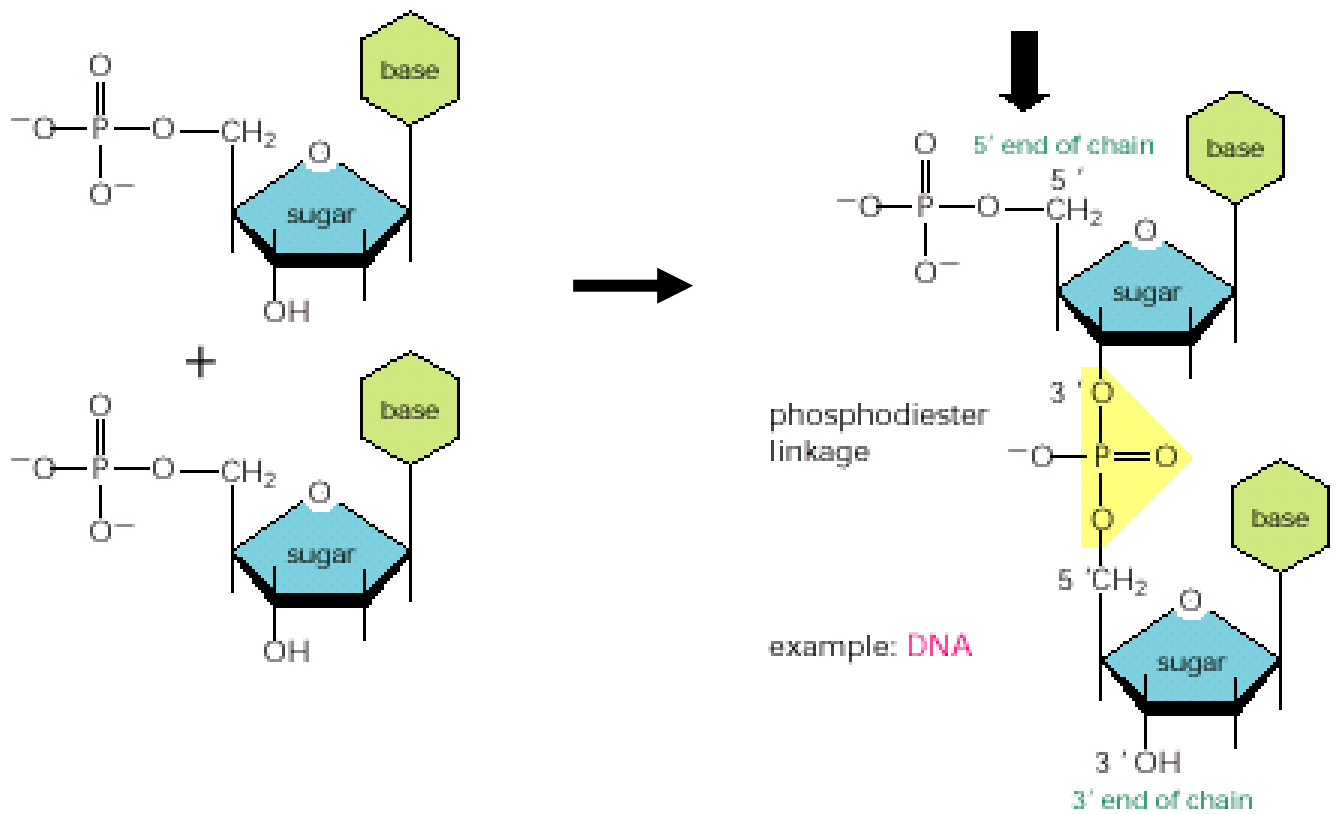
BASES



BASE + SUGAR = NUCLEOSIDE



BASE + SUGAR + PHOSPHATE = NUCLEOTIDE

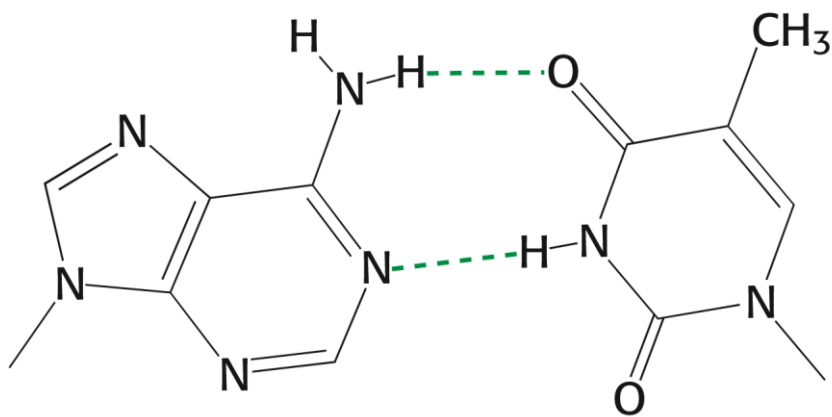


STRUKTURNÍ ÚROVNĚ

Primární – sekvence

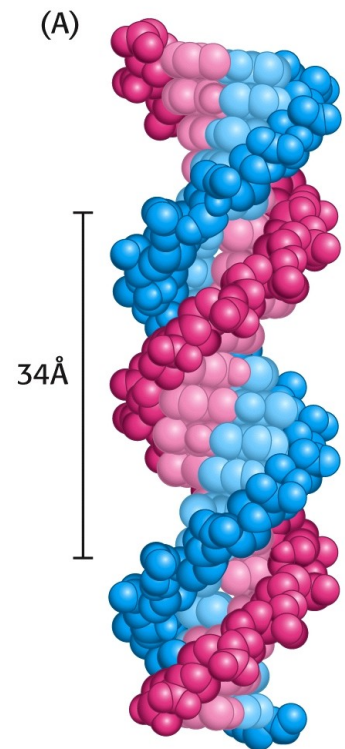
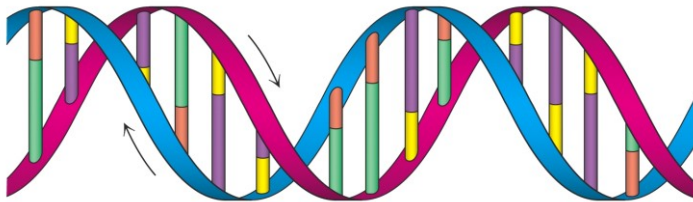
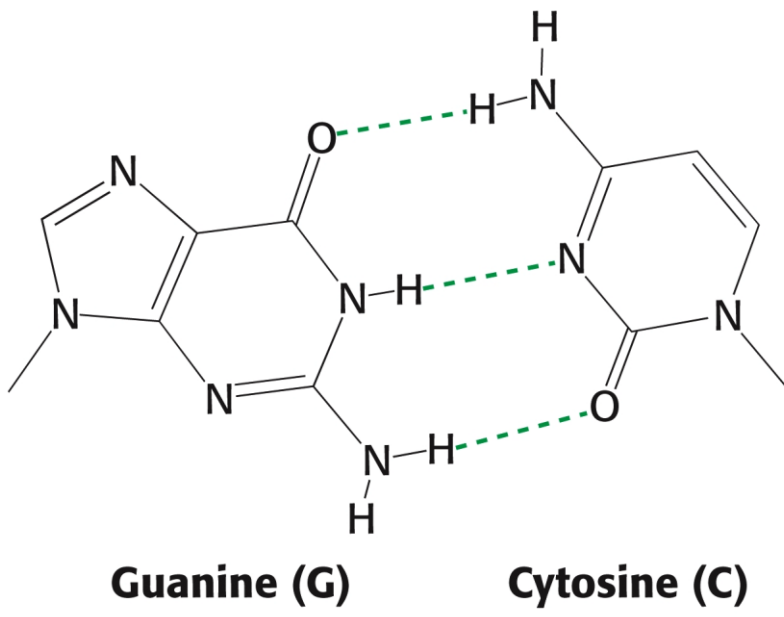
