

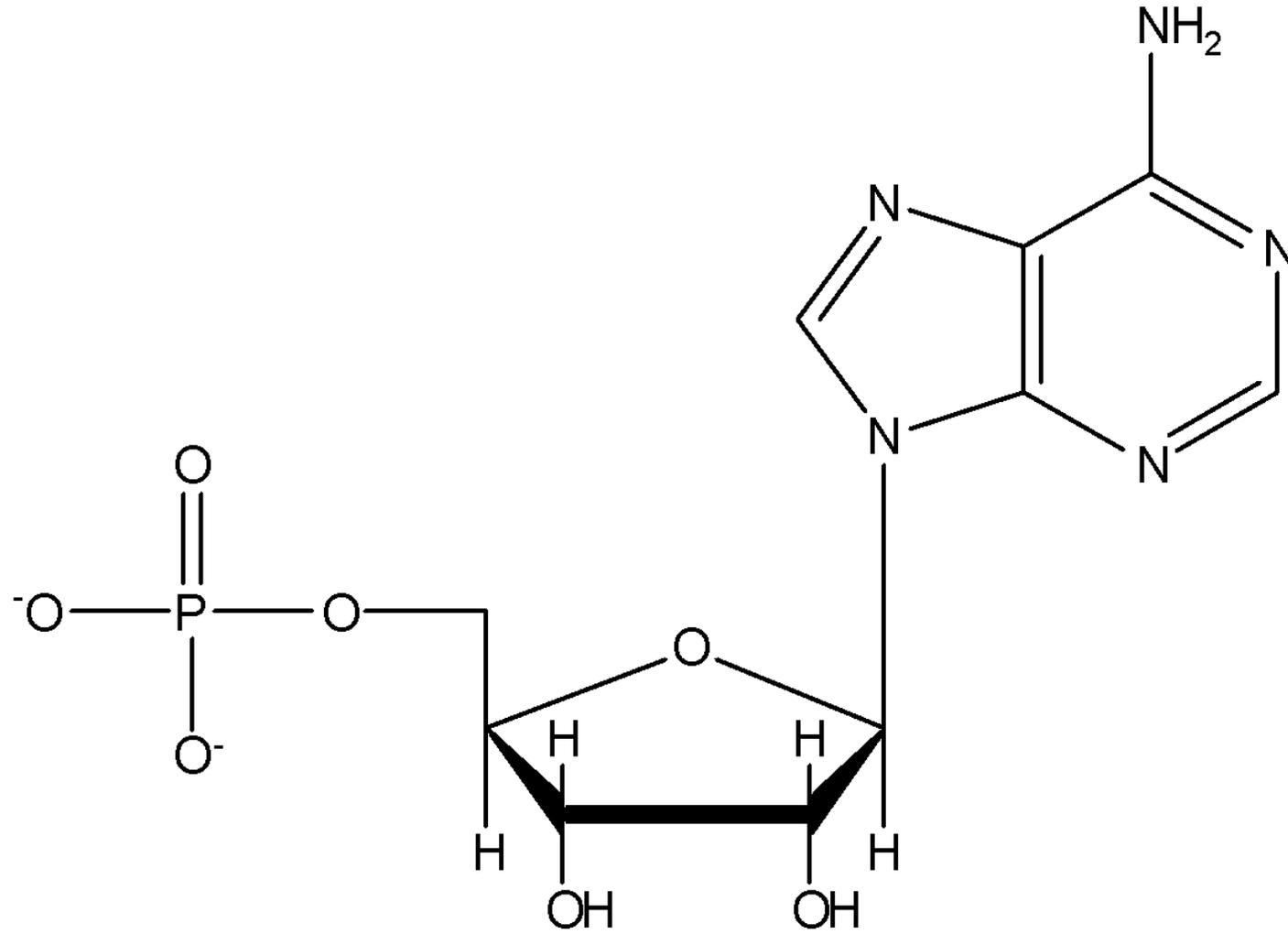
Биохимия и биофизика макромолекул

*Часть I Структура нуклеиновых
кислот*

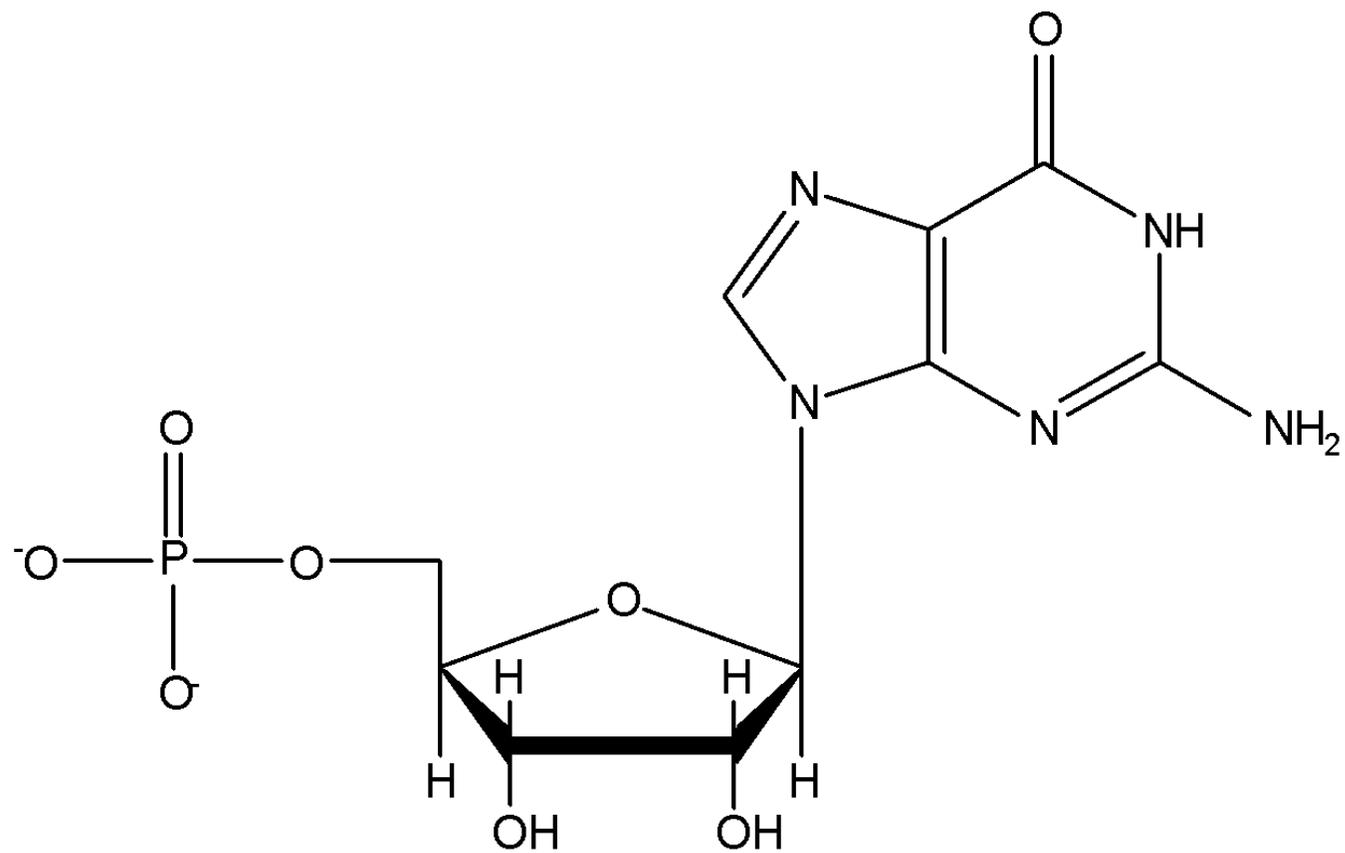
Чупахин Евгений Геннадьевич, биолог лаборатории молекулярно-генетических технологий, ассистент
кафедры

