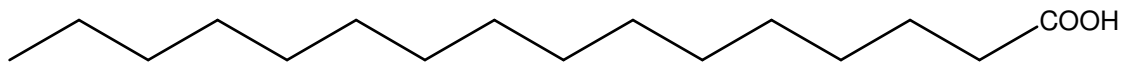
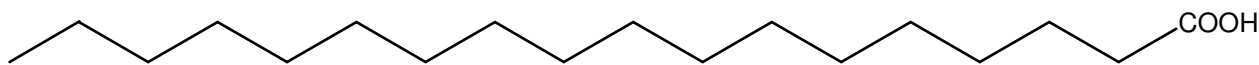


Lipidek: zsírsavak

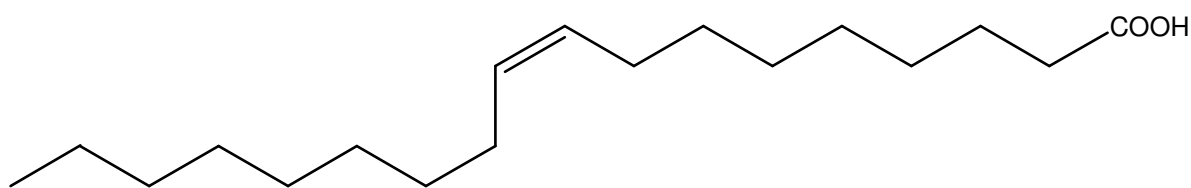
- hosszú szénláncú, telített vagy telítetlen karbonsavak



palmitinsav (hexadekánsav)



sztearinsav (oktadekánsav)

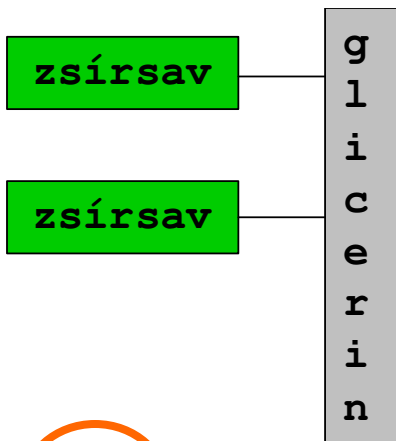


olajsav (cisz-9 oktadecénsav)

néhány, állatokban előforduló zsírsav

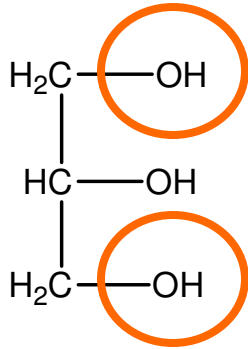
Szén-atom-szám	Kettős kötések száma	Közönséges név	Szisztematikus név	Képlet
12	0	laurát	<i>n</i> -dodekanoát	$\text{CH}_3(\text{CH}_2)_{10}\text{COO}^-$
14	0	mirisztát	<i>n</i> -tetradekanoát	$\text{CH}_3(\text{CH}_2)_{12}\text{COO}^-$
16	0	palmitát	<i>n</i> -hexadekanoát	$\text{CH}_3(\text{CH}_2)_{14}\text{COO}^-$
18	0	sztearát	<i>n</i> -oktadekanoát	$\text{CH}_3(\text{CH}_2)_{16}\text{COO}^-$
20	0	arachidát	<i>n</i> -eikozanoát	$\text{CH}_3(\text{CH}_2)_{18}\text{COO}^-$
22	0	behenát	<i>n</i> -dokozenoát	$\text{CH}_3(\text{CH}_2)_{20}\text{COO}^-$
24	0	lignocereát	<i>n</i> -tetrakozanoát	$\text{CH}_3(\text{CH}_2)_{22}\text{COO}^-$
16	1	palmitoleát	<i>cisz</i> - Δ^9 -hexadecenoát	$\text{CH}_3(\text{CH}_2)_5\text{CH}=\text{CH}(\text{CH}_2)_7\text{COO}^-$
18	1	oleát	<i>cisz</i> - Δ^9 -oktadecenoát	$\text{CH}_3(\text{CH}_2)_7\text{CH}=\text{CH}(\text{CH}_2)_7\text{COO}^-$
18	2	linoleát	<i>cisz</i> , <i>cisz</i> - Δ^9 , Δ^{12} -oktadekadienoát	$\text{CH}_3(\text{CH}_2)_4(\text{CH}=\text{CHCH}_2)_2(\text{CH}_2)_6\text{COO}^-$
18	3	linolenát	all- <i>cisz</i> - Δ^9 , Δ^{12} , Δ^{15} -oktadekatrienoát	$\text{CH}_3(\text{CH}_2)_2(\text{CH}=\text{CHCH}_2)_3(\text{CH}_2)_6\text{COO}^-$
20	4	arachidonát	all- <i>cisz</i> - Δ^5 , Δ^8 , Δ^{11} , Δ^{14} -eikozatetraenoát	$\text{CH}_3(\text{CH}_2)_4(\text{CH}=\text{CHCH}_2)_4(\text{CH}_2)_2\text{COO}^-$