Sekundární

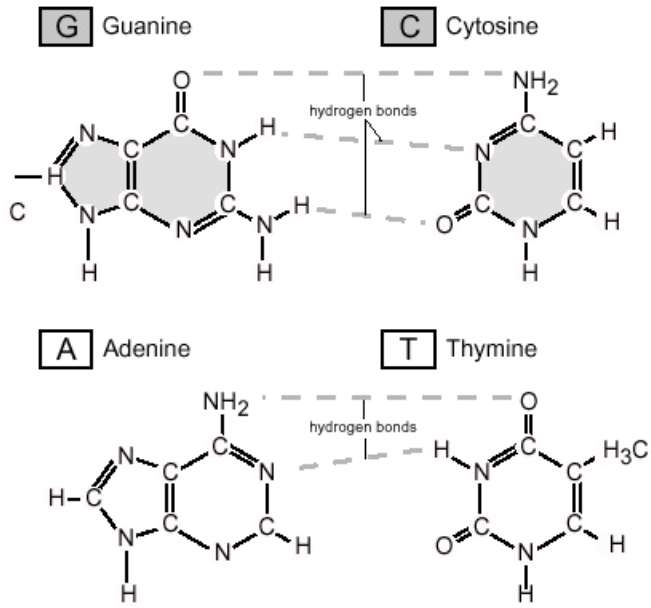
- Chragaffovy pravidla – poměr bází v DNA
 $A+G=T+C$ $A=T$ $G=C$ $A+C=G+T$
 - Donohue – báze v tautomerních ketoformách
 - Franklinová – RTG difrakční analýza
- Watson, Crick (1953) – dvojšroubovice



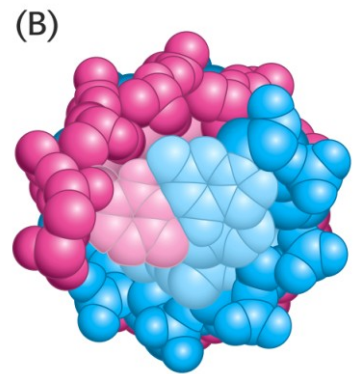
Adenine (A)