химии химико-биологического института БФУ им. И. Канта

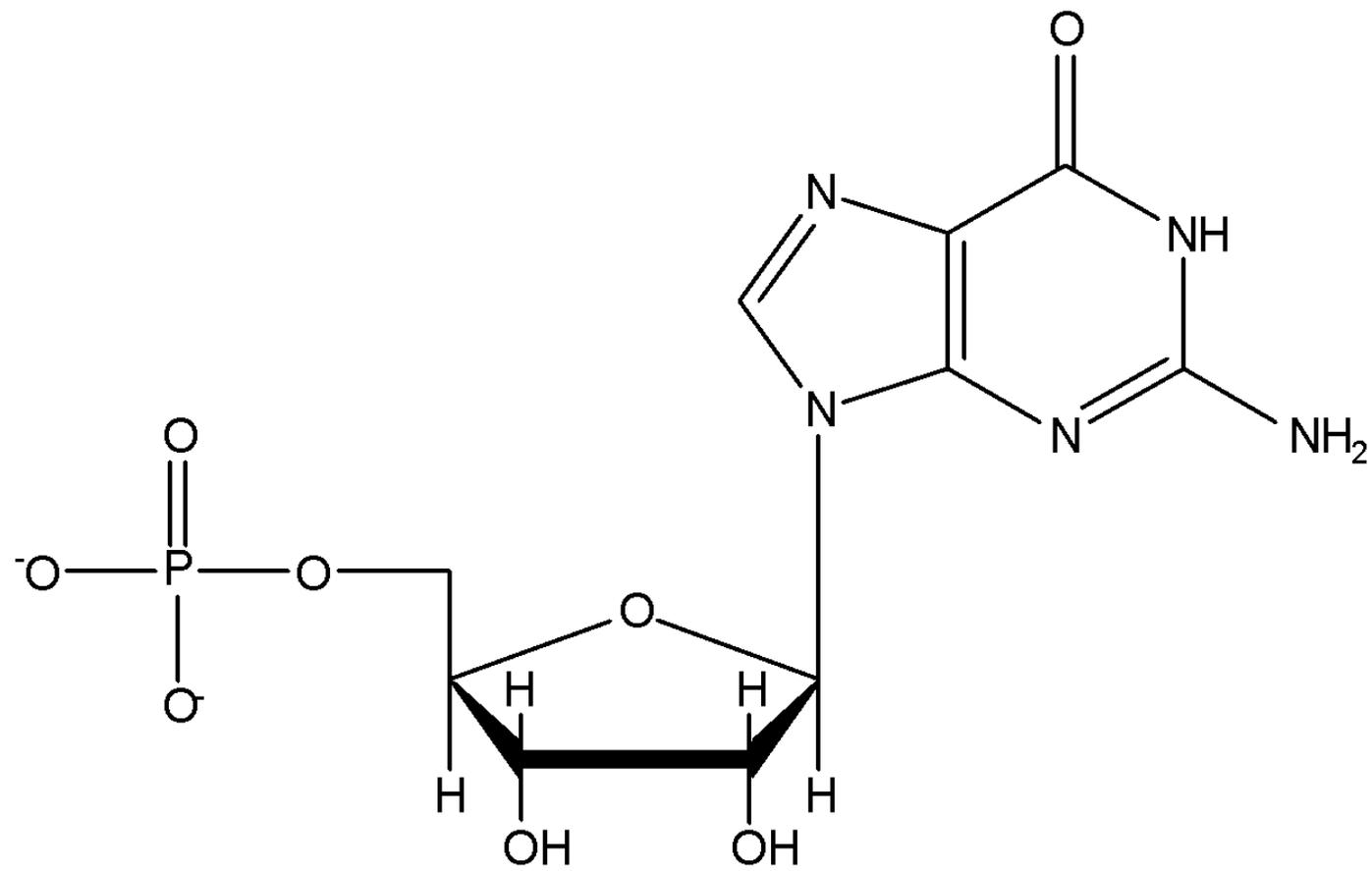
Нуклеотиды
РНК



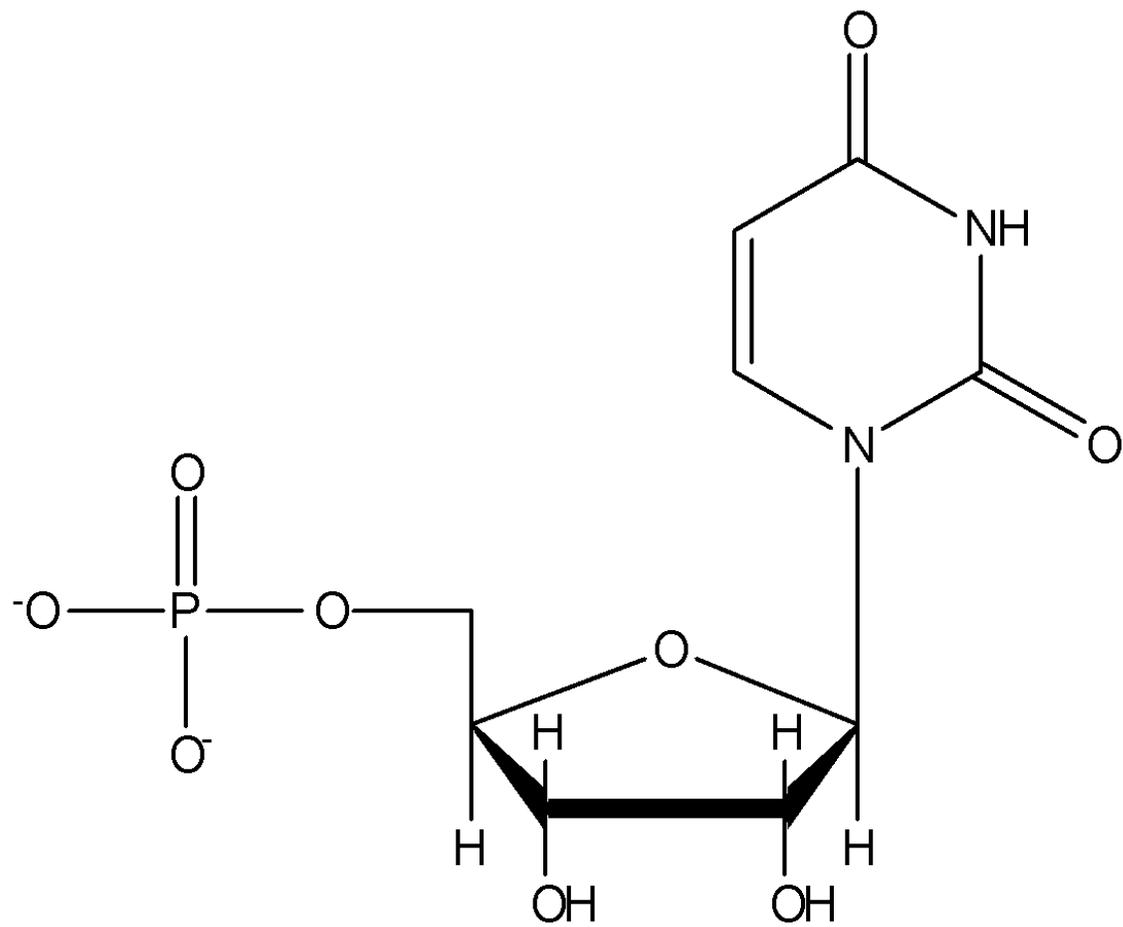
Аденозин
фосфат



Гуанозин
фосфат

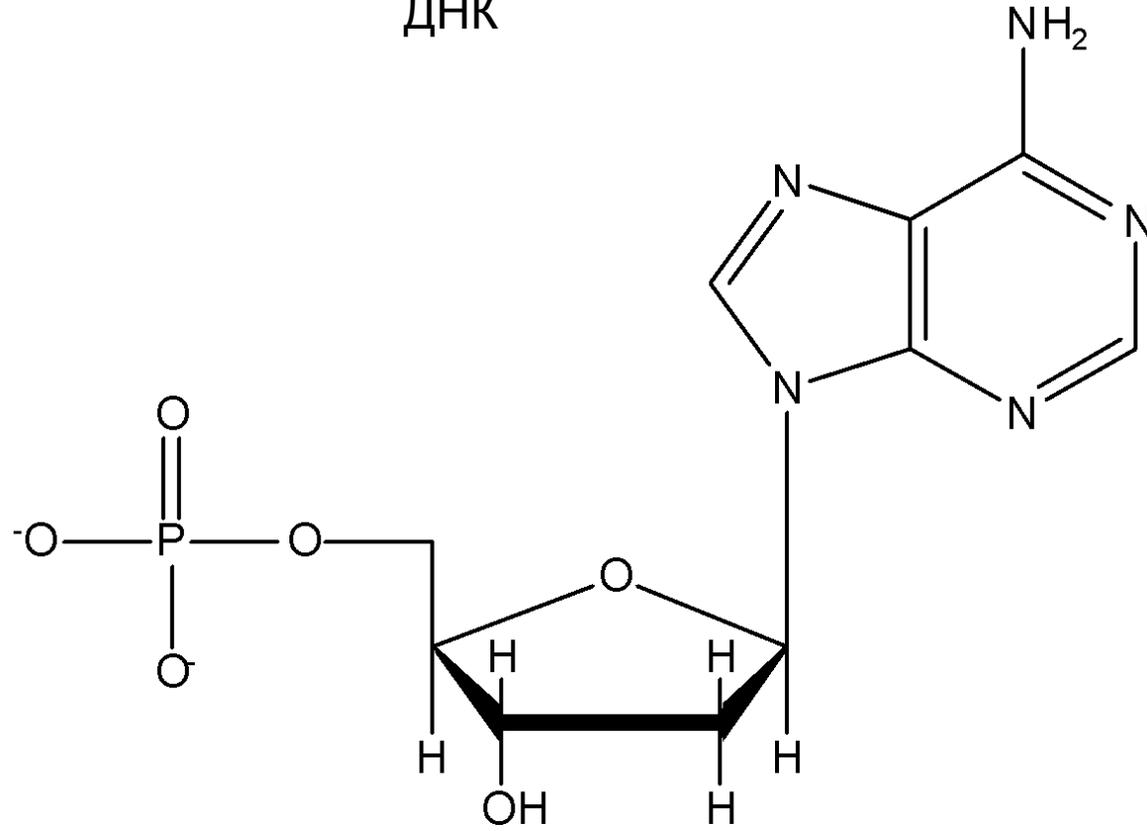


Цитозин
фосфат

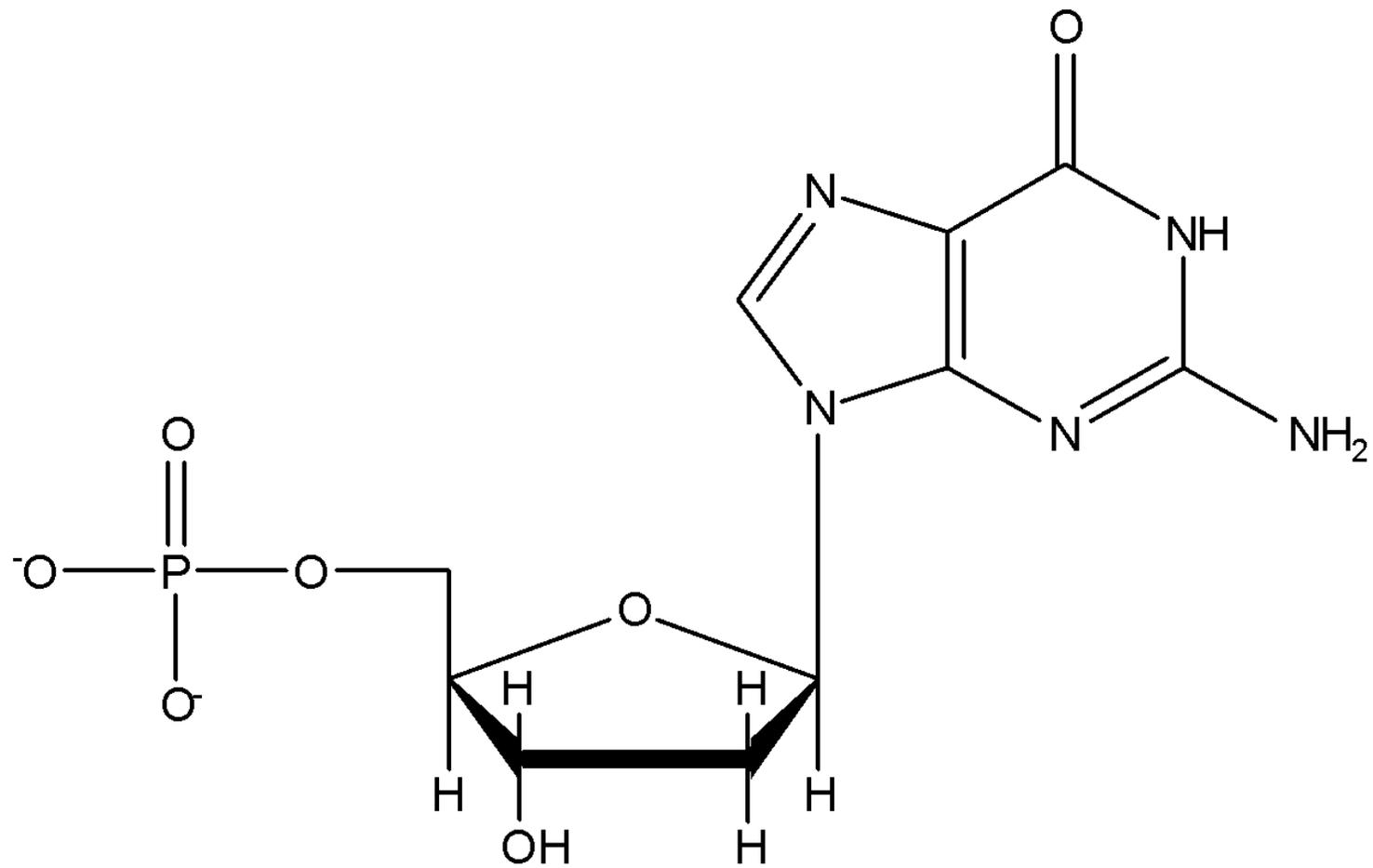


Уридин
фосфат

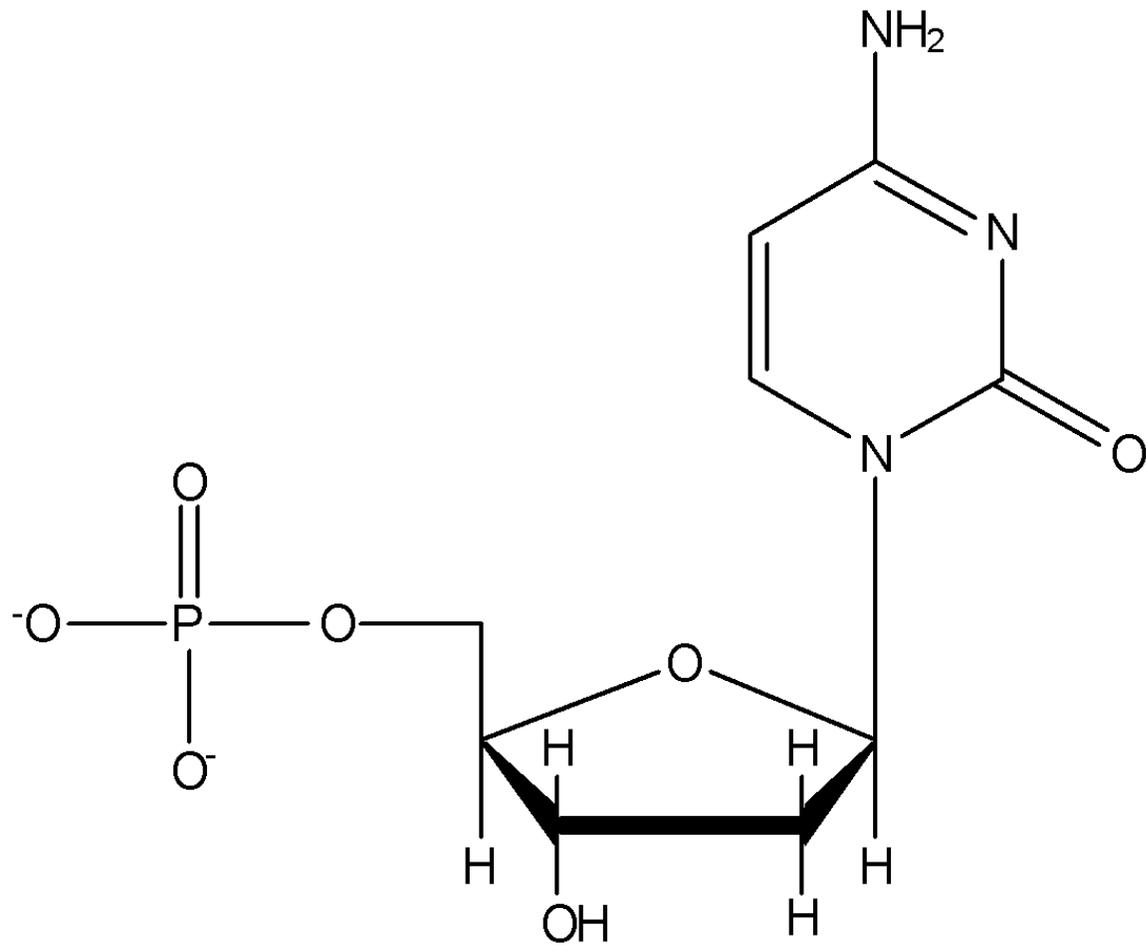
Нуклеотиды
ДНК



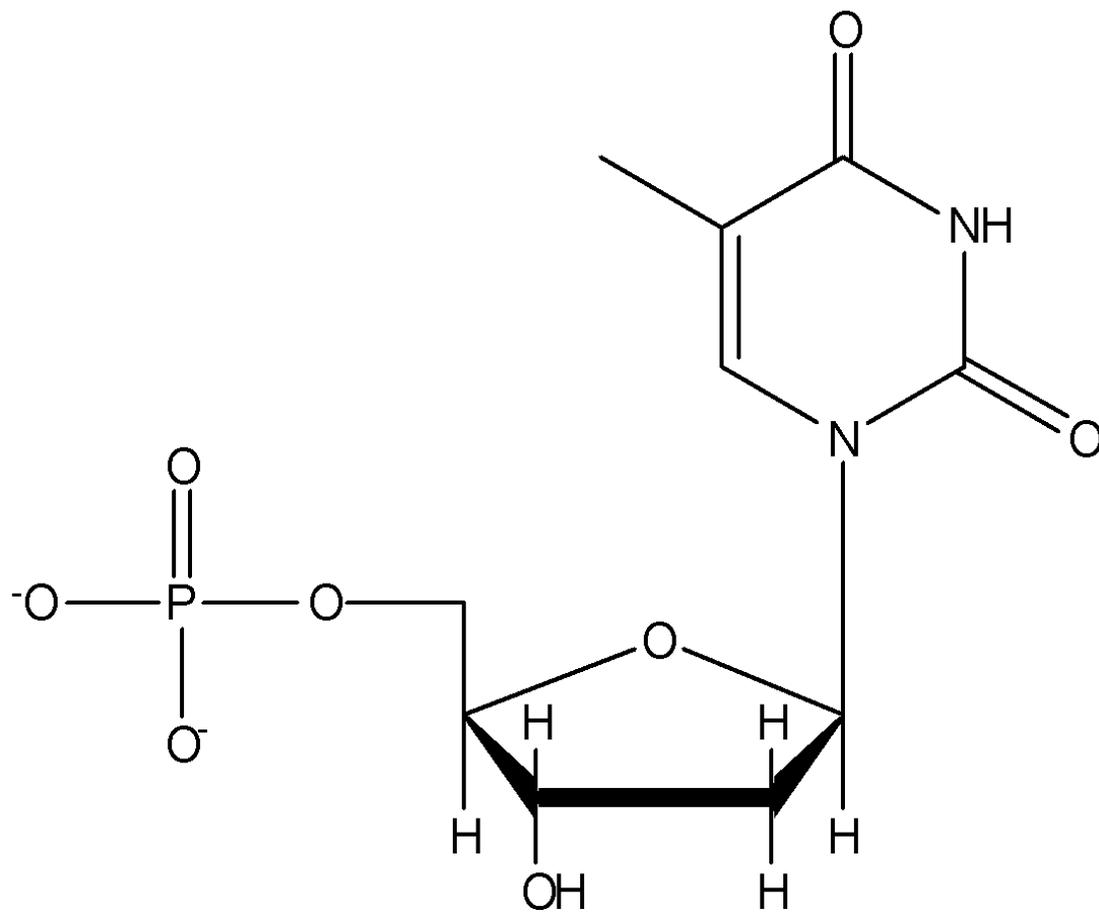
Дезоксиаденозин
фосфат



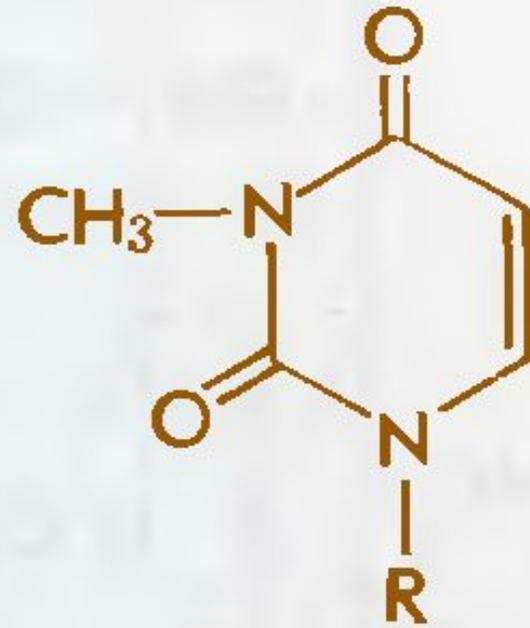
Дезоксигуанозин
фосфат



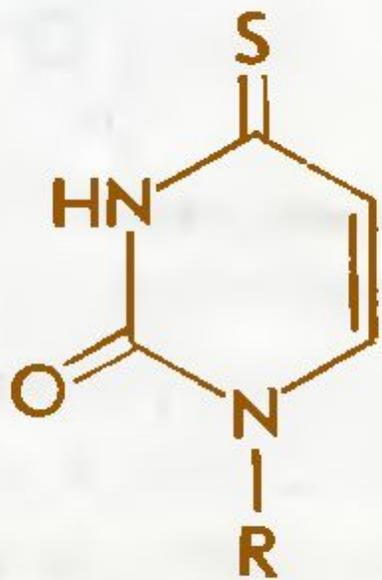
Дезоксигуанозин
фосфат



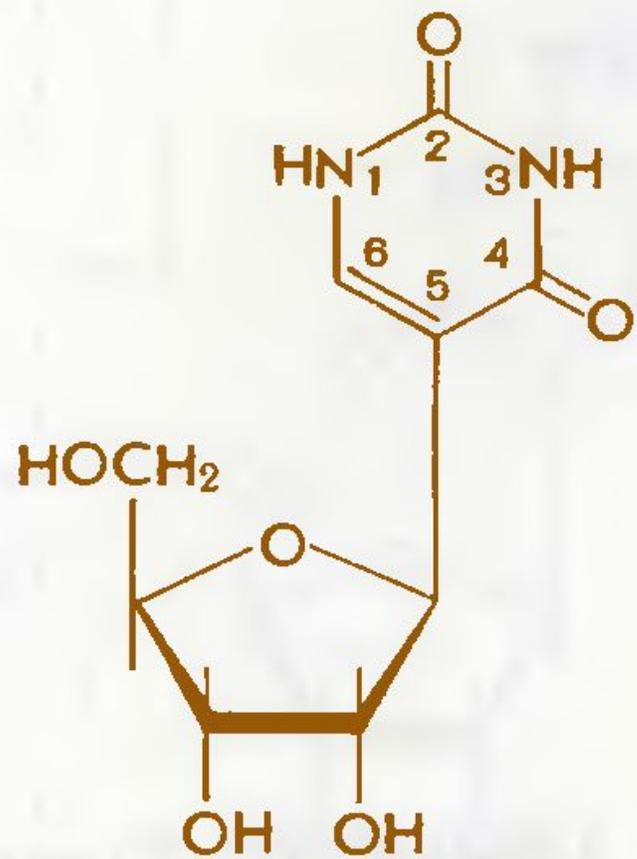
Дезокситимидин
фосфат



3- Метилуридин (m³U)

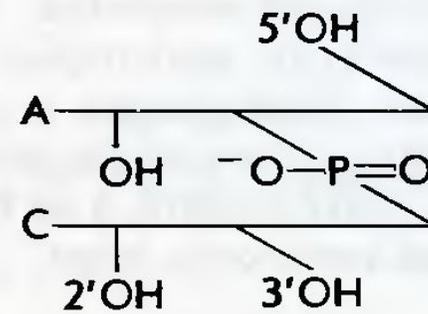
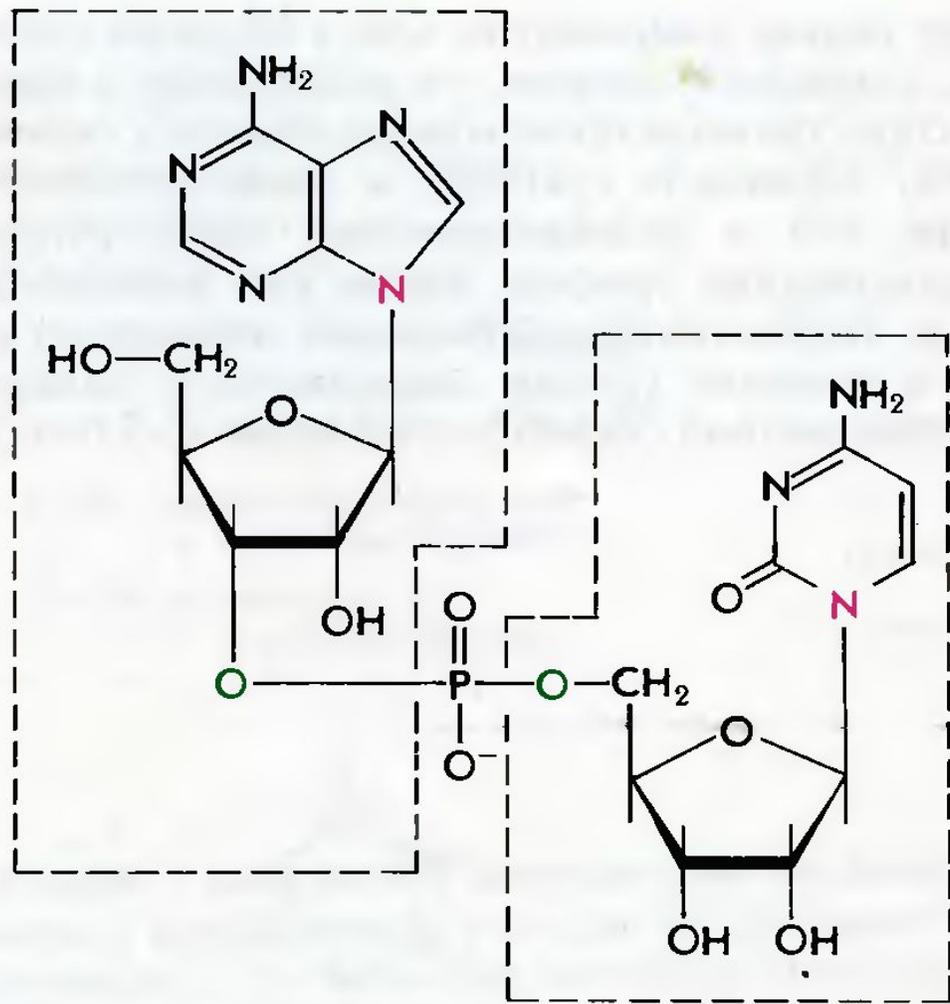


4-Тиоуридин (S⁴U)

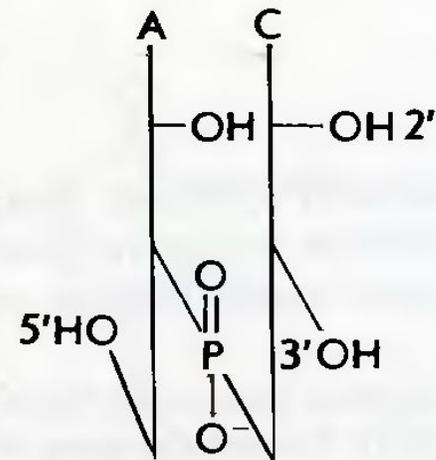


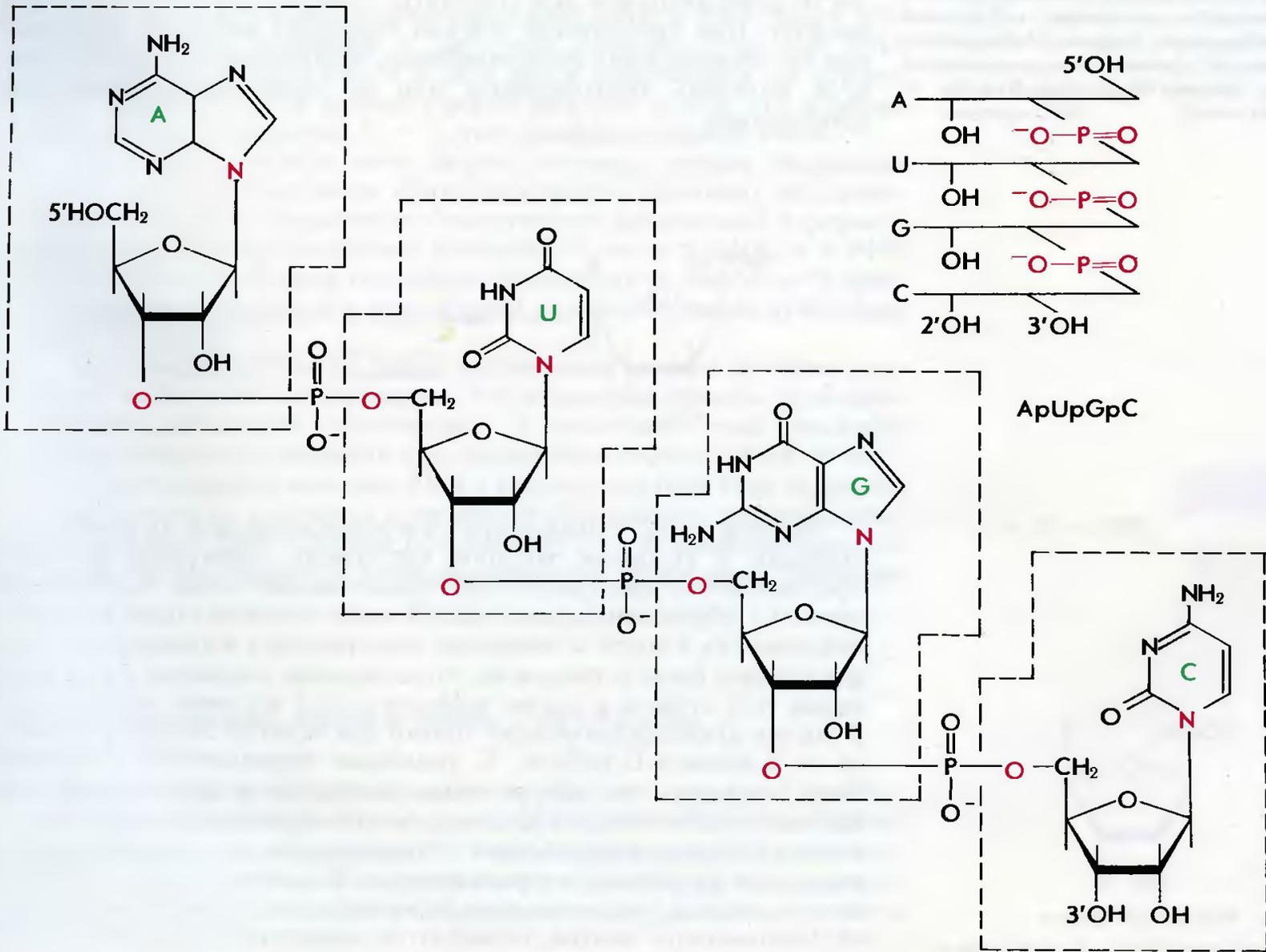
Псевдоуридин (Ψ)

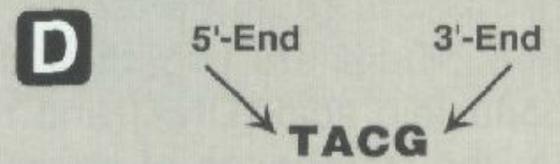
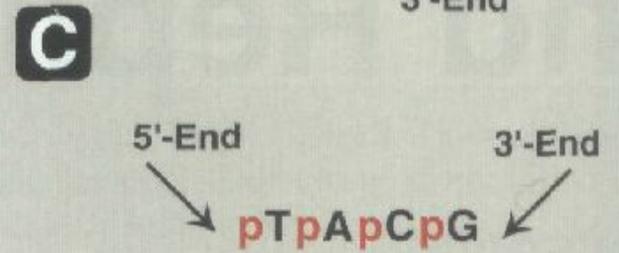
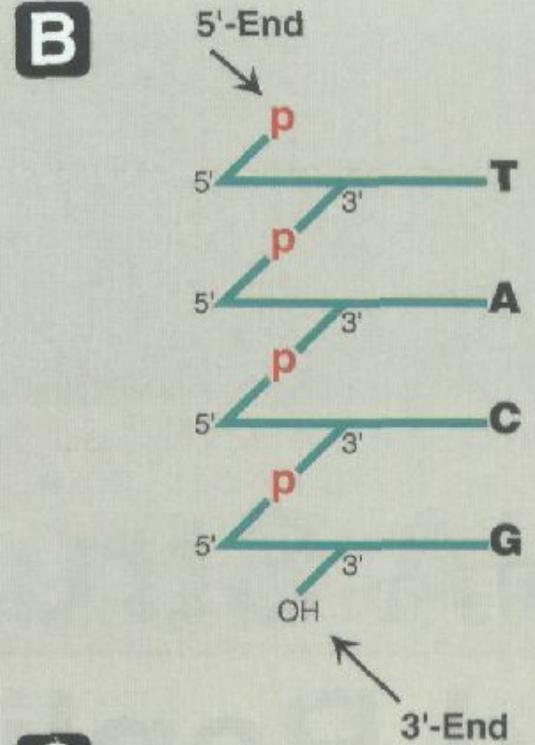
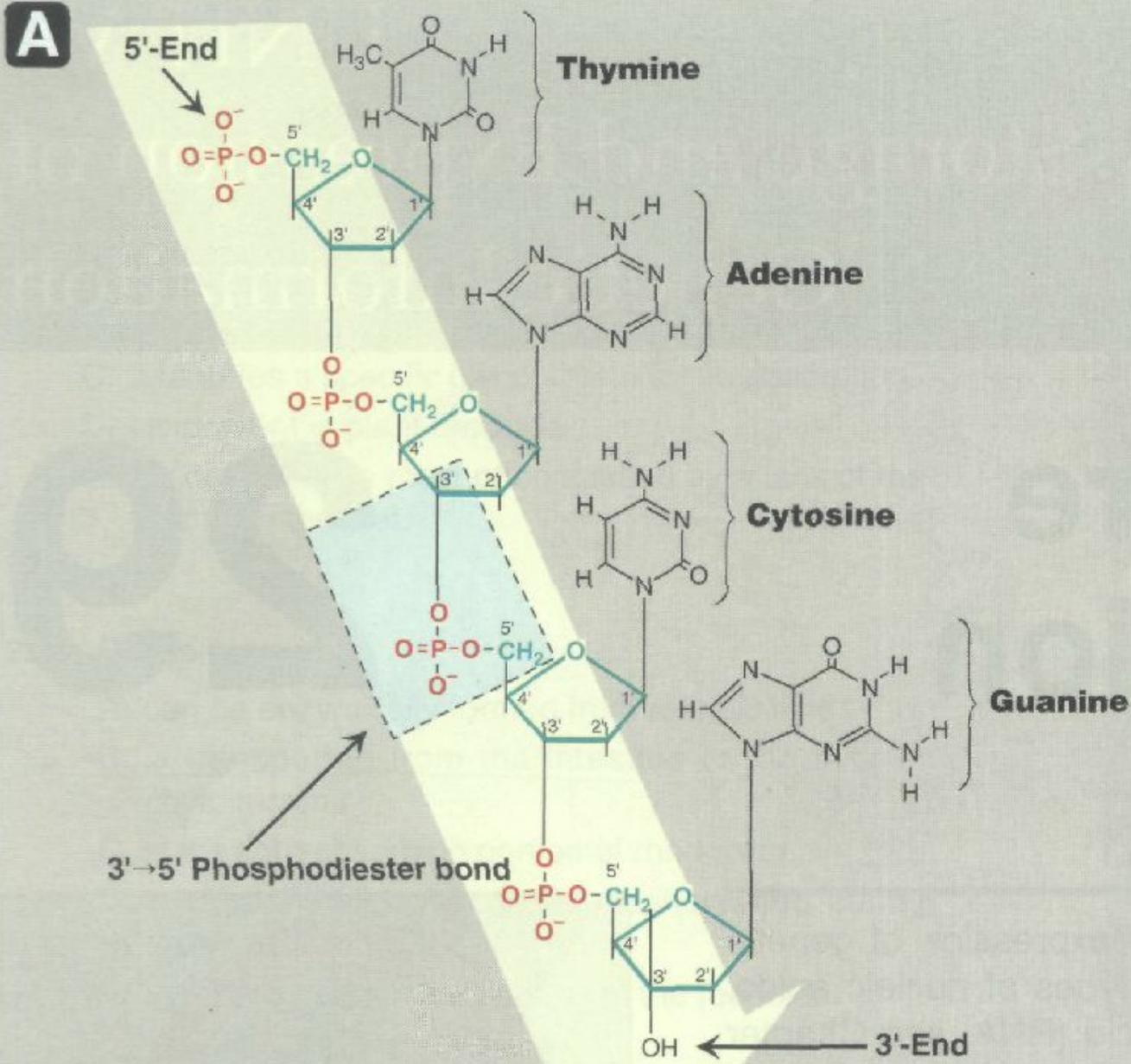
основание (нуклеотид)	основание+сахар (нуклеозид)	обозначения РНК	обозначения ДНК
аденин	аденозин	A (А)	d-A
гуанин	гуанозин	G (Г)	d-G
тимин	тимидин	T (Т)	d-T
цитозин	цитидин	C (Ц)	d-C
урацил	уридин	U (У)	