Lipidek: foszfolipidek

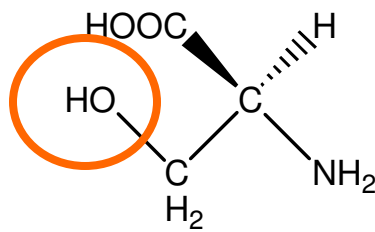


Általános membránalkotók

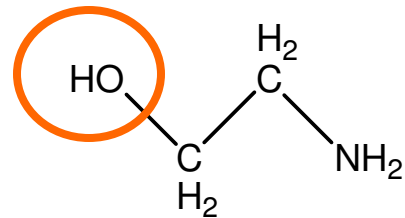
általános felépítés:



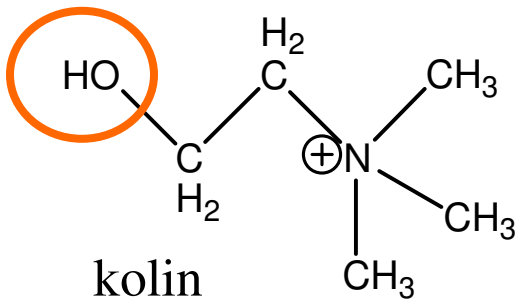
glicerín



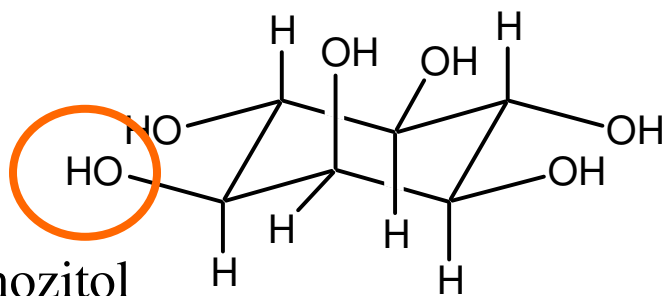
szerin



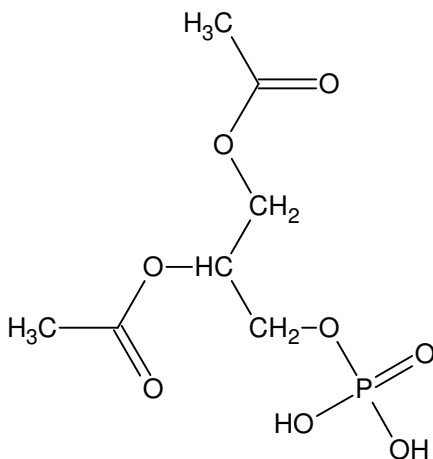