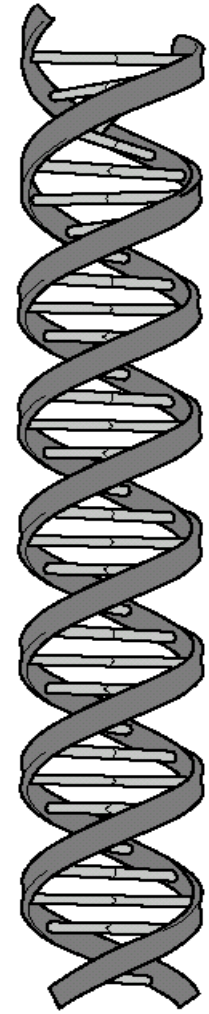
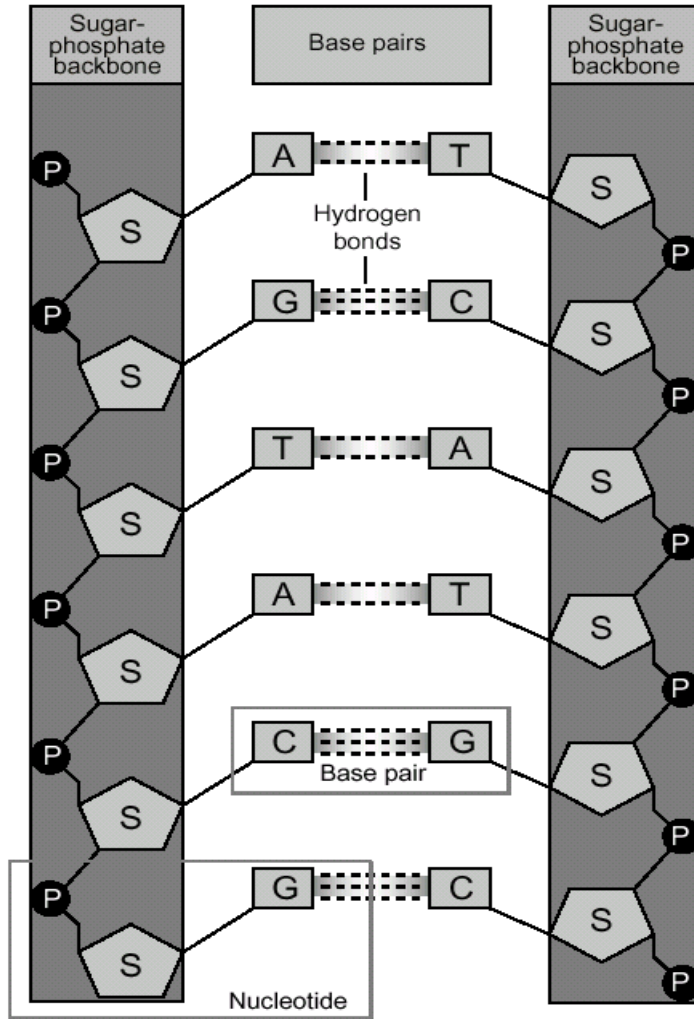
Thymine (T)