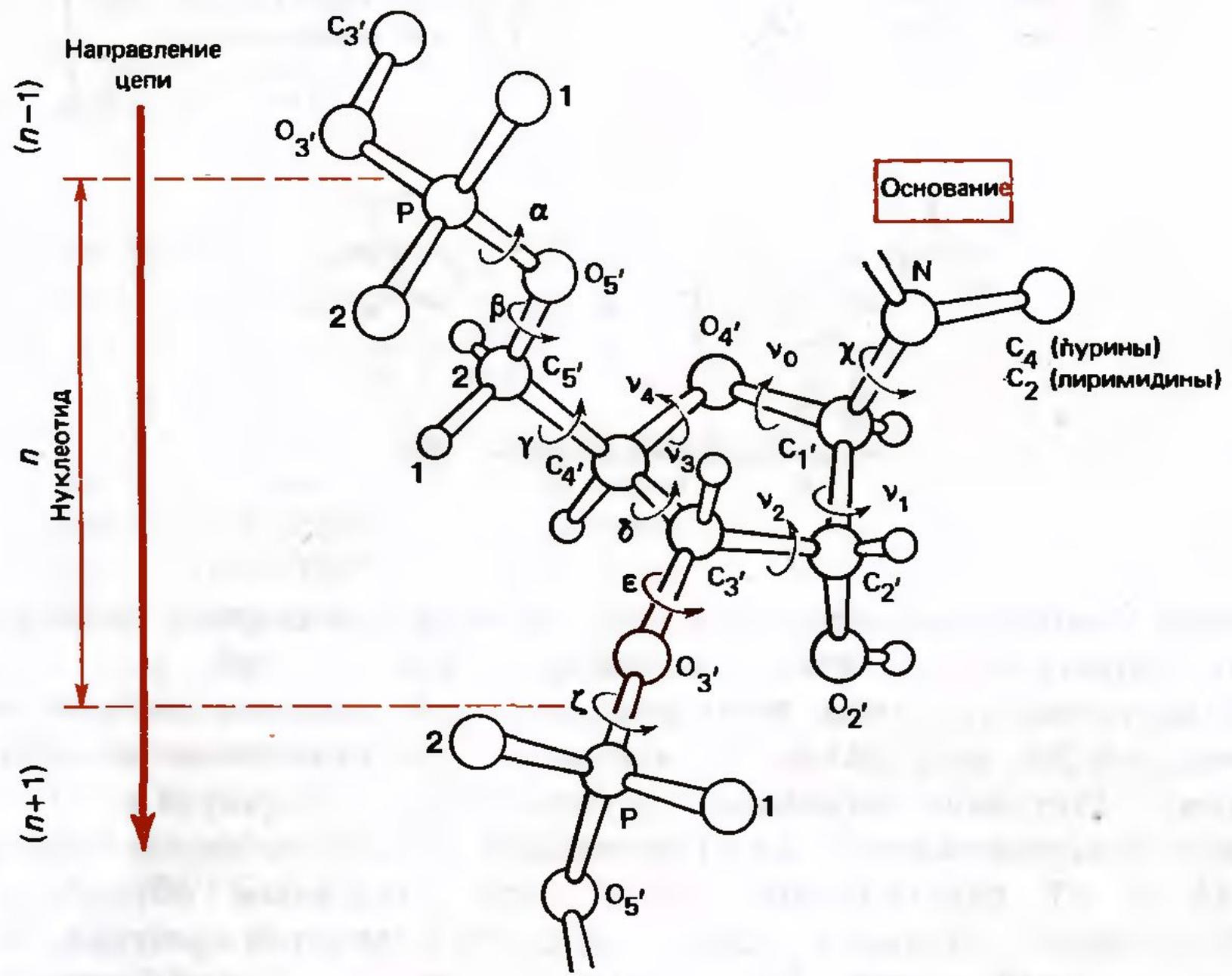


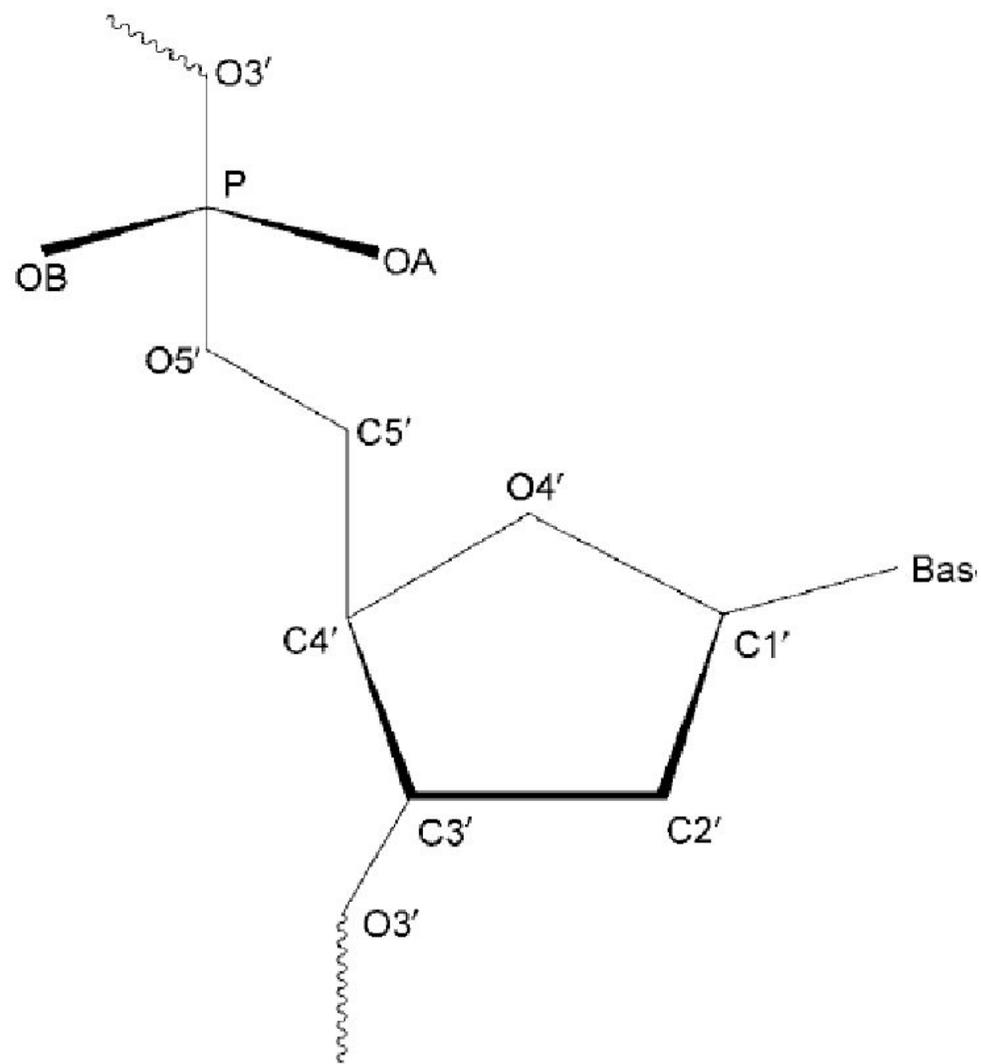
или

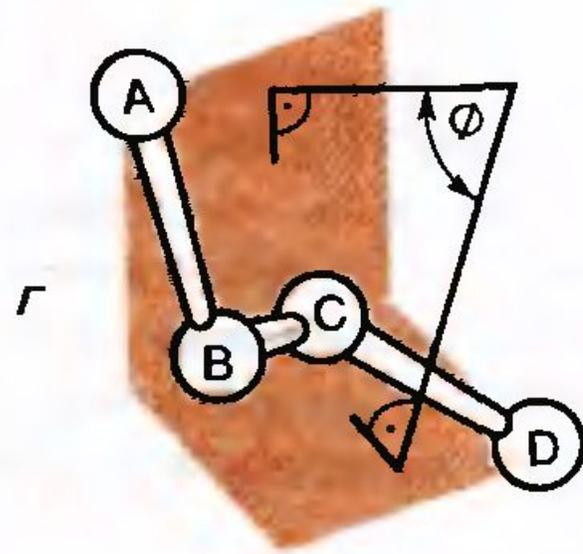
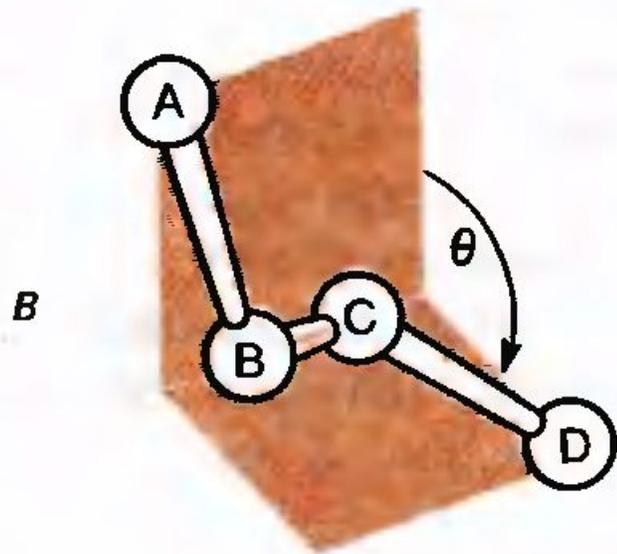
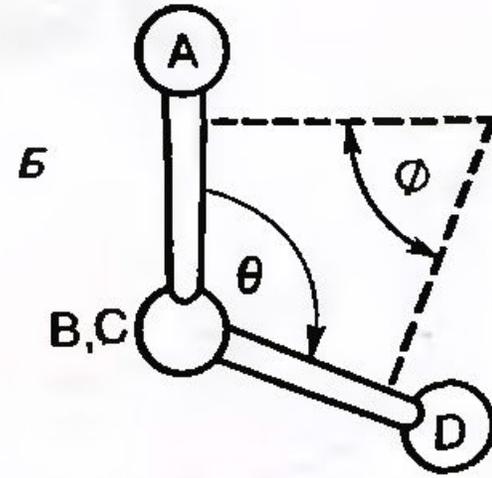
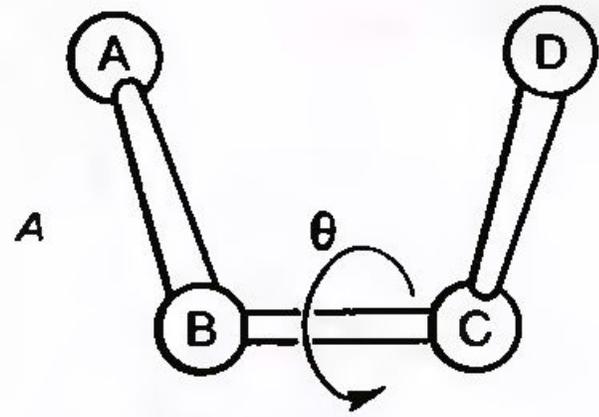


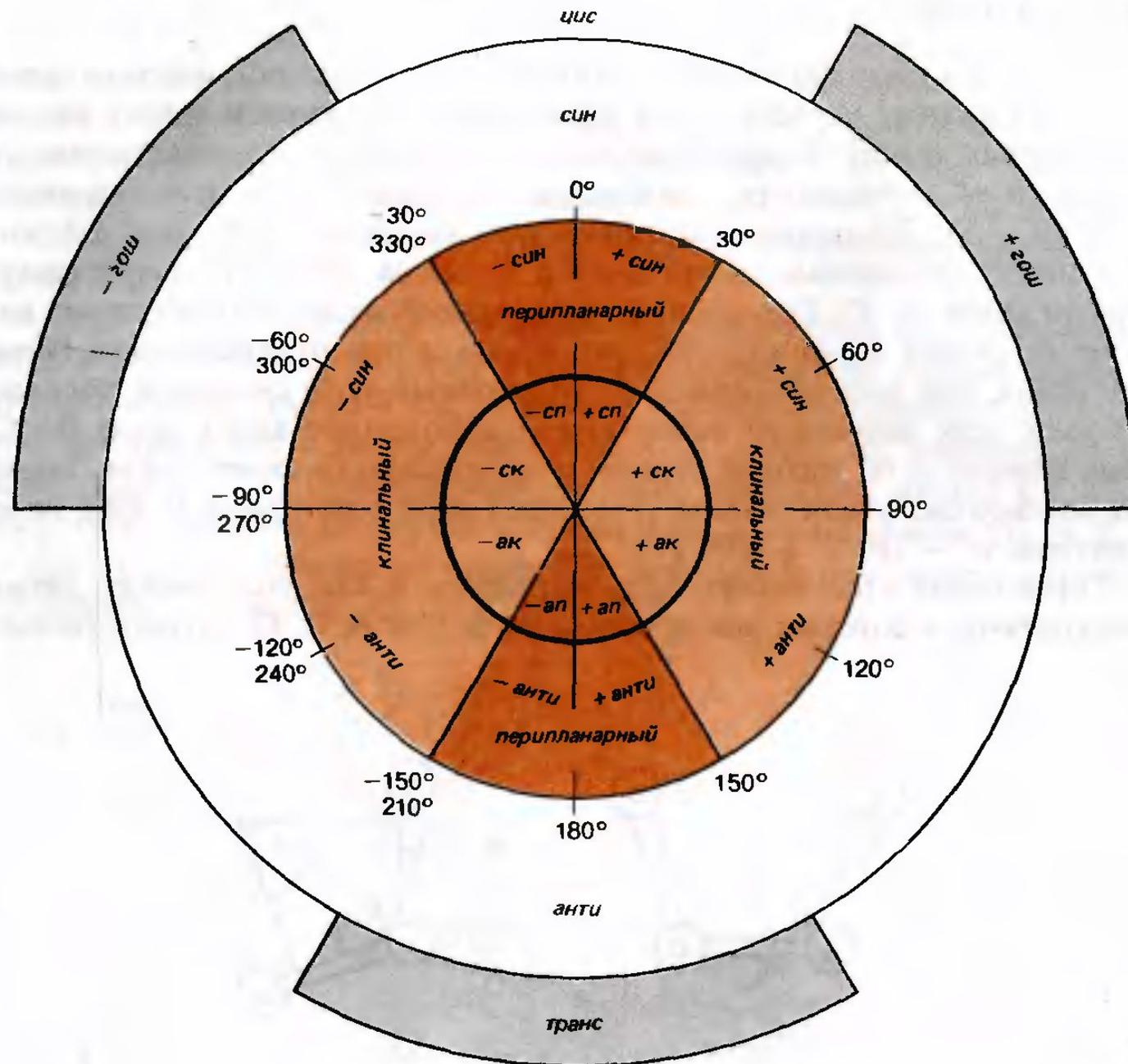


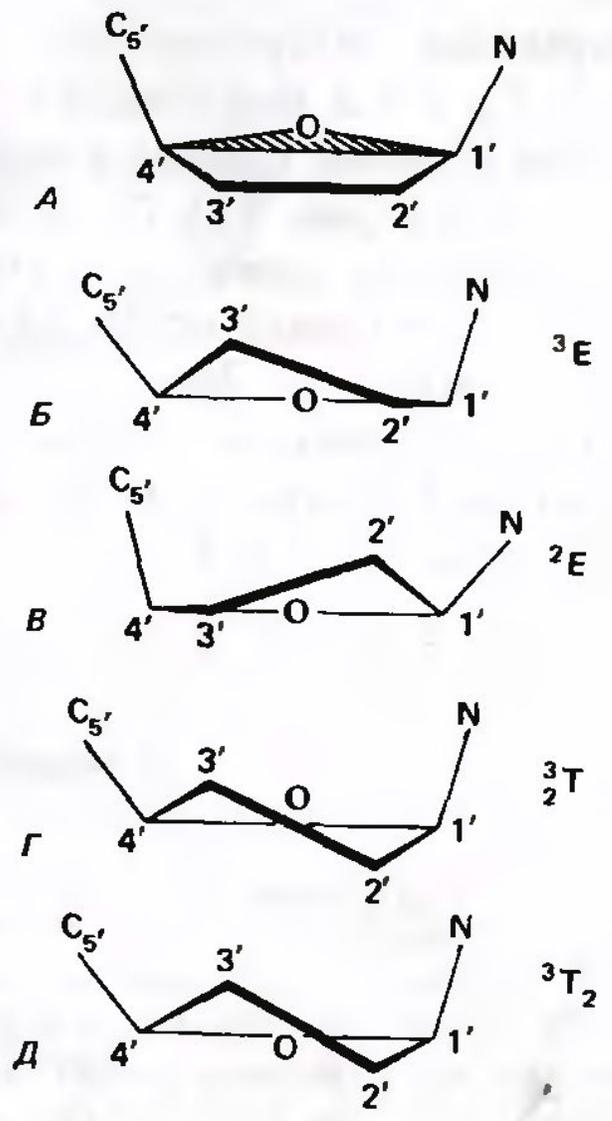
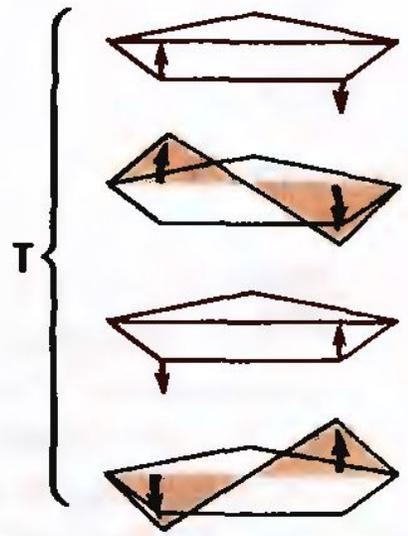
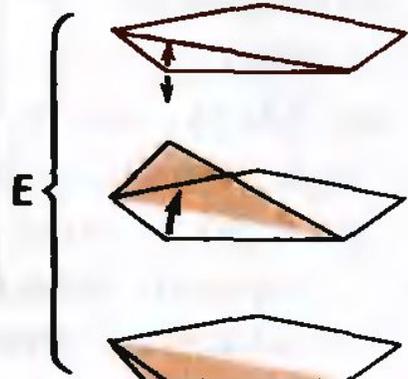


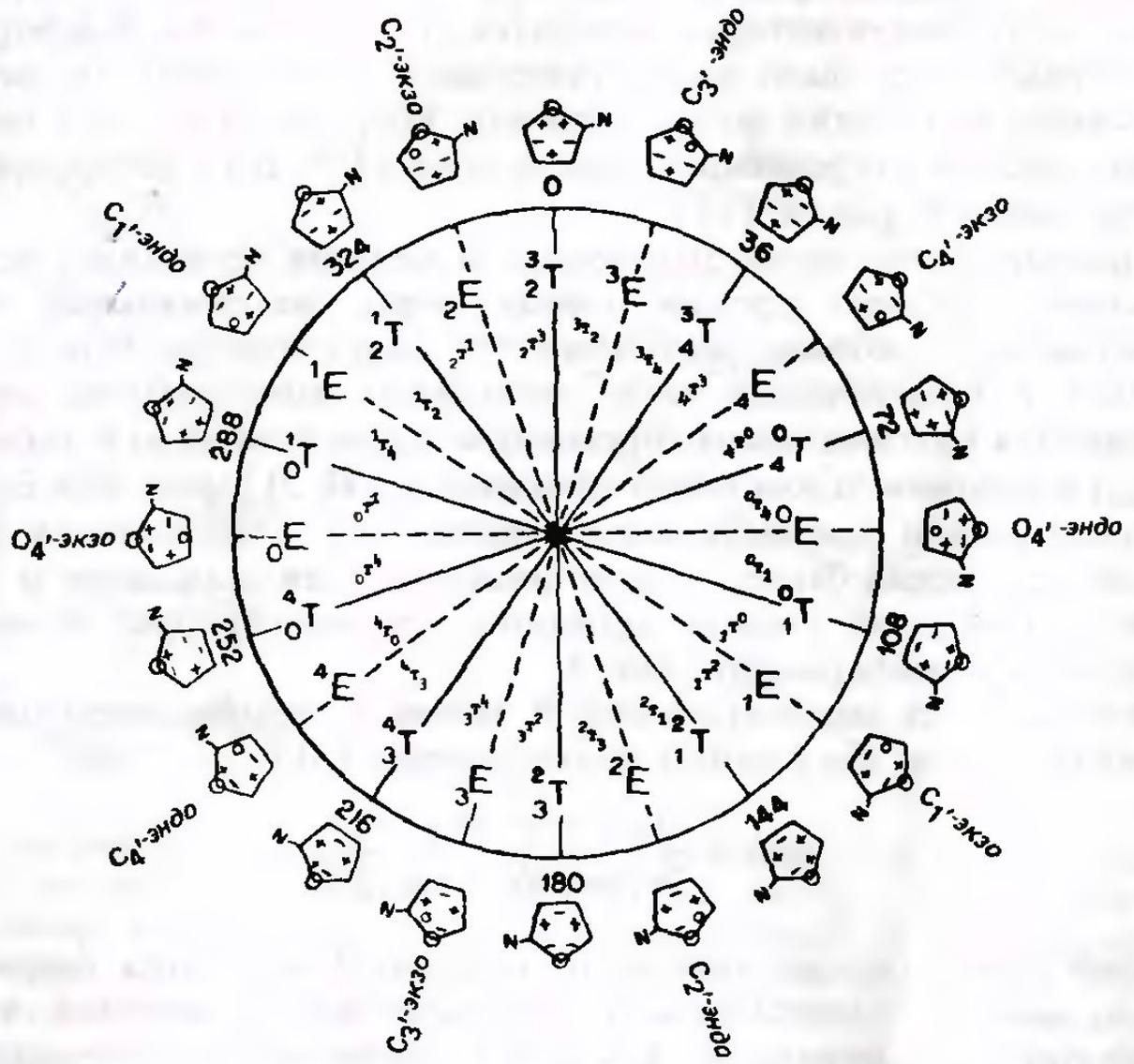


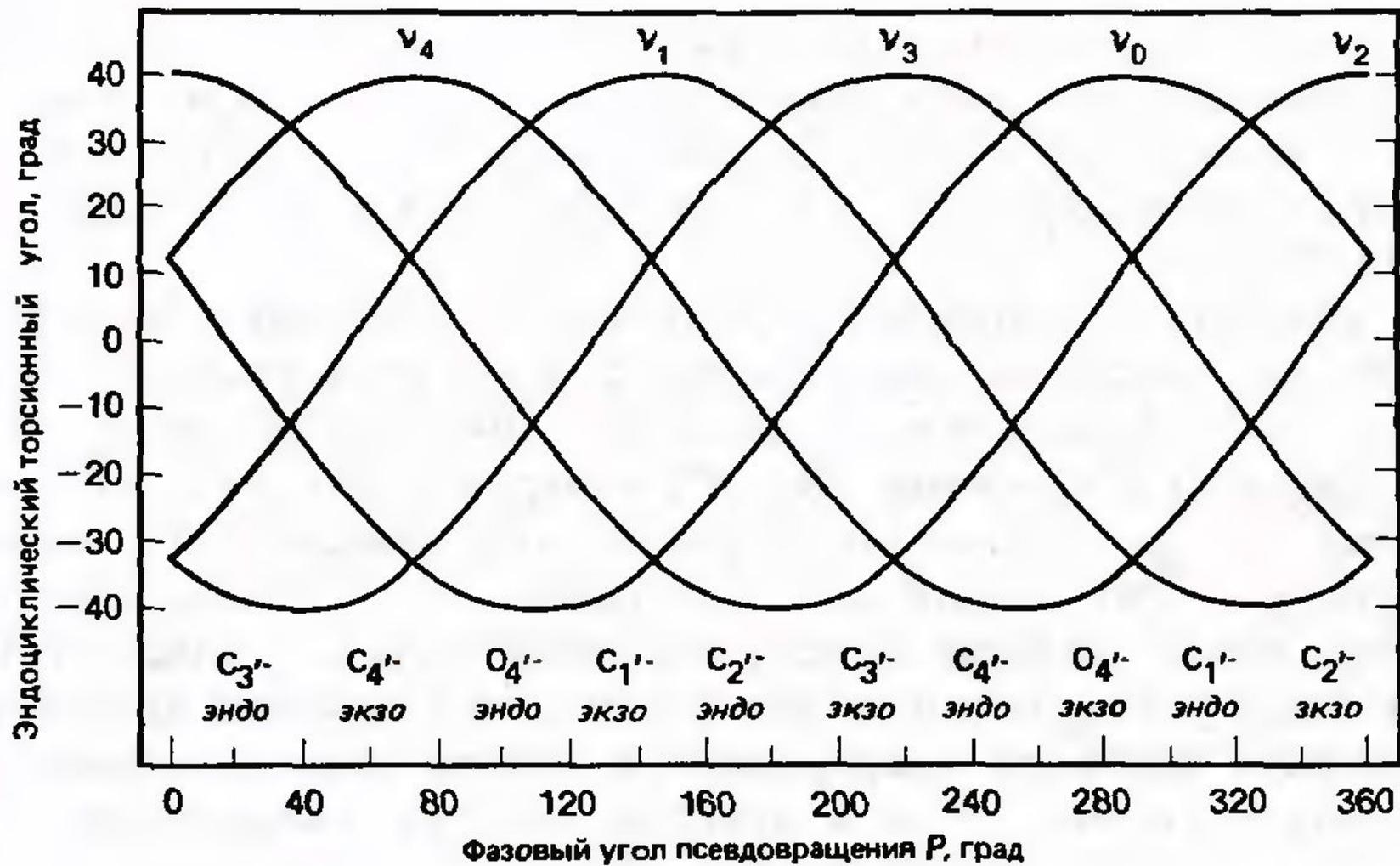


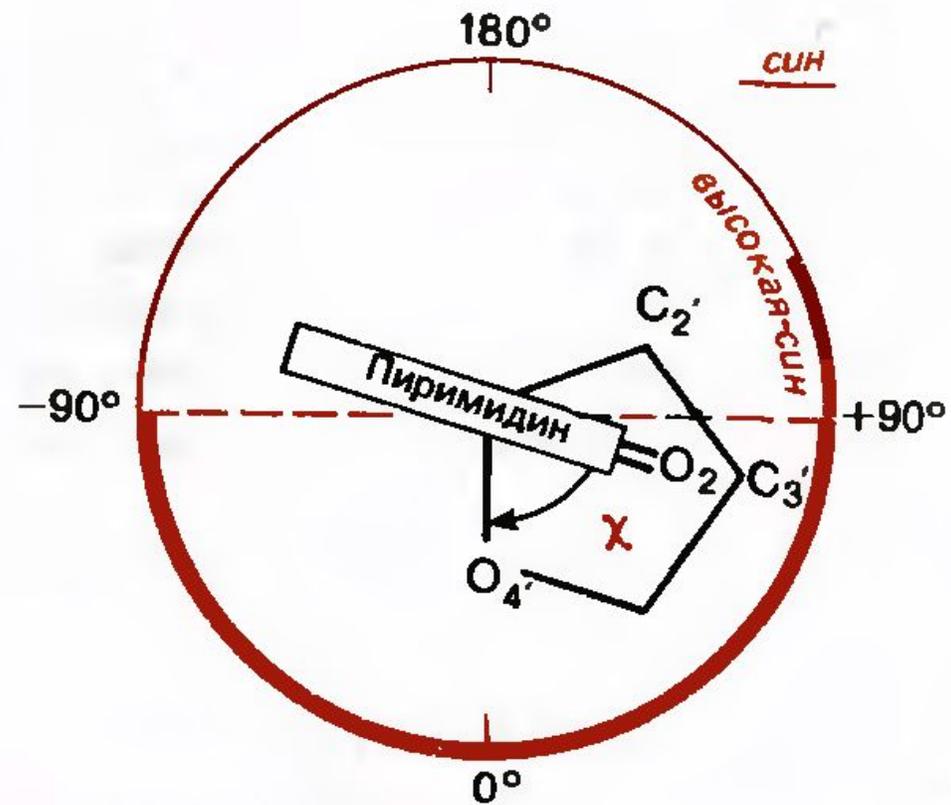
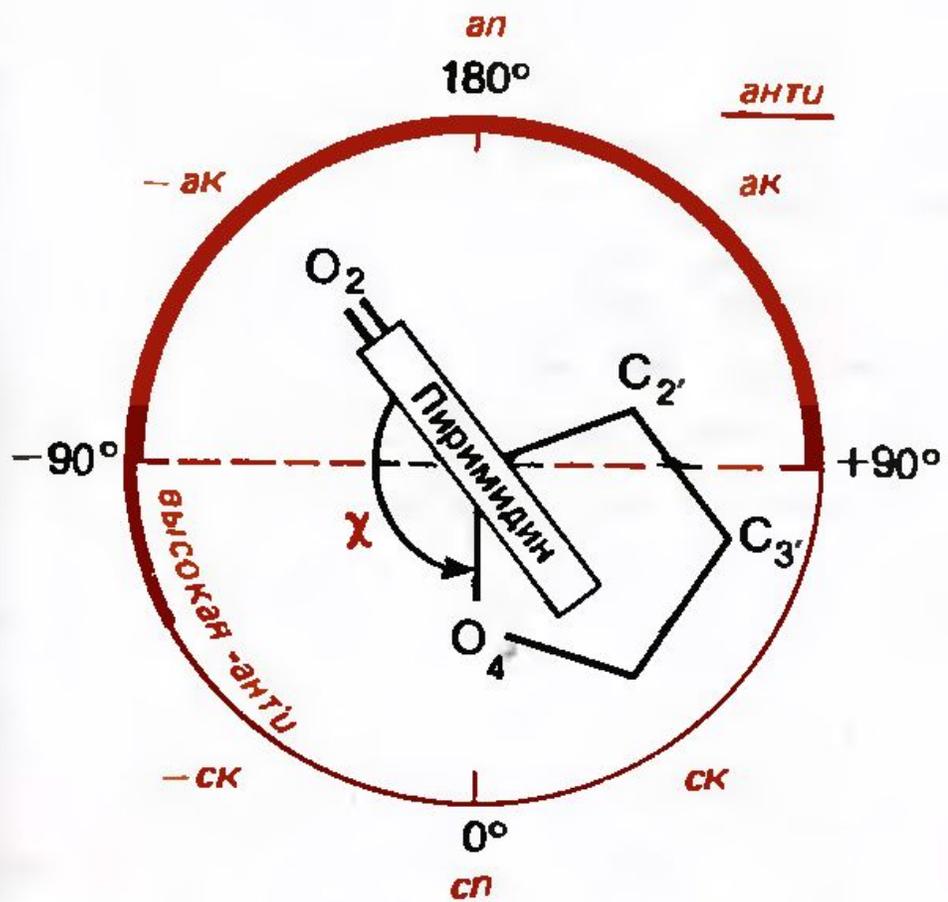


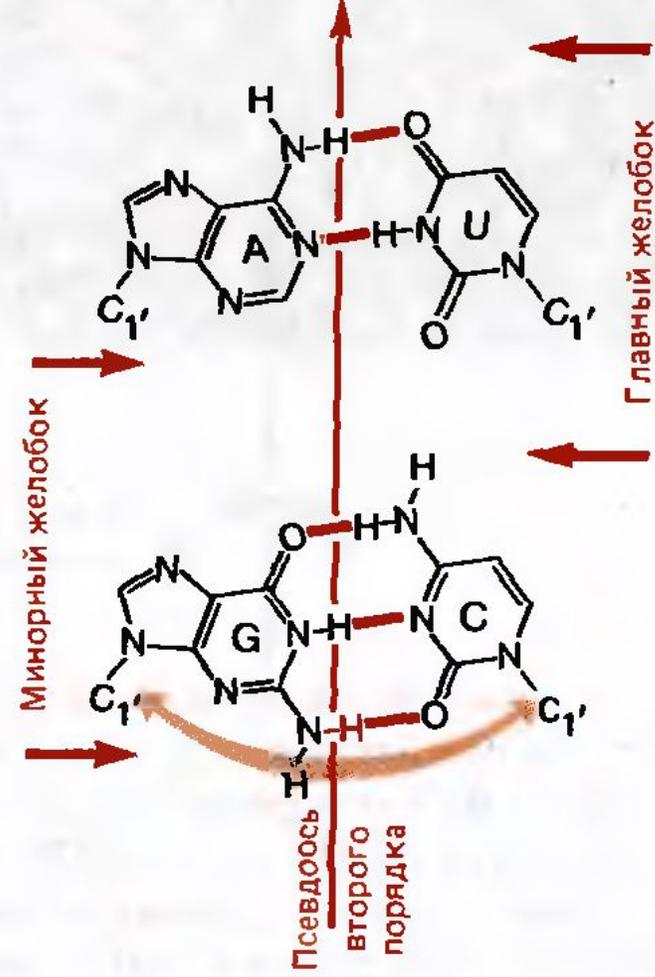
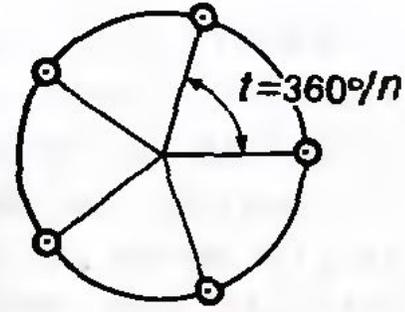
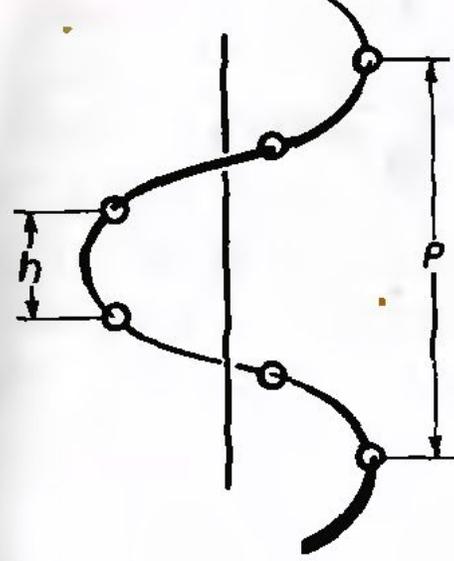




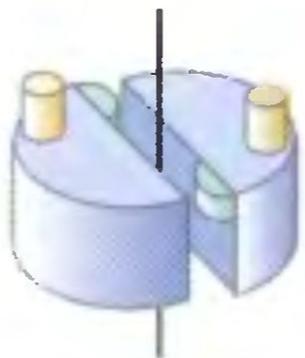






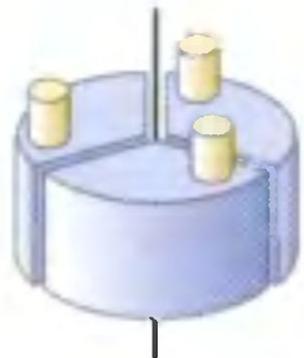


a Ось 2-го
порядка



C_2

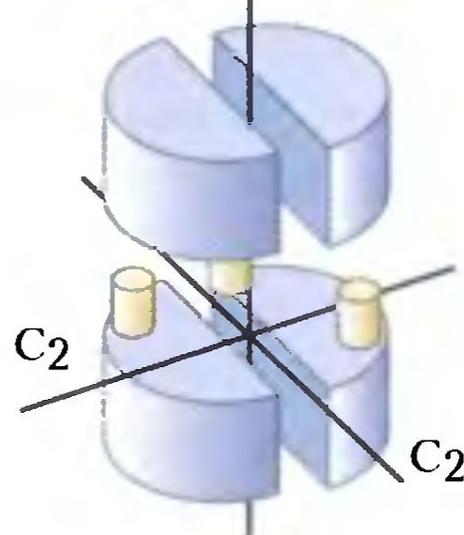
Ось 3-го
порядка



C_3

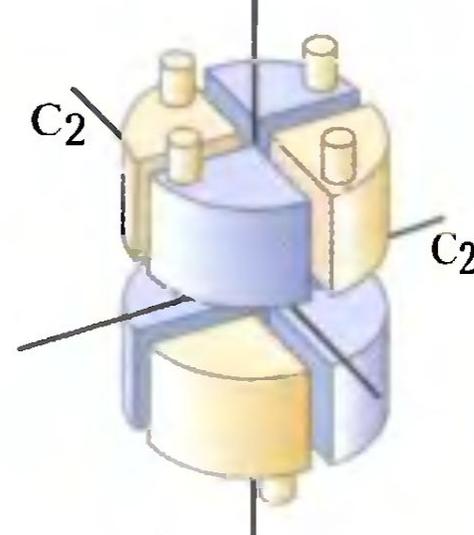
Два примера поворотной симметрии типа C

б Ось 2-го
порядка (C_2)



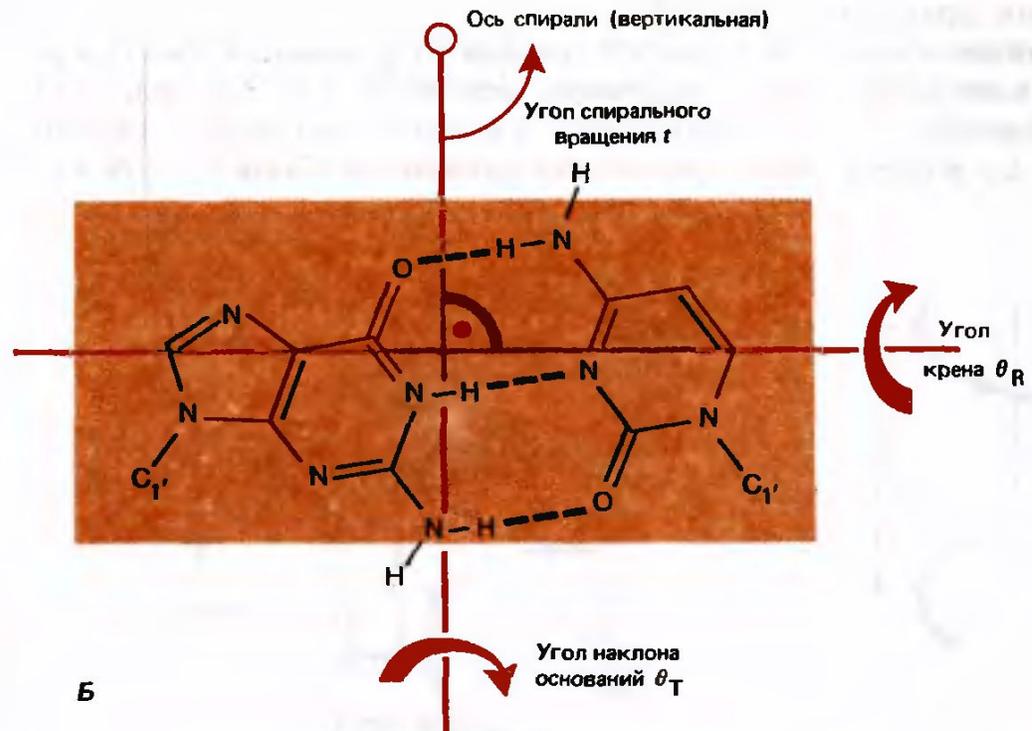
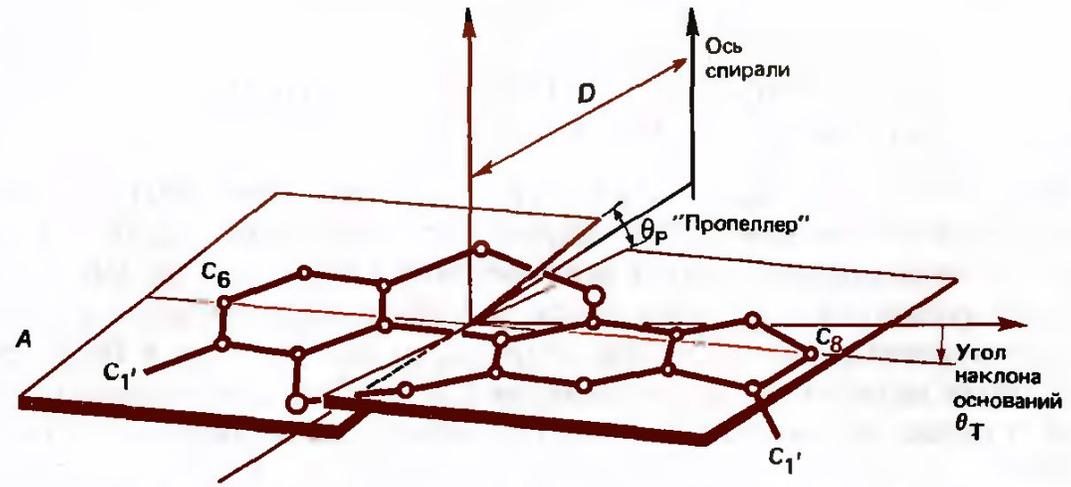
D_2