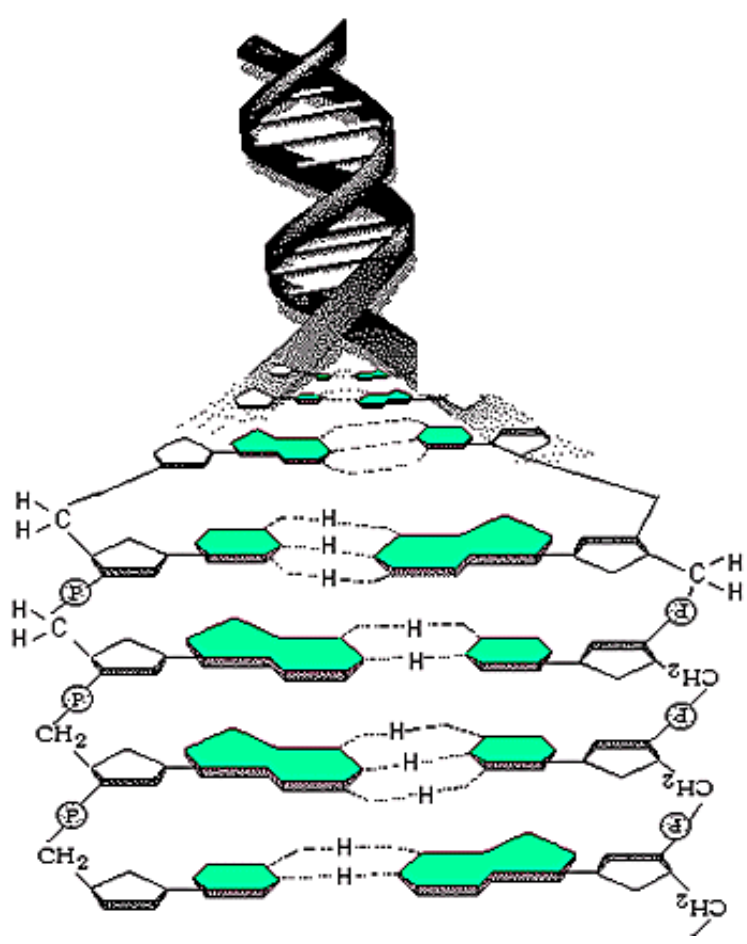


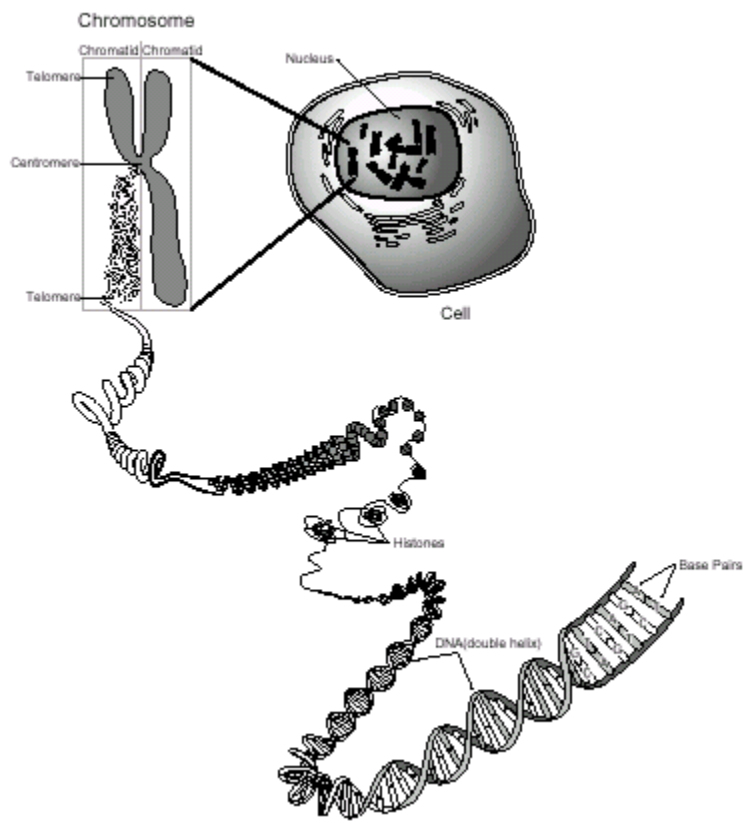


Prostorový model DNA – pohled z boku (A) a shora (B)

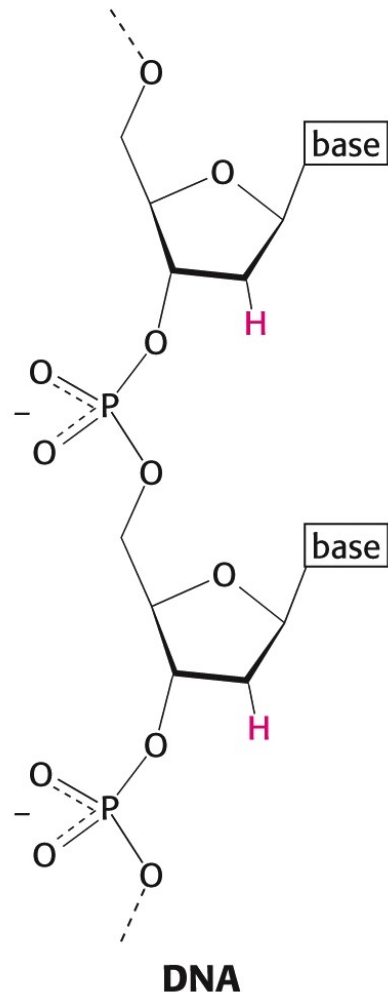
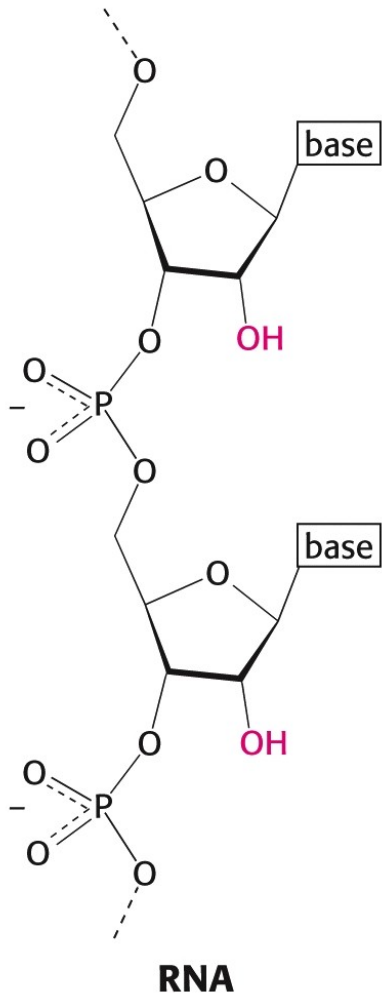