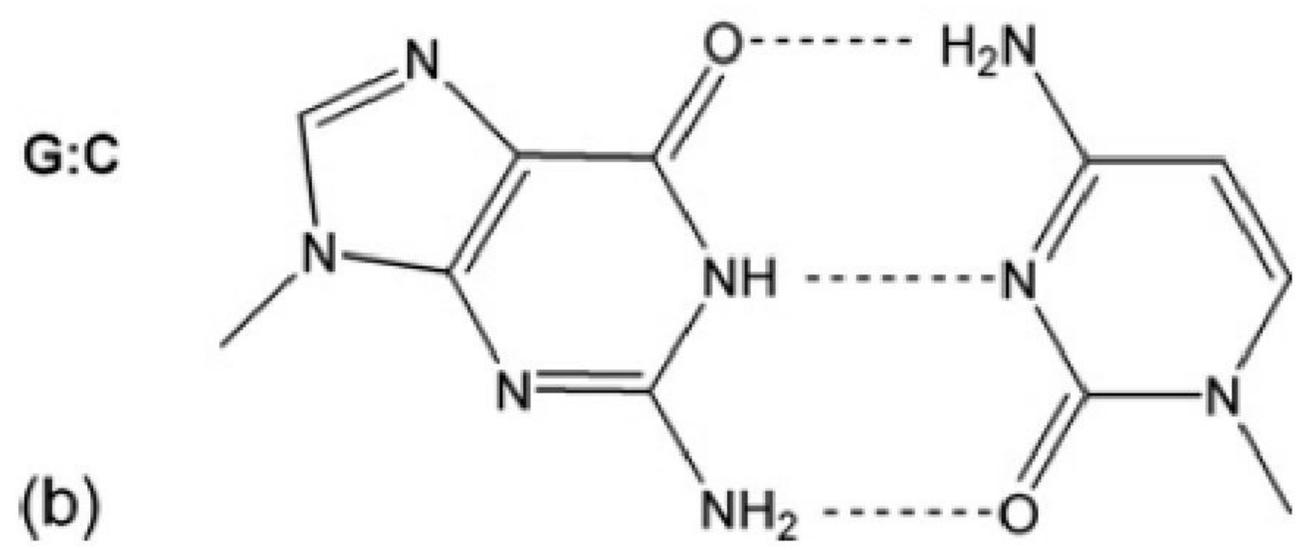
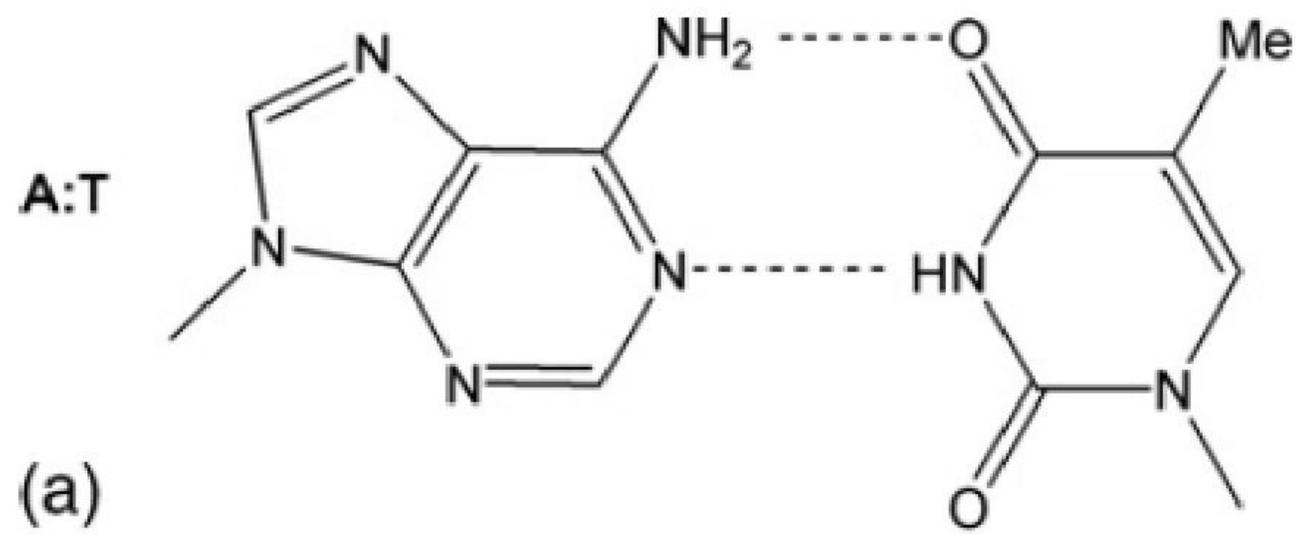
Ось 4-го
порядка



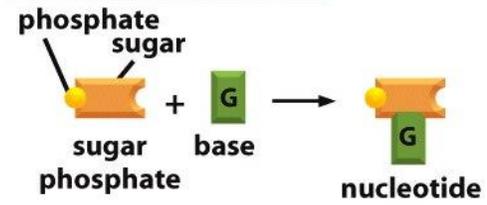
D_4

Два примера поворотной симметрии типа D





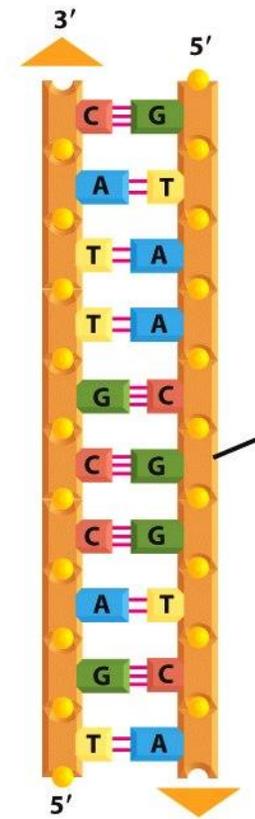
building blocks of DNA



DNA strand



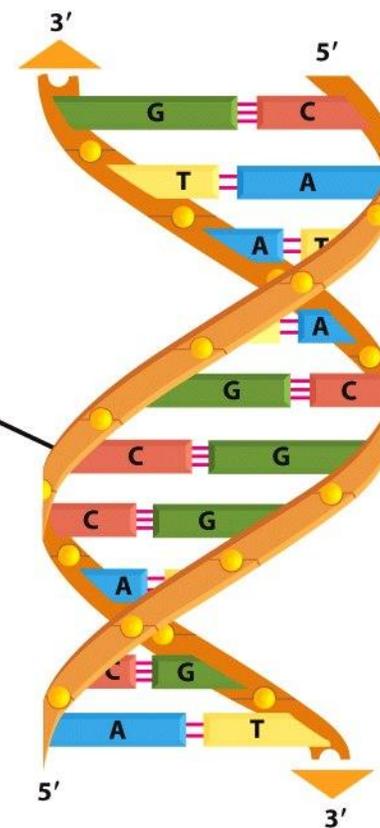
double-stranded DNA

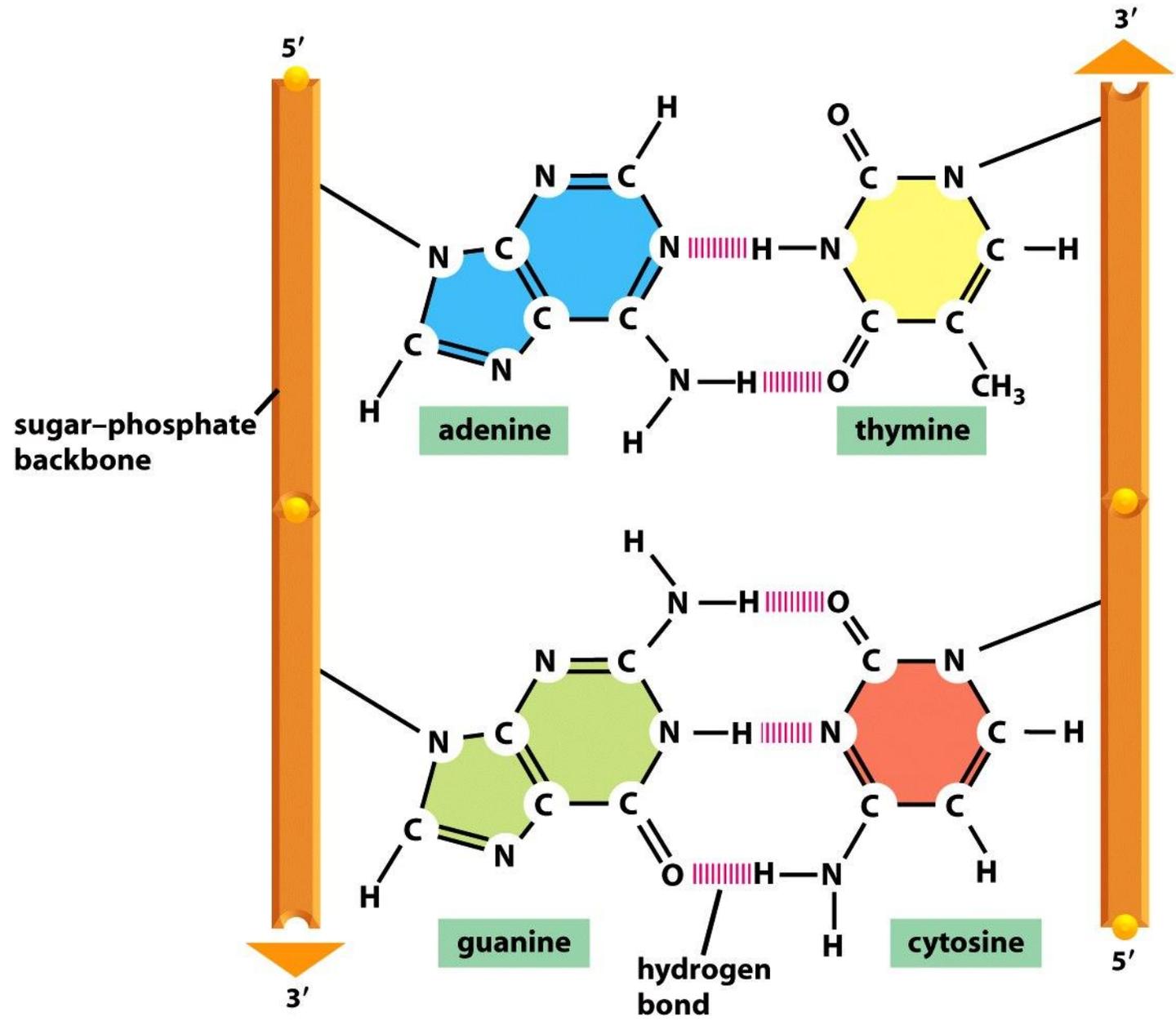


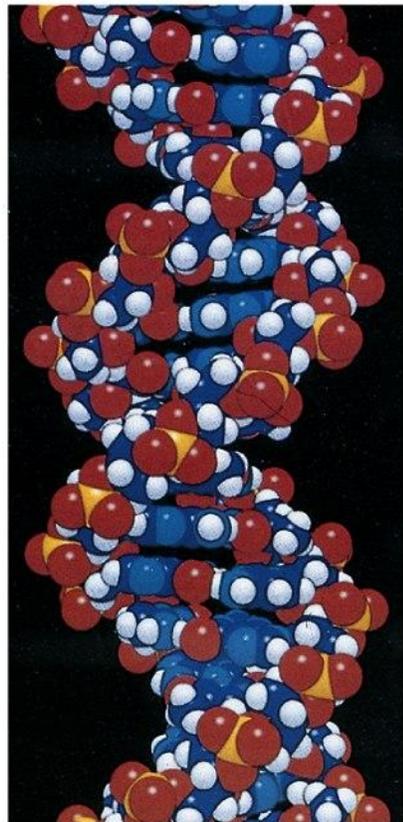
sugar-phosphate backbone

hydrogen-bonded base pairs

DNA double helix

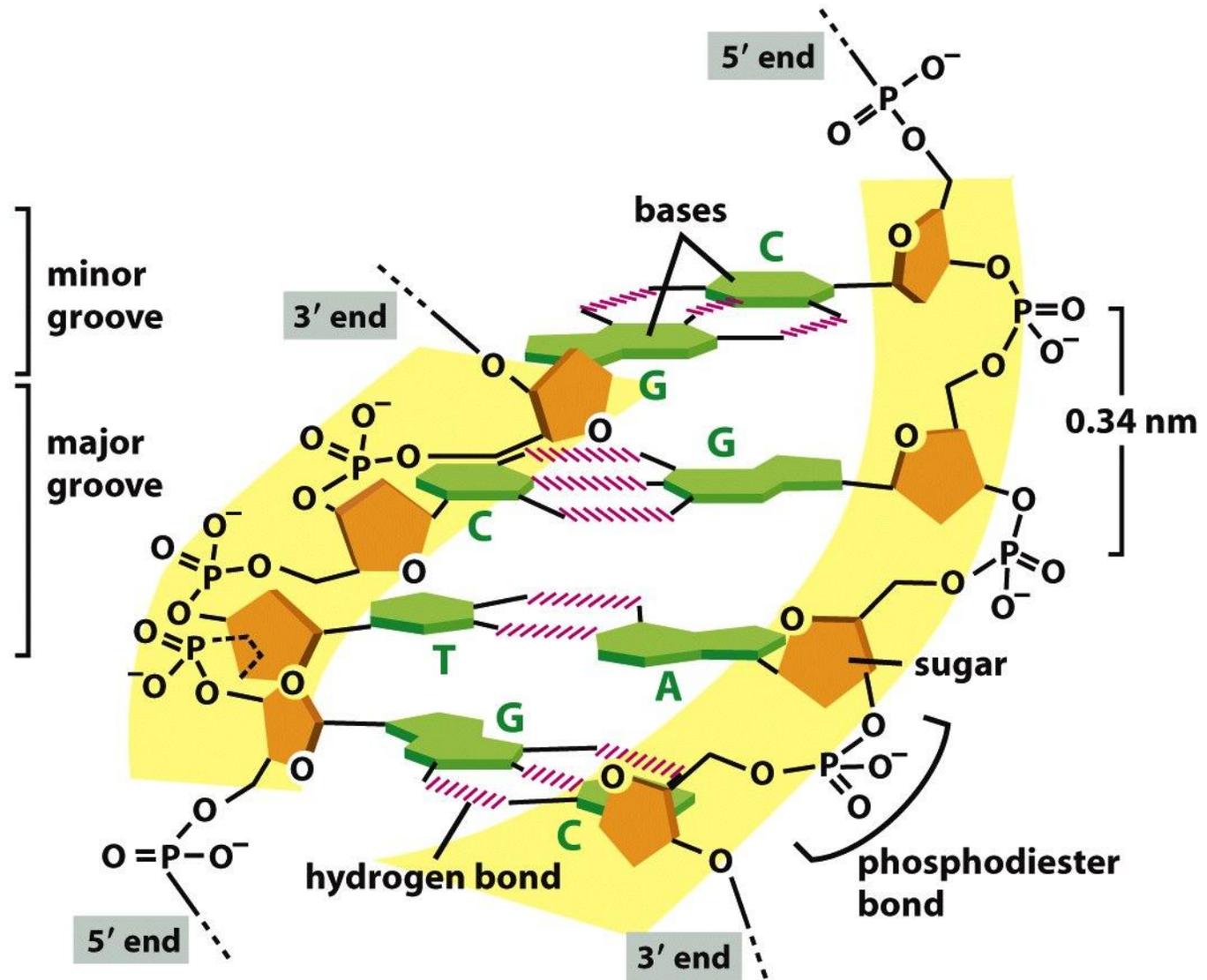






2 nm

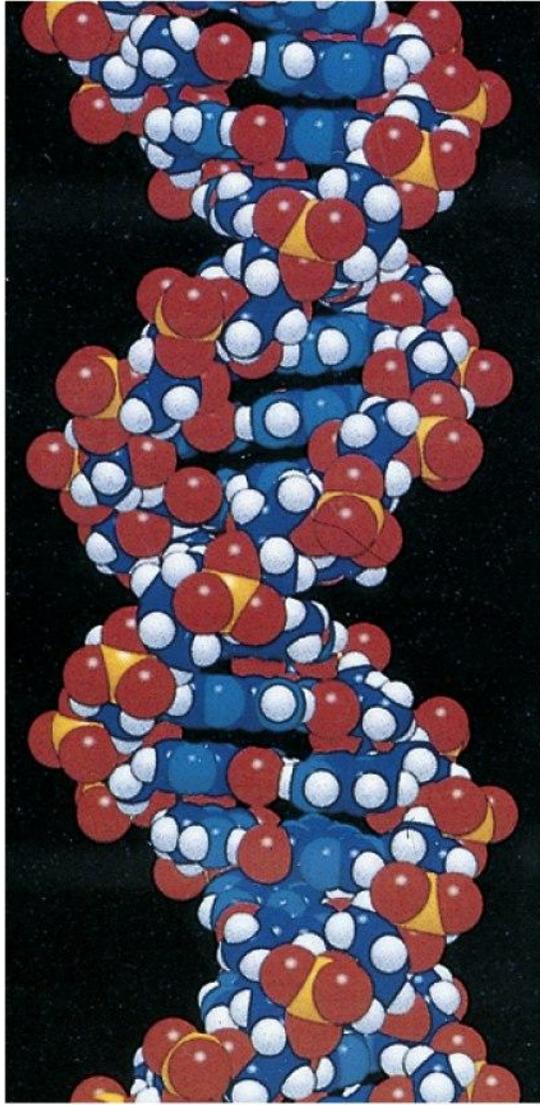
(A)



hydrogen bond

5' end

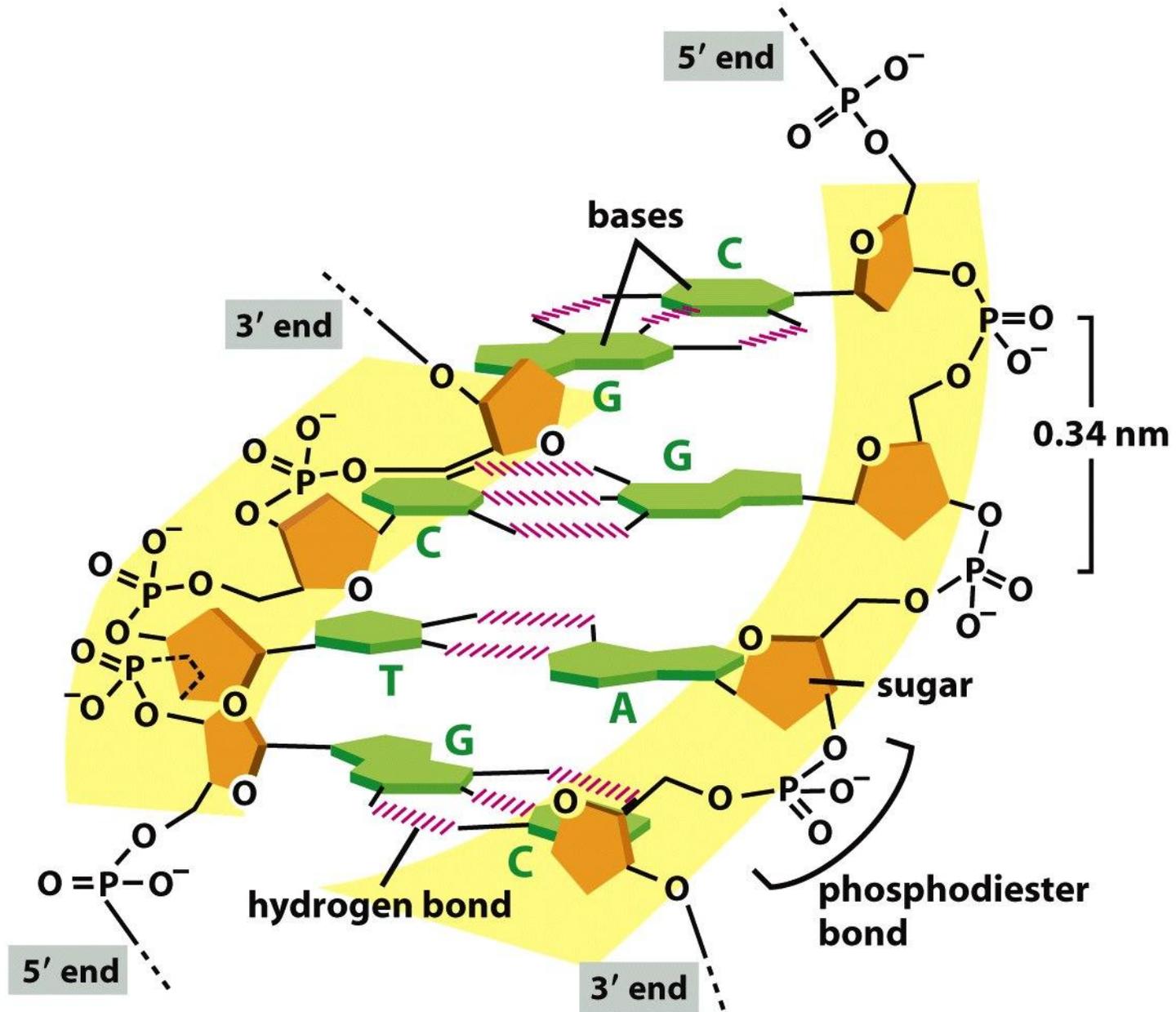
(B)



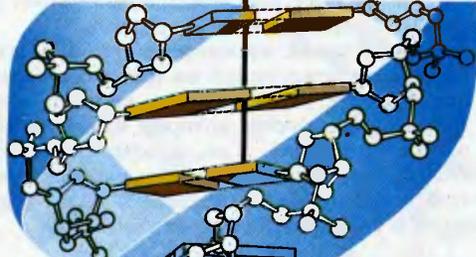
minor
groove

major
groove

2 nm

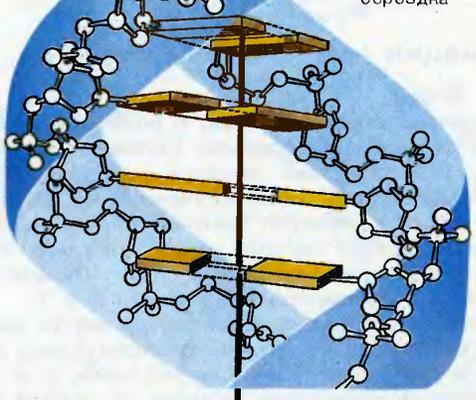


В-форма ДНК



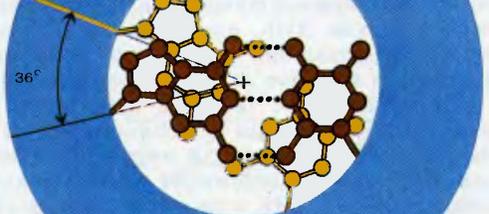
Малая бороздна

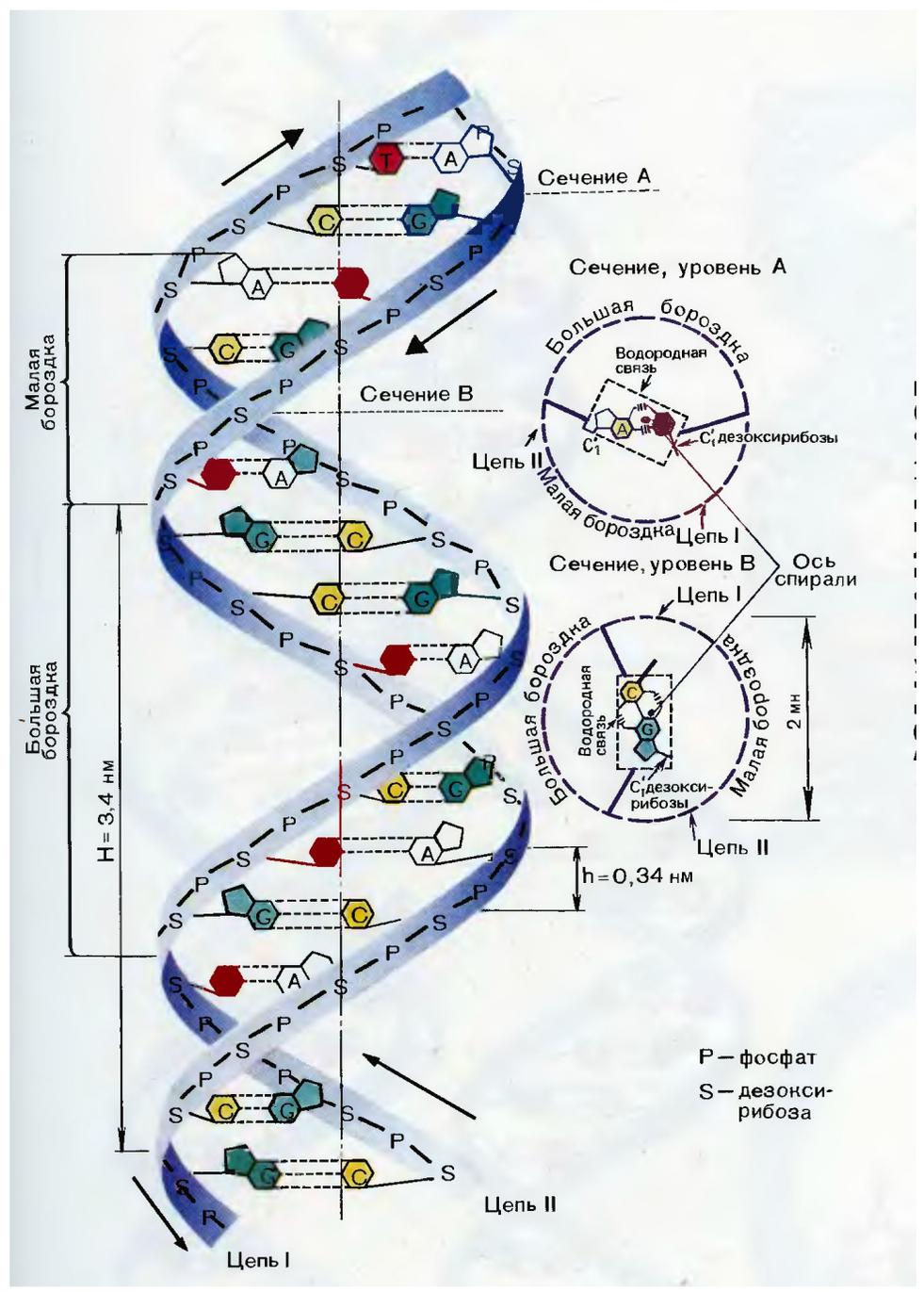
Большая бороздна



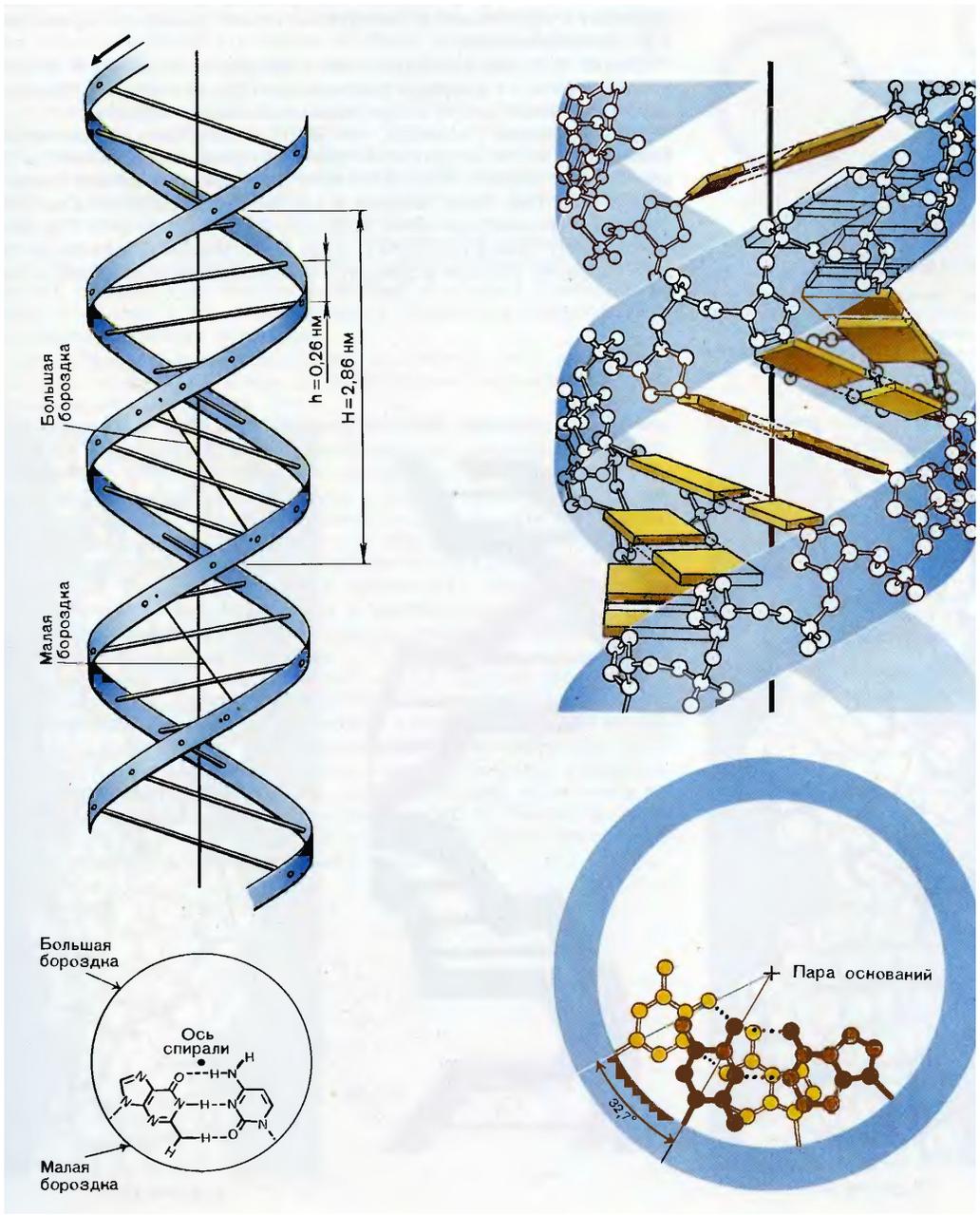
Пара оснований

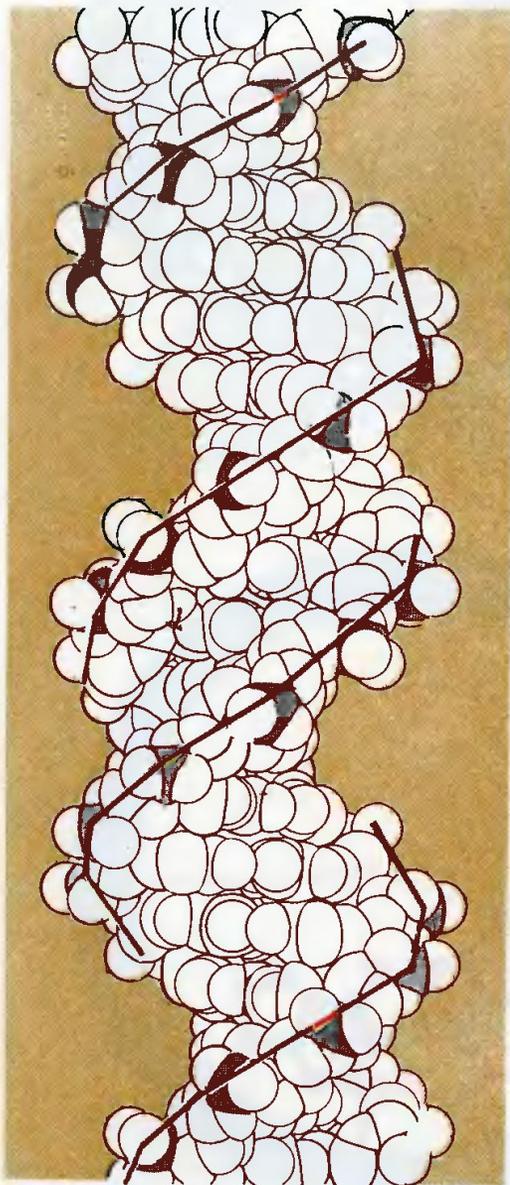
36°



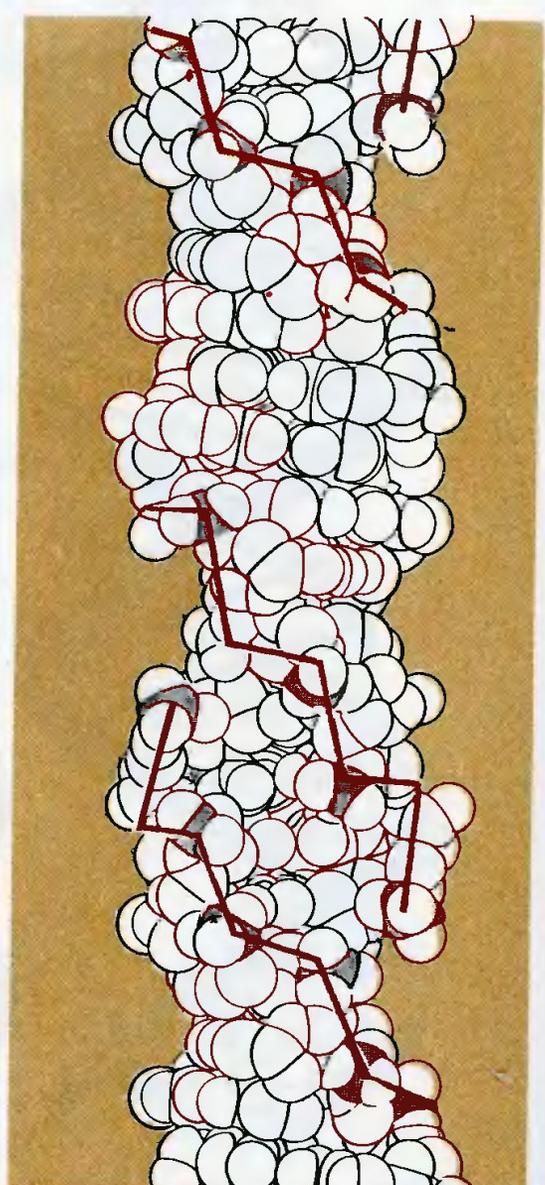


Р — фосфат
 С — дезоксирибоза

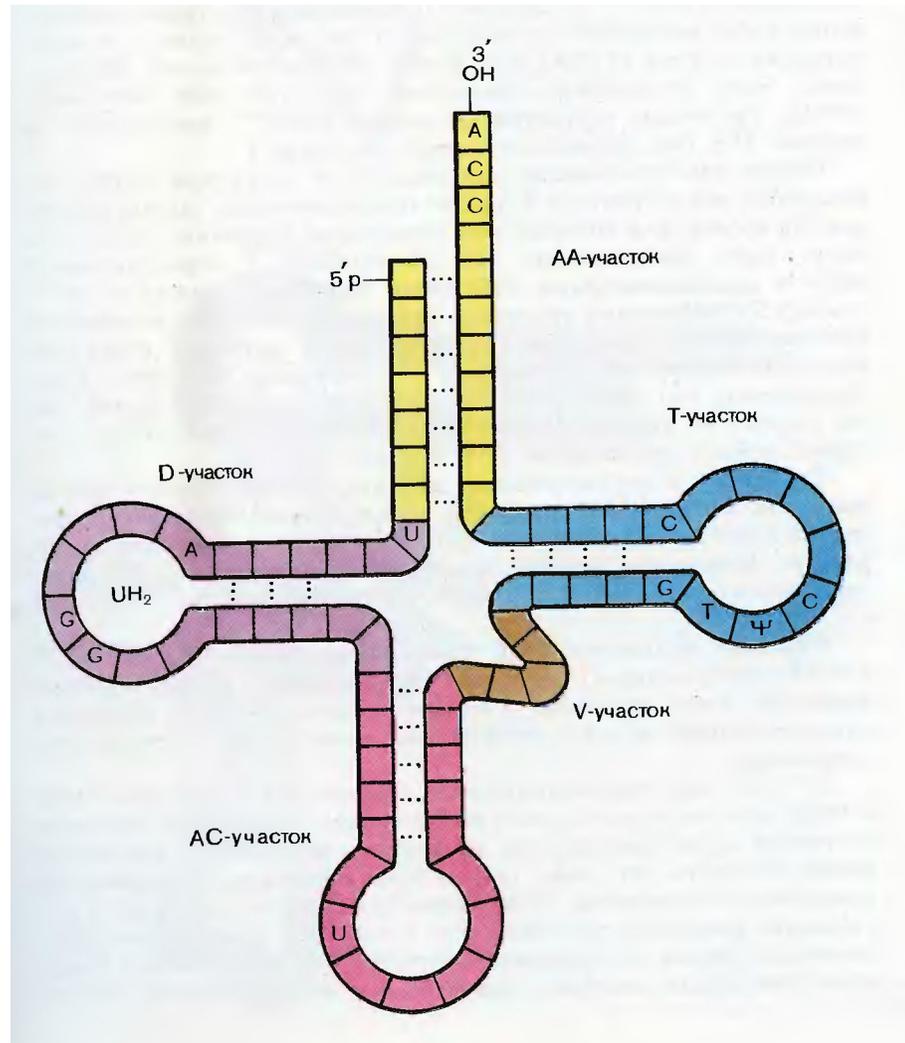
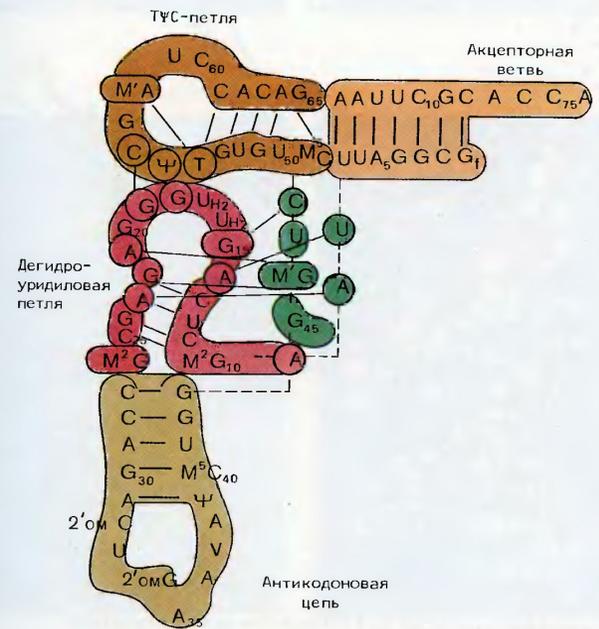
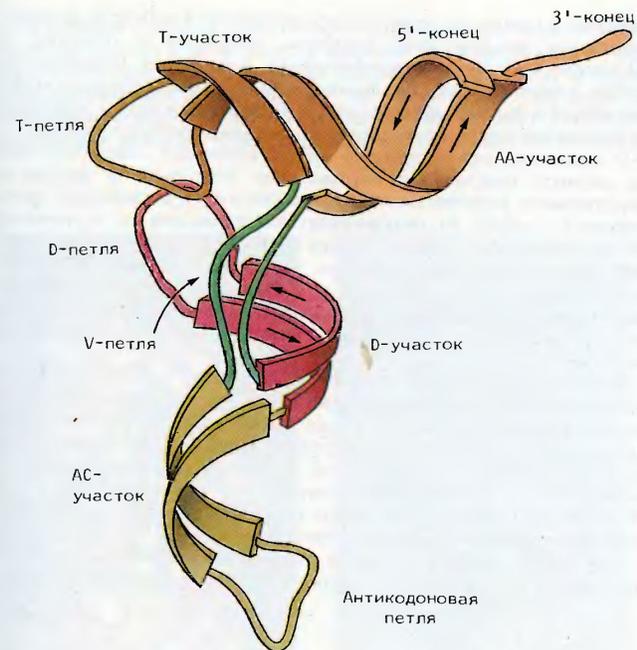