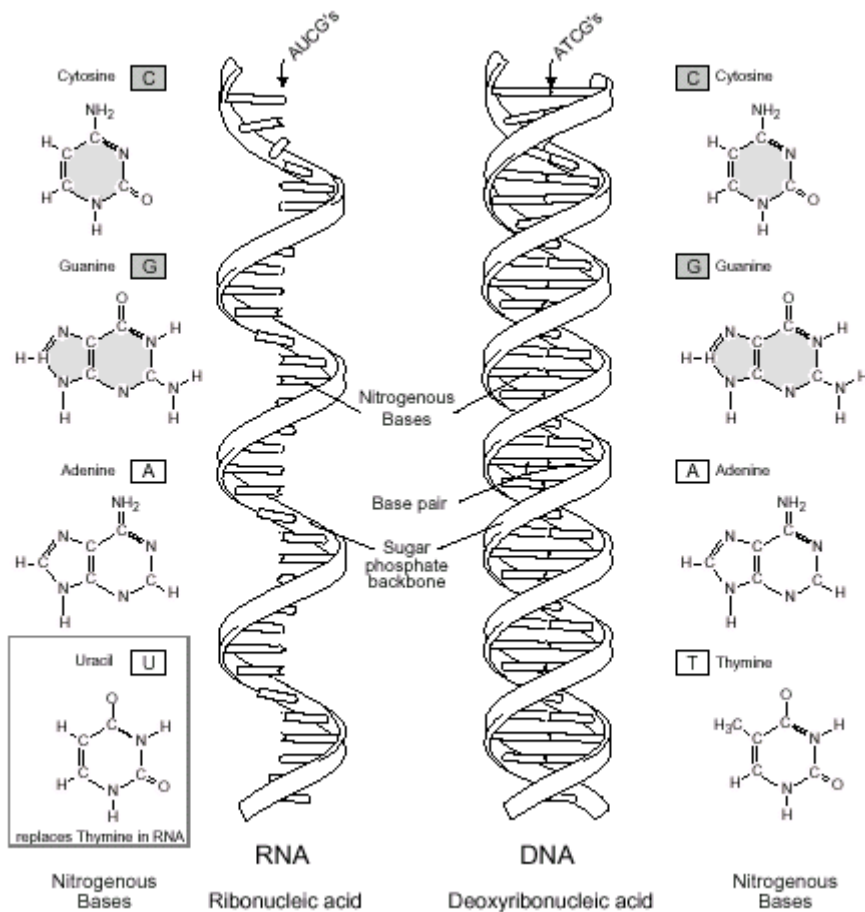






RNA



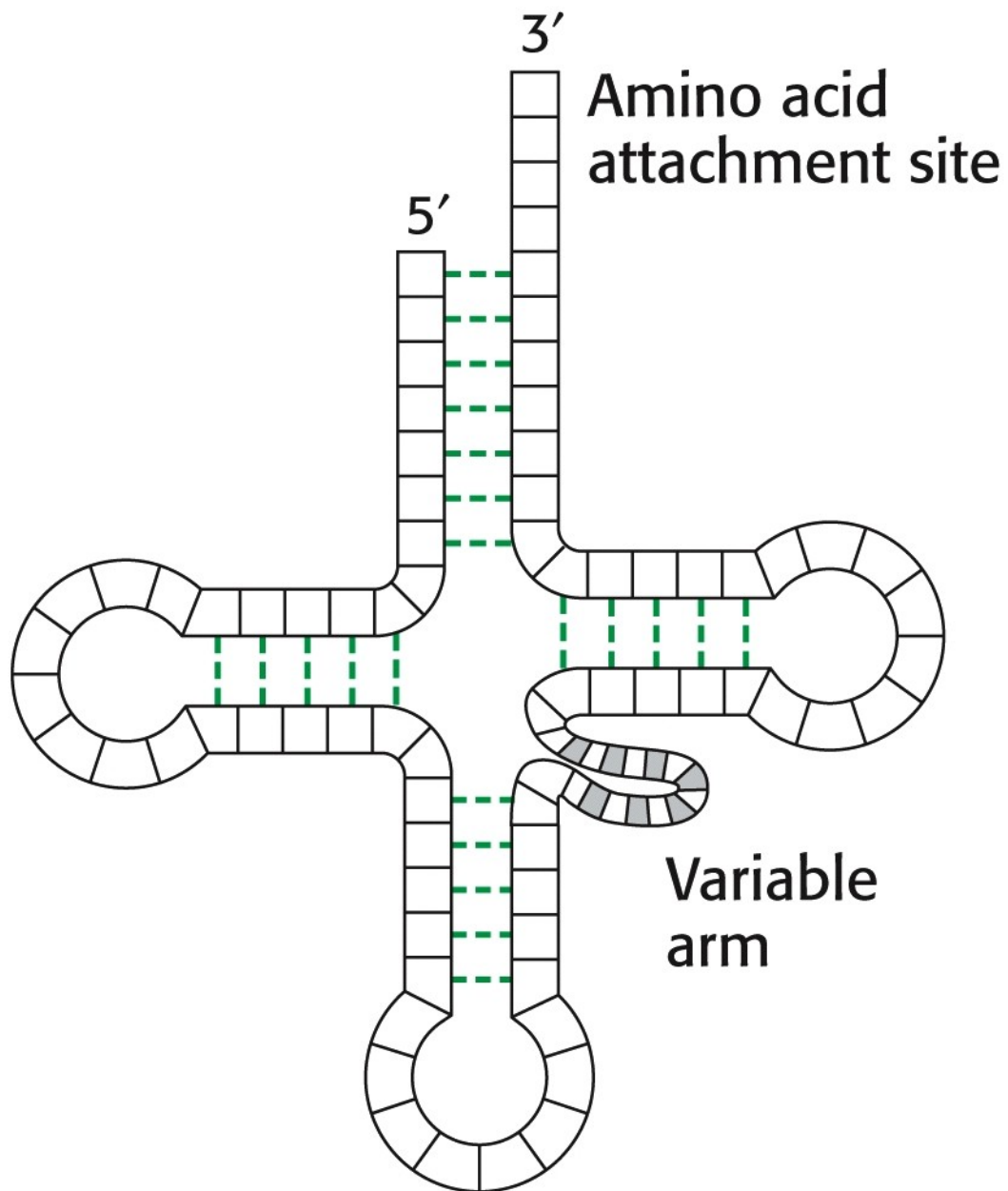


Formy RNA

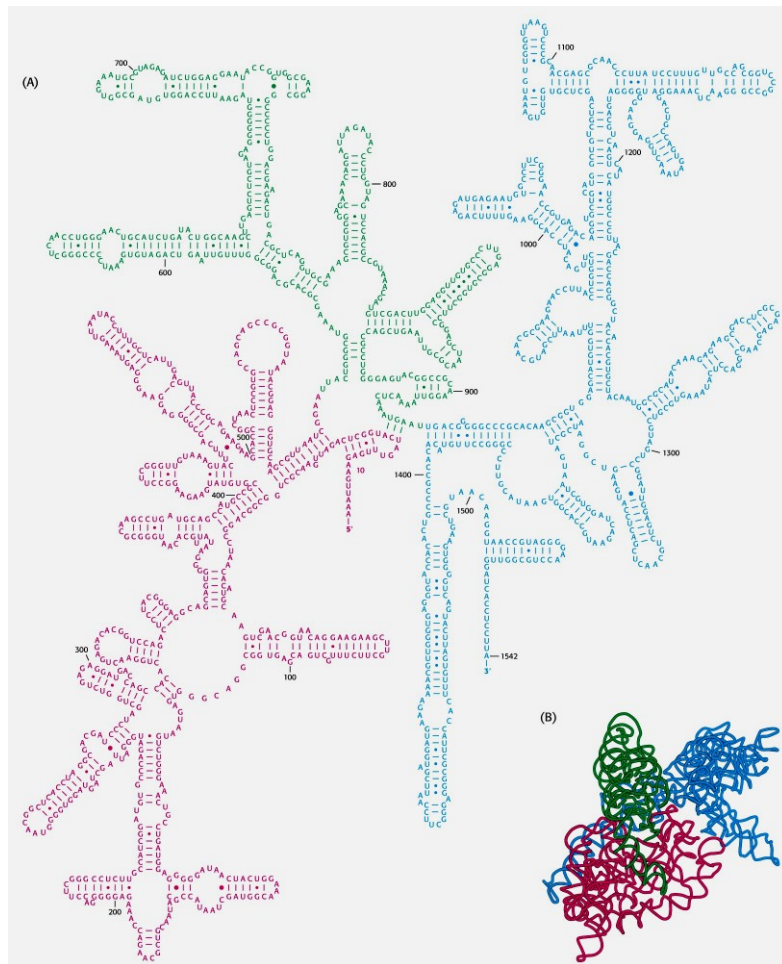
- mRNA – mediátorová, messenger, - informační – 5-10 %
- rRNA – ribosomální – 80 %
- tRNA – transferová, přenosová – 10-15 %
60 tRNA

TABLE 5.2 RNA molecules in *E. coli*

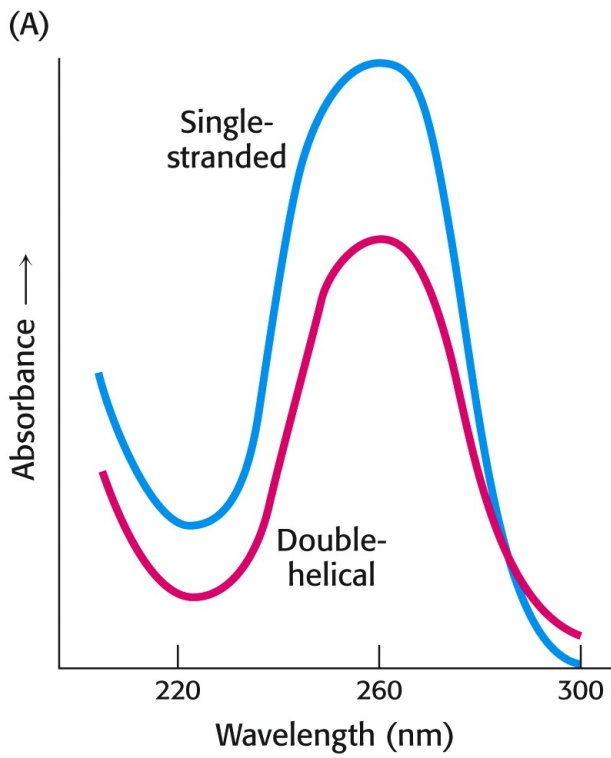
Type	Relative amount (%)	Sedimentation coefficient (S)	Mass (kd)	Number of nucleotides
Ribosomal RNA (rRNA)	80	23	1.2×10^3	3700
		16	0.55×10^3	1700
		5	3.6×10^1	120
Transfer RNA (tRNA)	15	4	2.5×10^1	75
Messenger RNA (mRNA)	5		Heterogeneous	