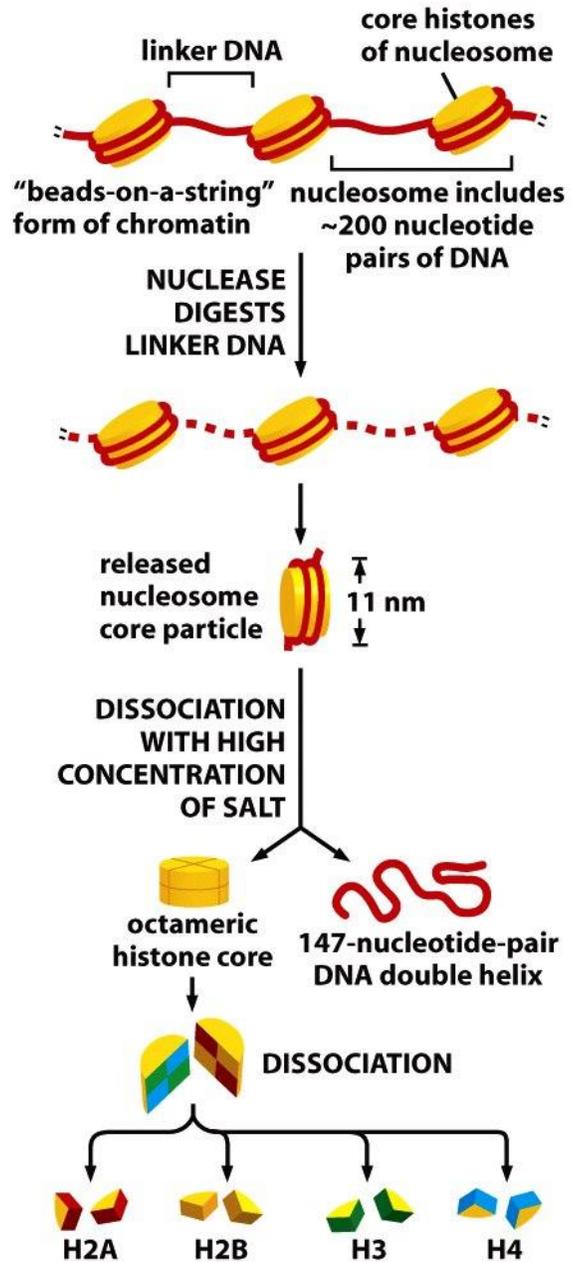


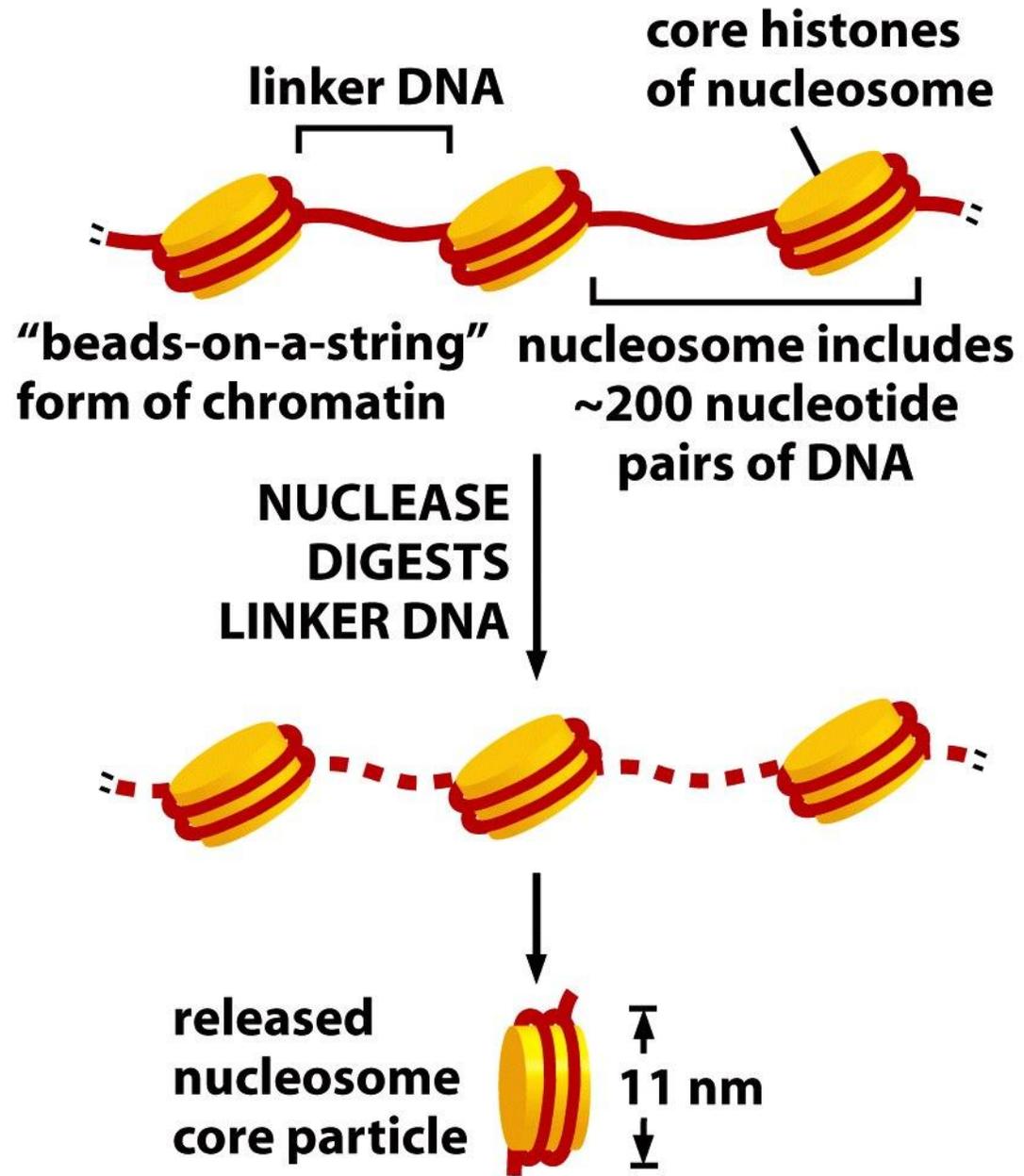
В-форма ДНК

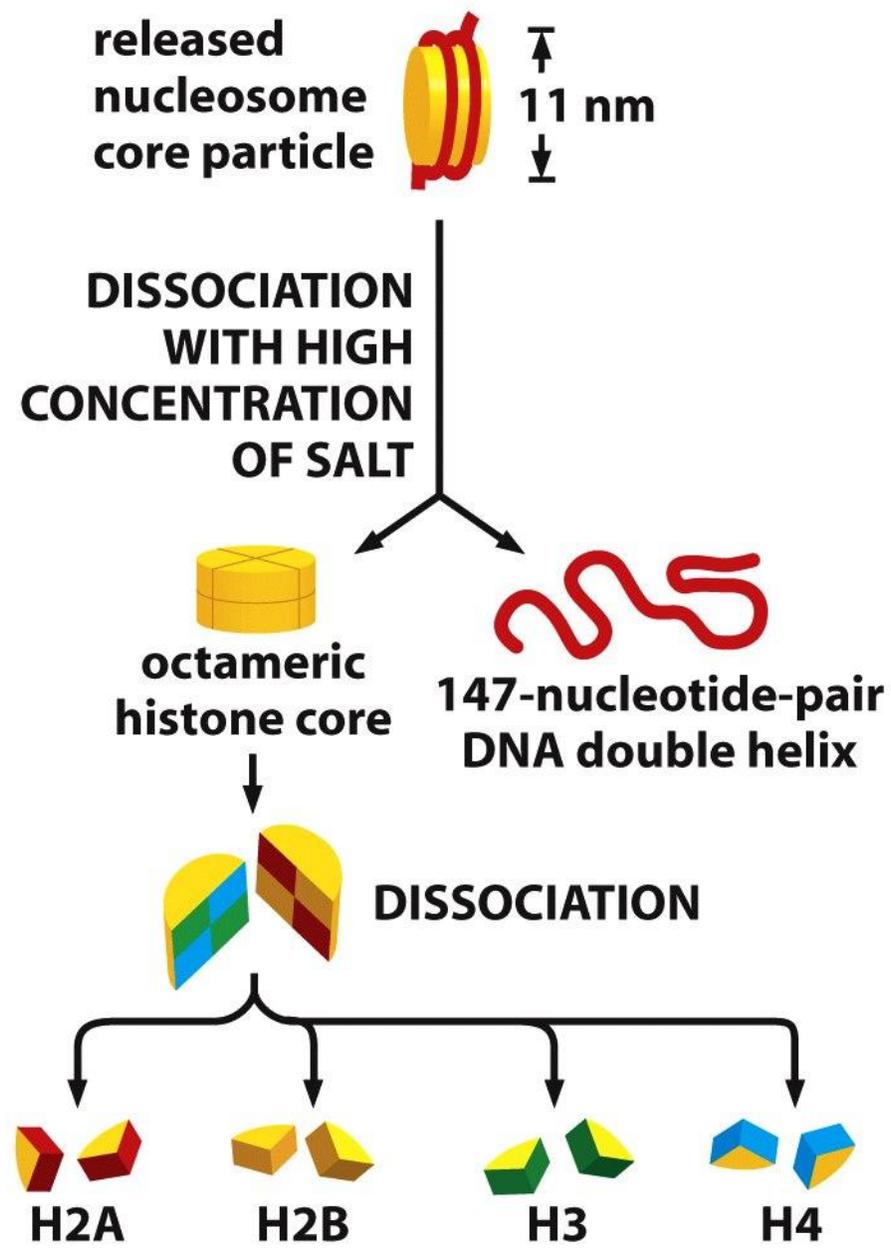


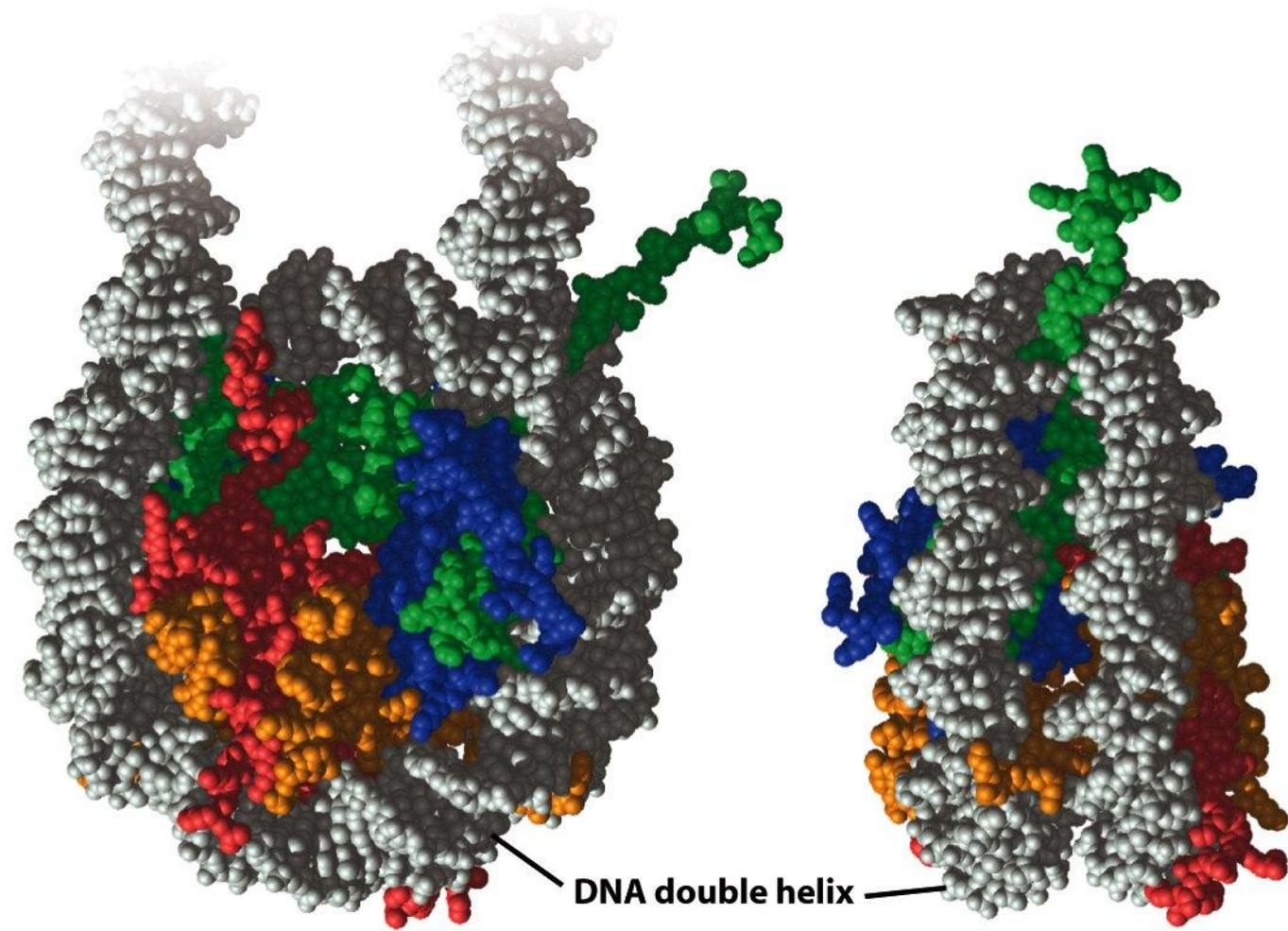
Z-форма ДНК







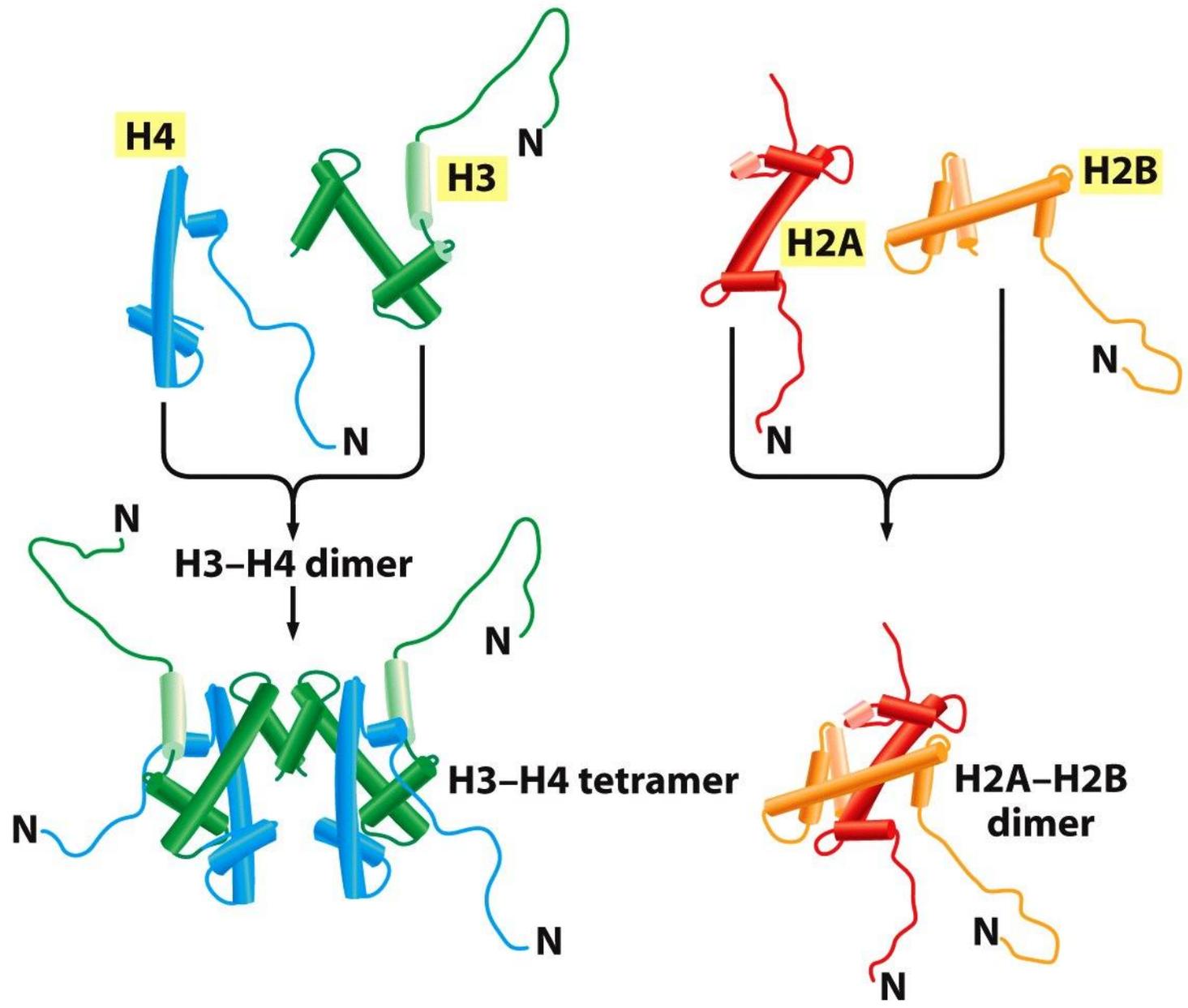


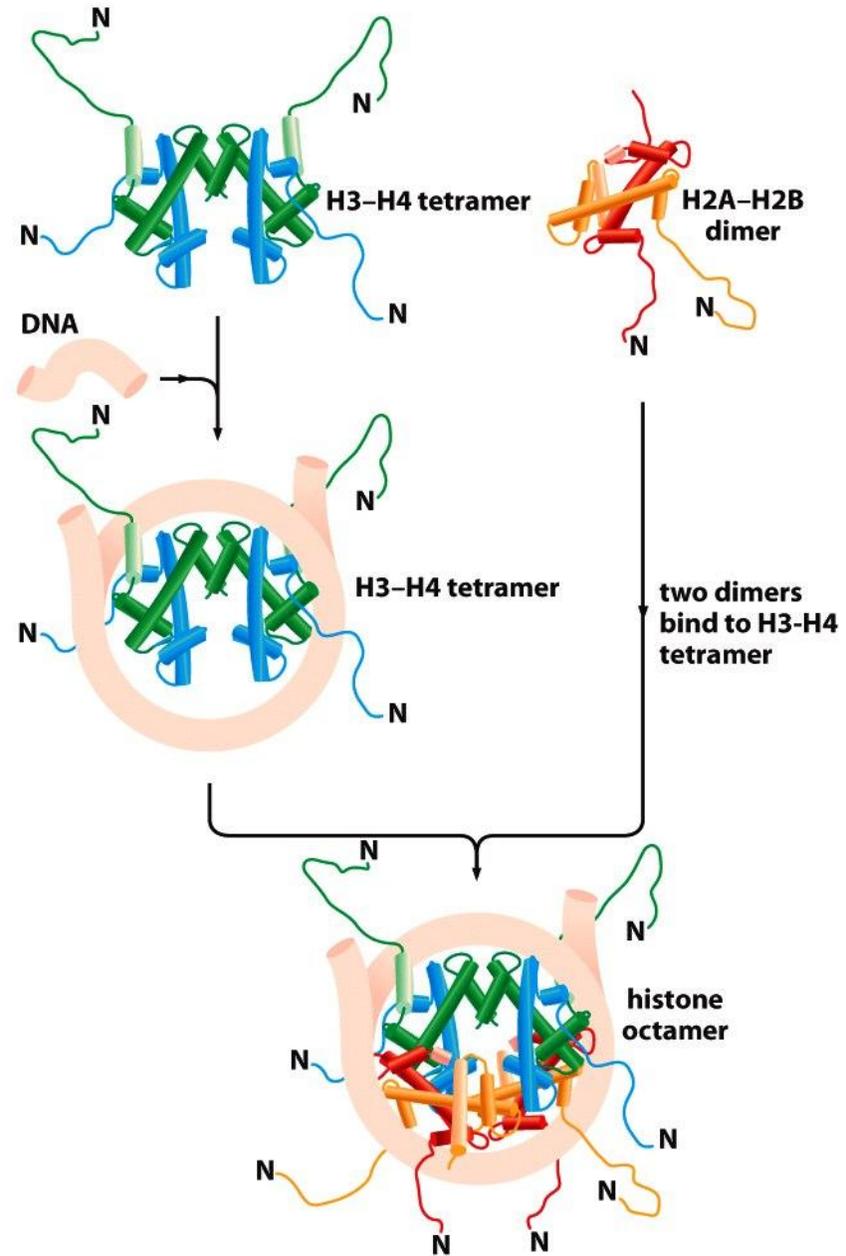


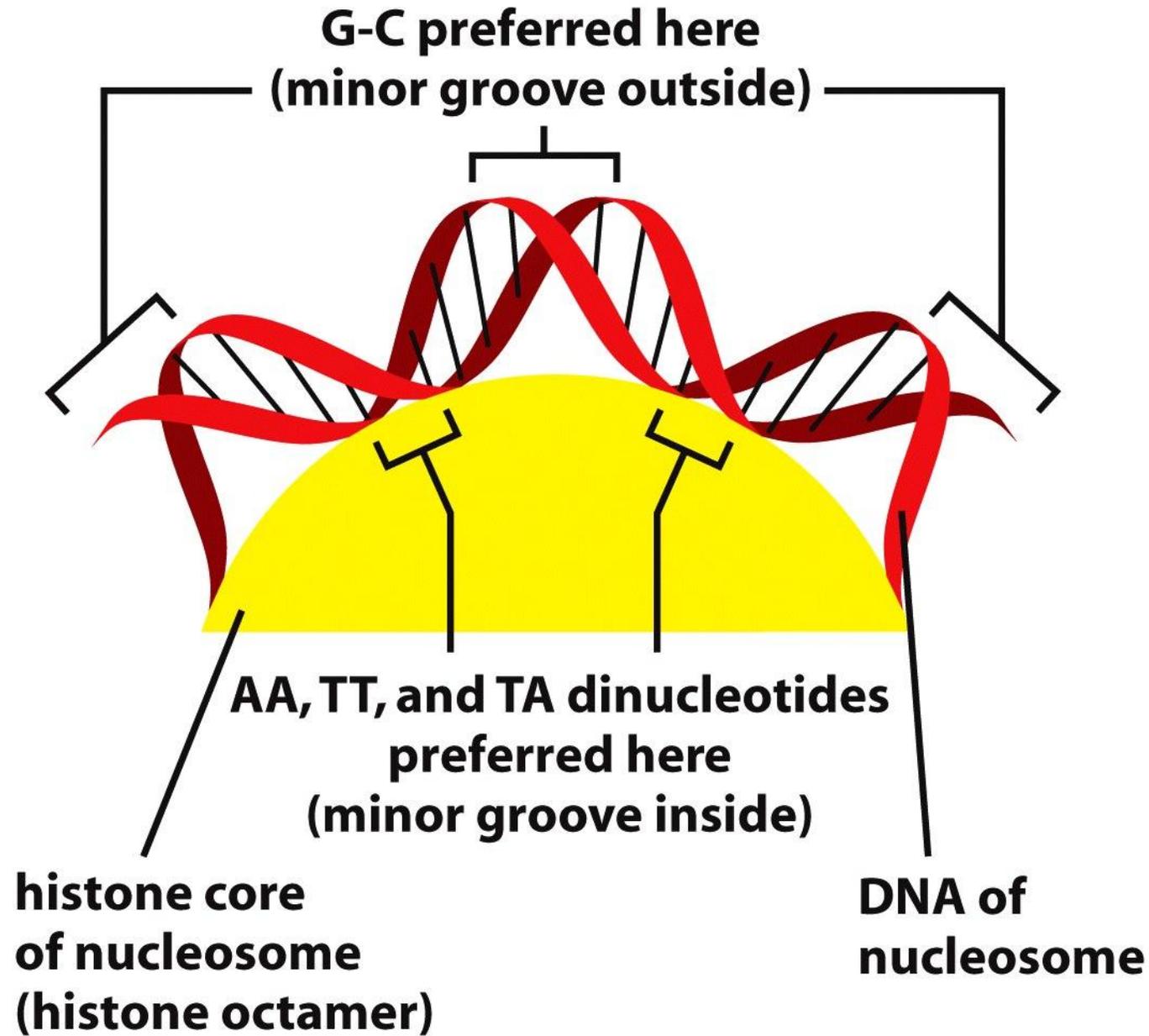
side view

bottom view

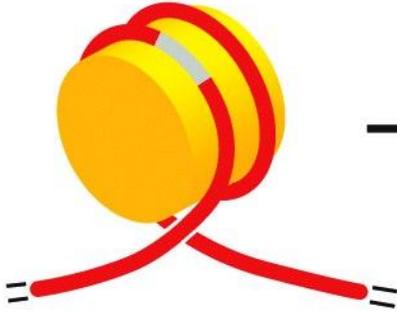
● histone H2A ● histone H2B ● histone H3 ● histone H4