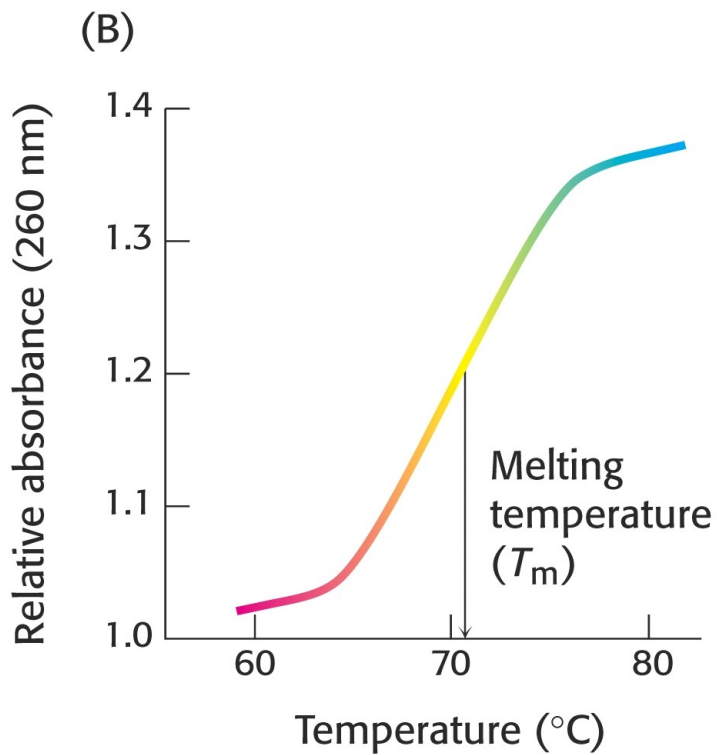
tRNA – jetelový list



rRNA



Absorpční spektrum DNA



„Denaturace DNA“

Sekvence – metoda Maxam-Gilbertova

Modifikace bází – DMS – puriny, hydrazinolýza pyrimidinů
 Štěpení řetězce v místě této báze

G – DMS, piperidin

A+G – kys. mravenčí, piperidin

T+C – hydrazin, piperidin

T – hydrazin + NaCl, piperidin

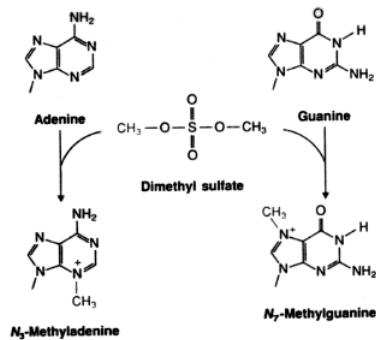


FIGURE 4A.1
 Reaction of purines with dimethyl sulfate.

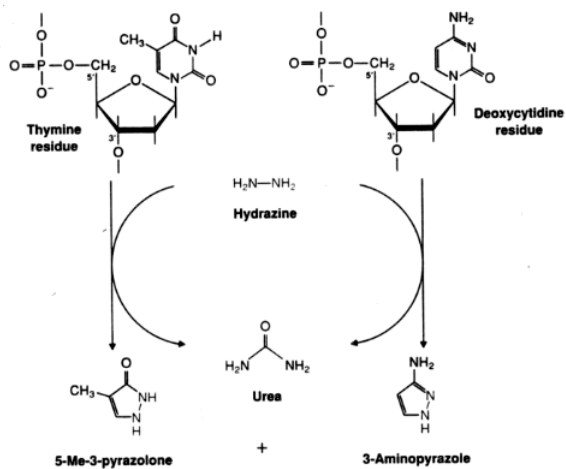


FIGURE 4A.2
 Hydrazinolysis of pyrimidines.

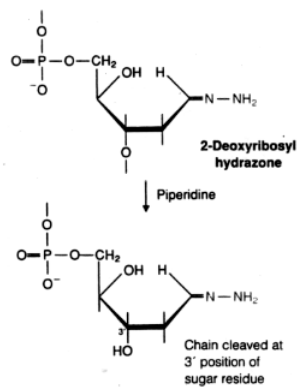
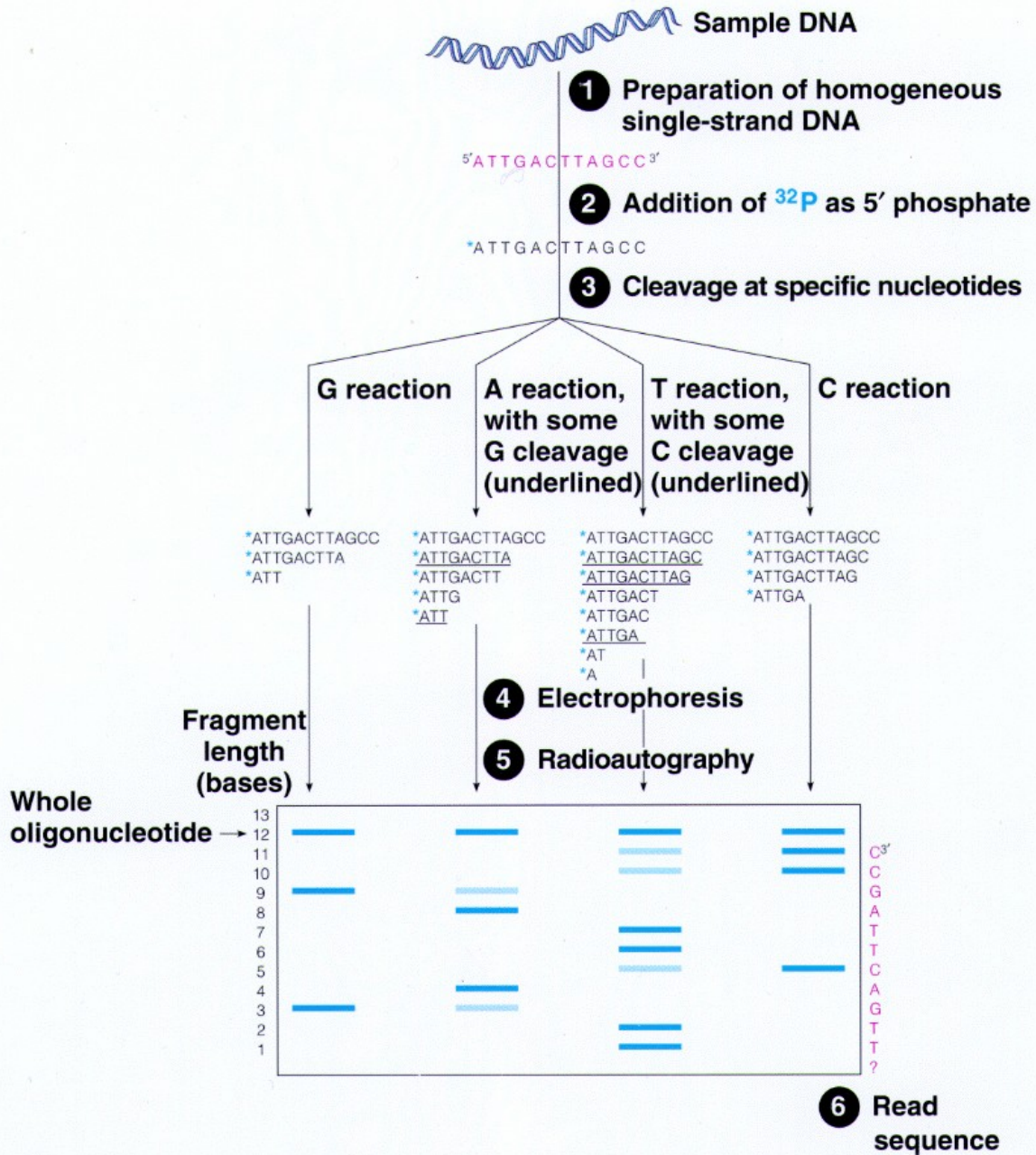
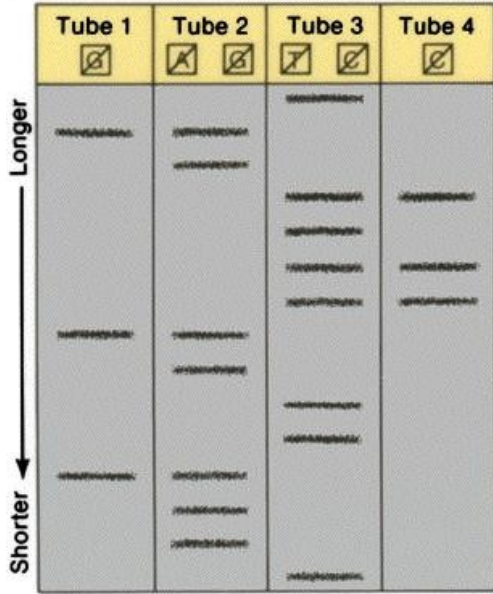


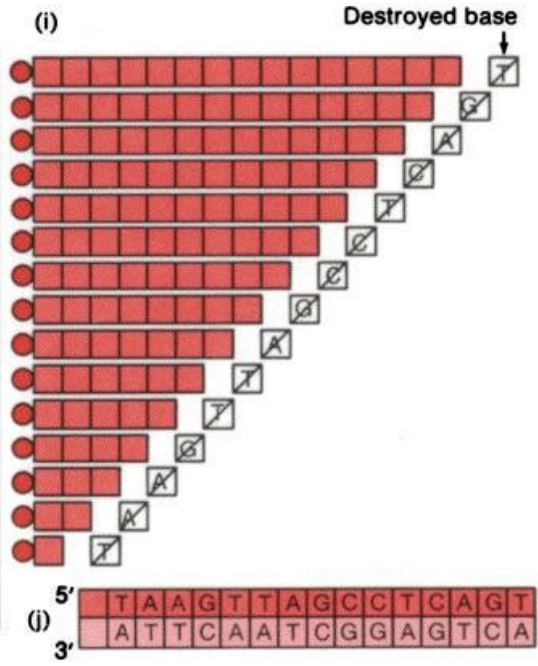
Figure 4A.4 Sequencing an oligonucleotide by the Maxam-Gilbert method



(h)



(i)



Top of gel