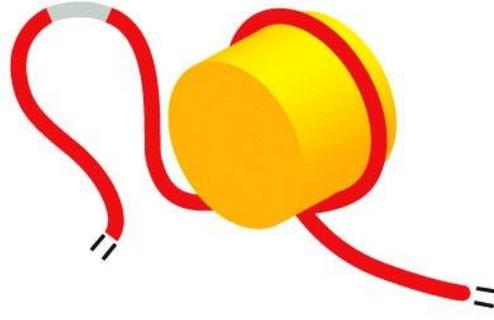




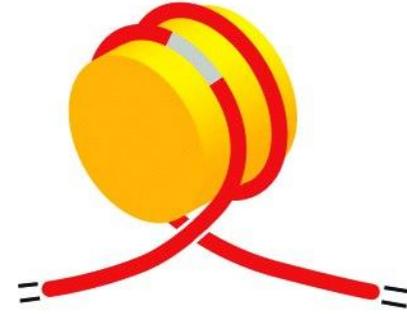
**wrapped nucleosome
exists for 250
milliseconds**



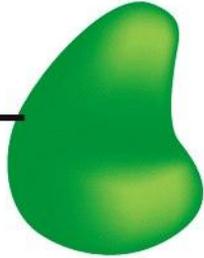
**unwrapped nucleosome
exists for 10-50
milliseconds**



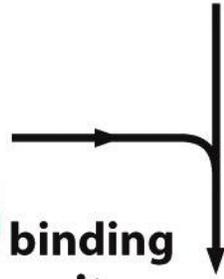
**rewrapped
nucleosome**



**sequence-specific
DNA-binding
protein**



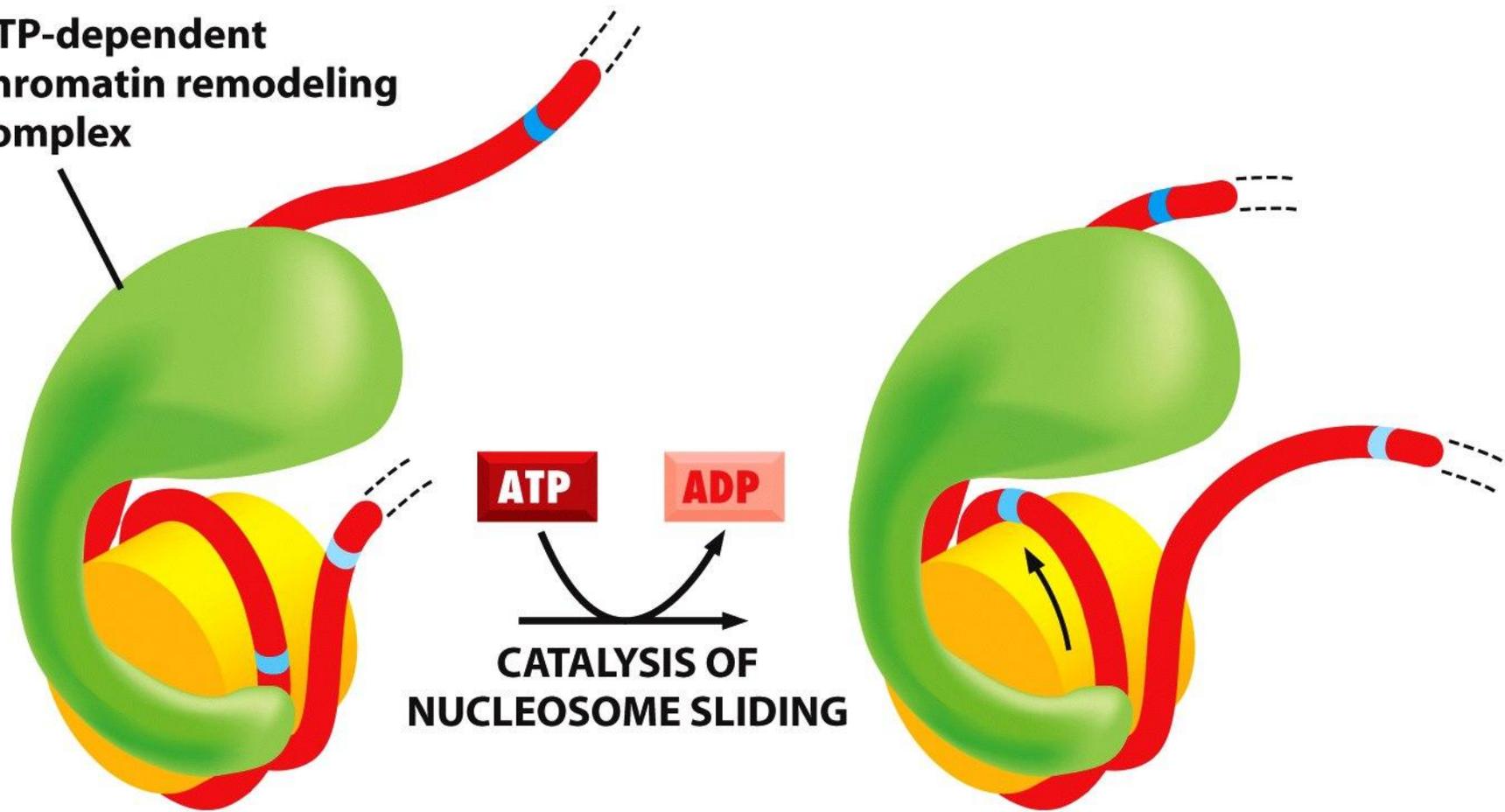
**binding
site**



**PROTEIN
BINDS**

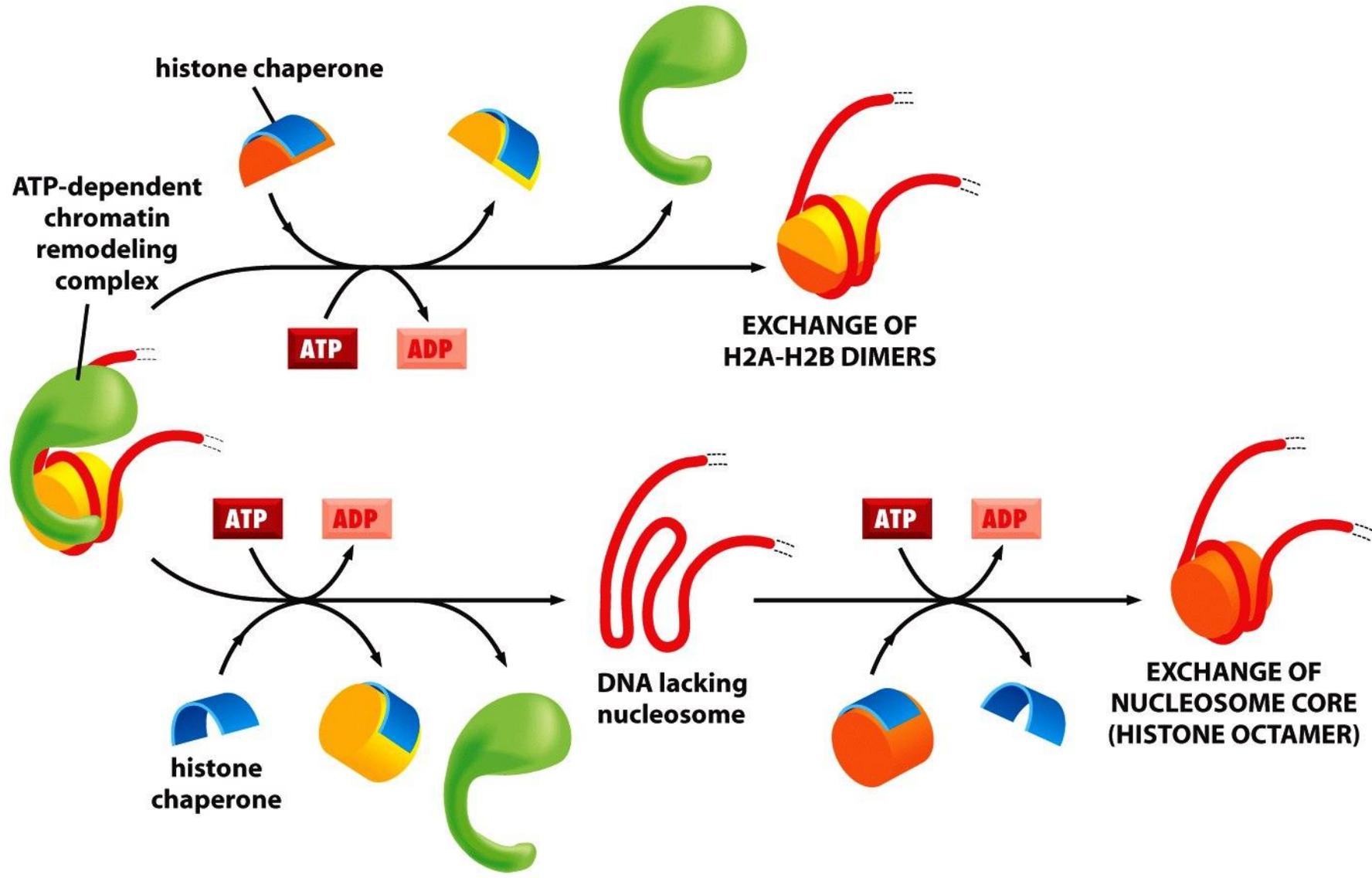


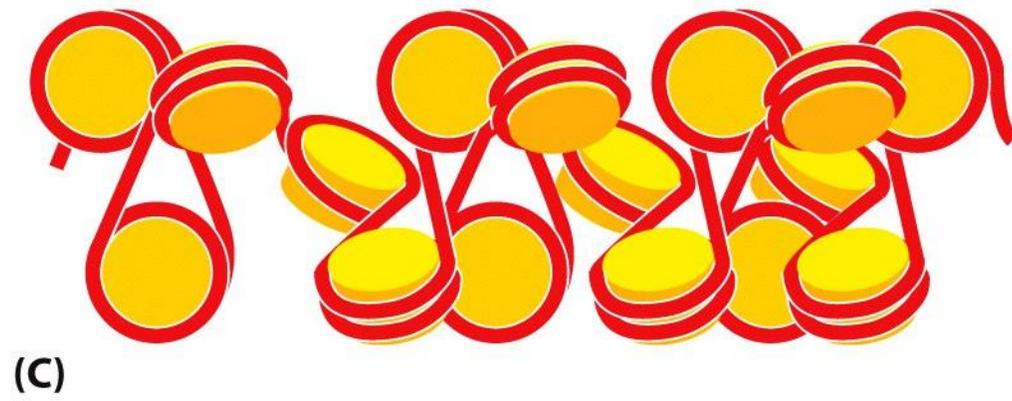
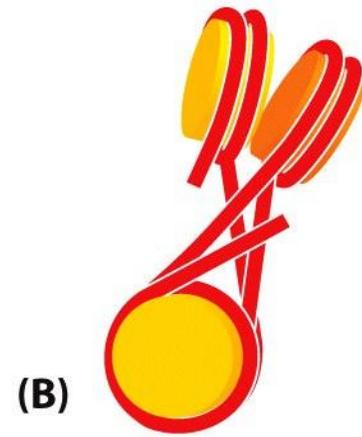
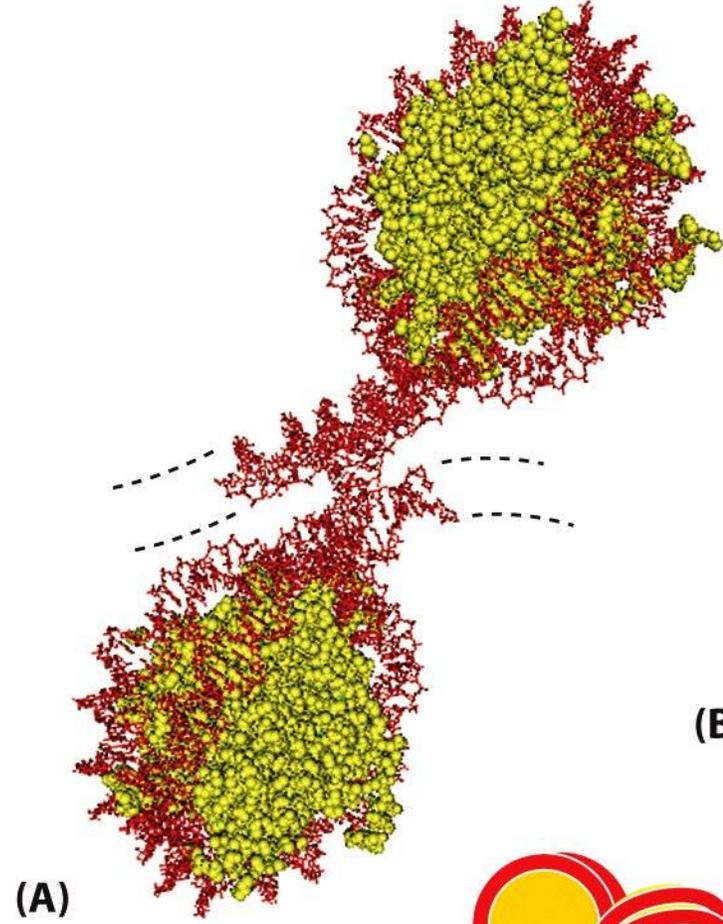
**ATP-dependent
chromatin remodeling
complex**

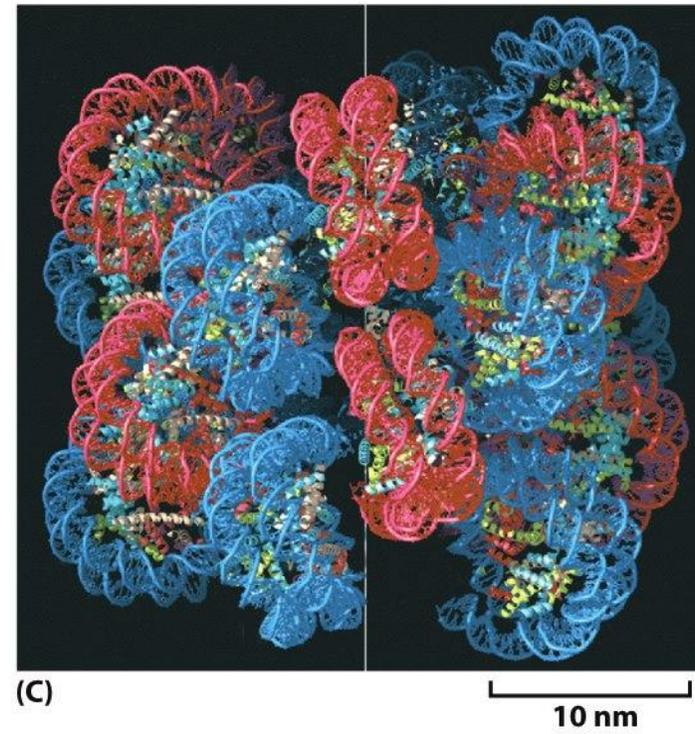
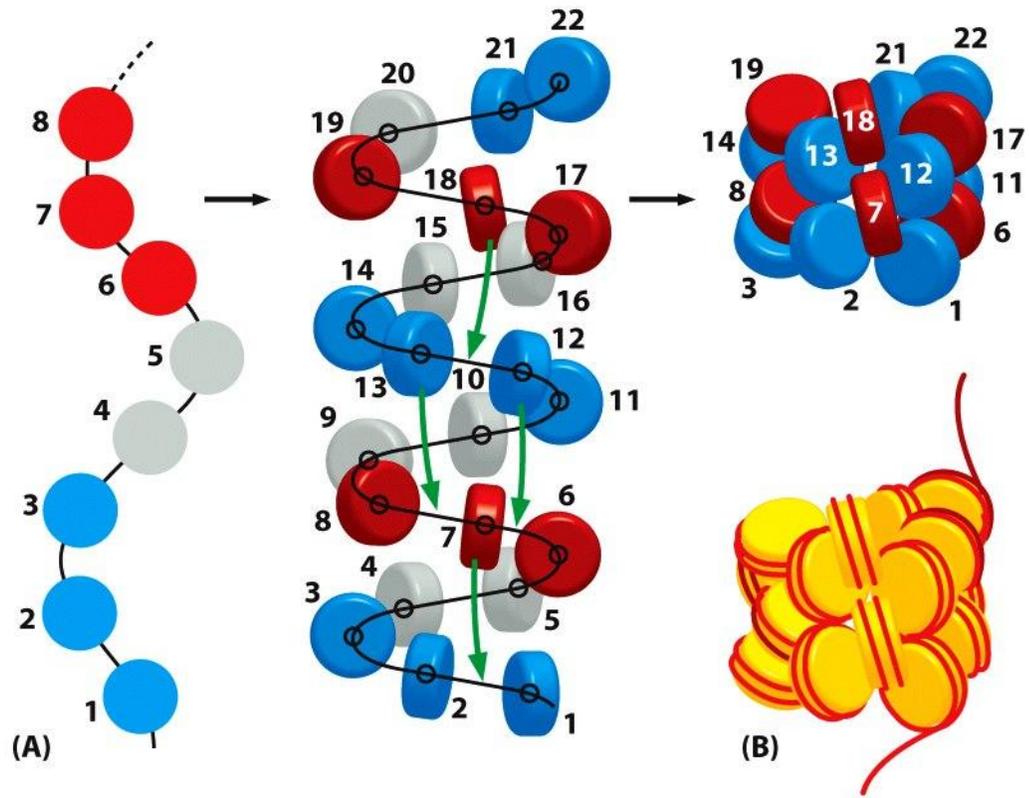


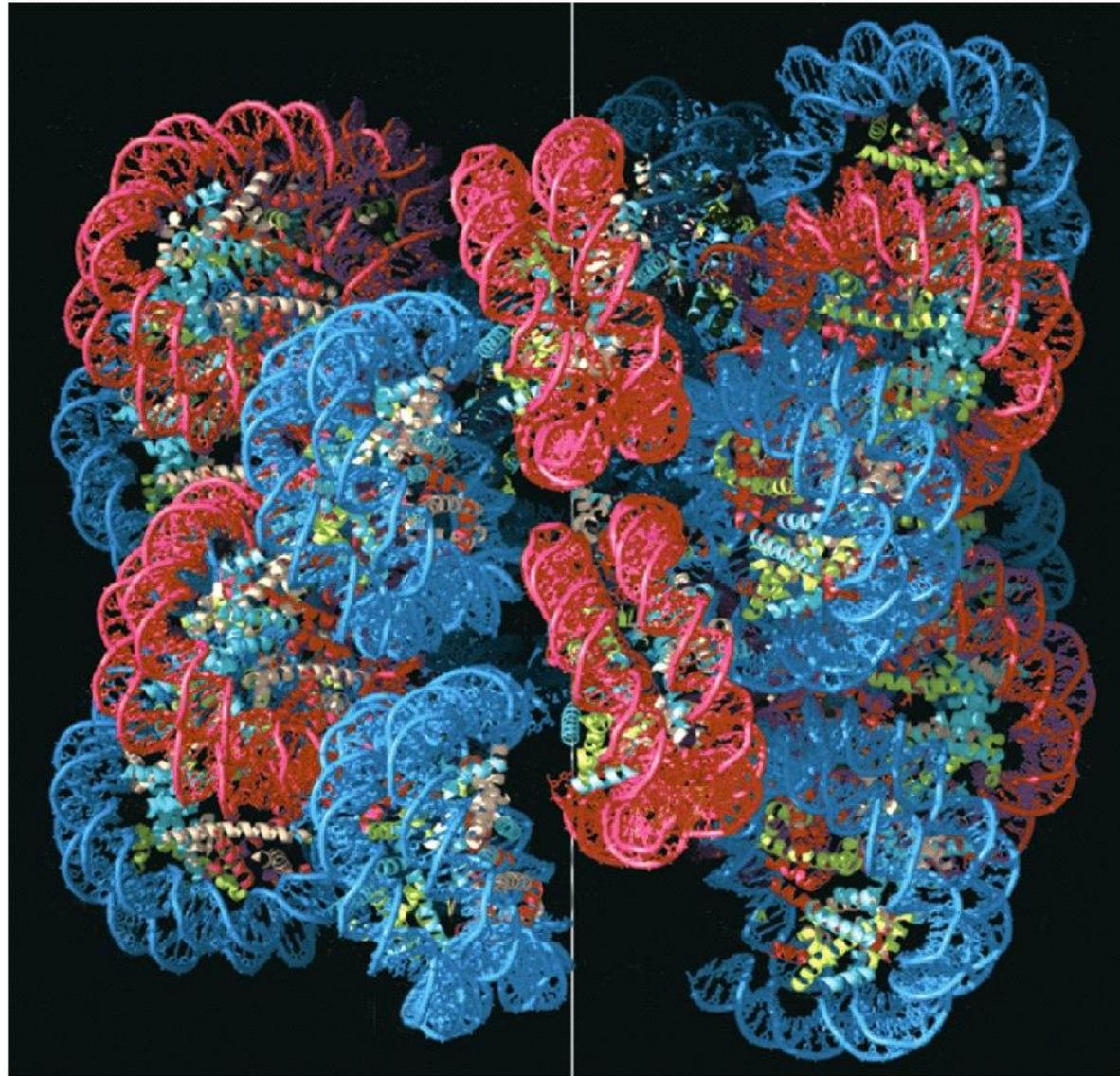
ATP **ADP**

**CATALYSIS OF
NUCLEOSOME SLIDING**









10 nm