etanolamin



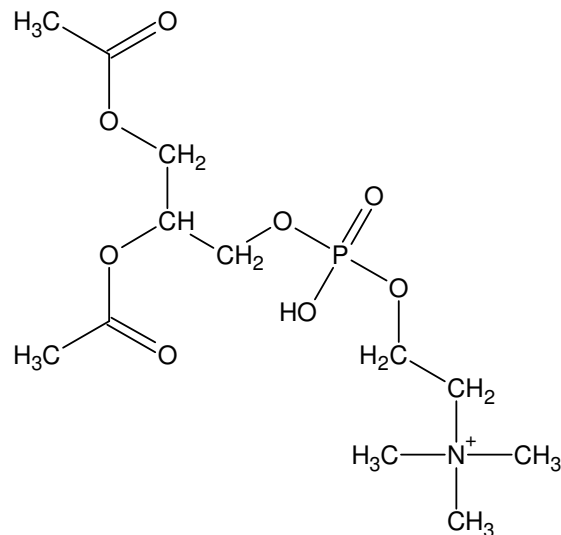
kolin



inozitol

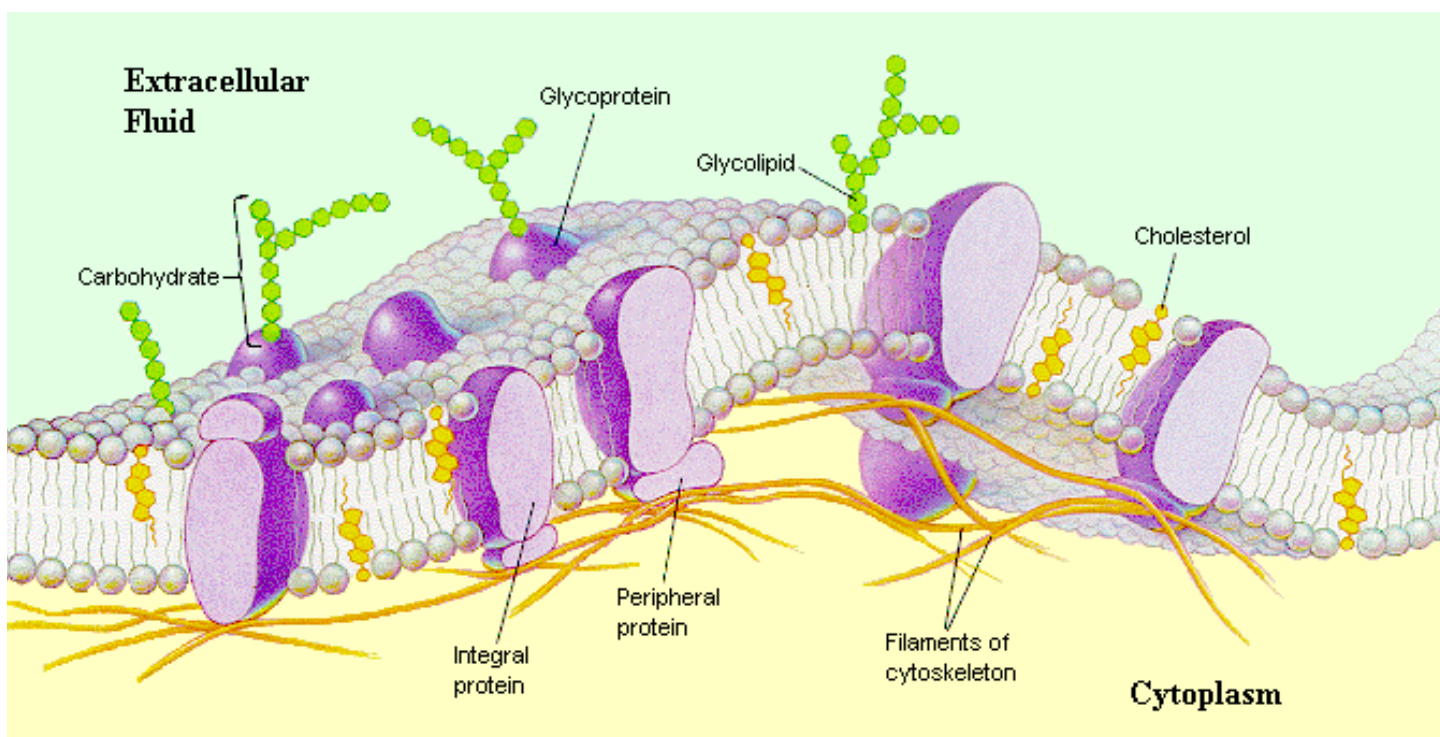
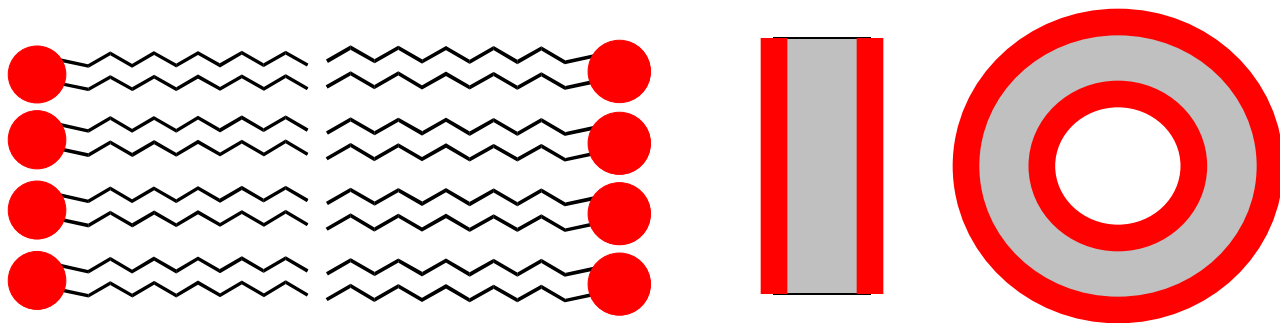


foszfatidsav



lecitin (foszfatidil-kolin)

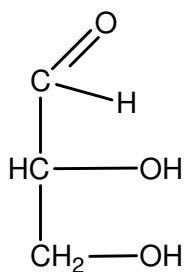
Biológiai membránok a „folyékony mozaik” modell



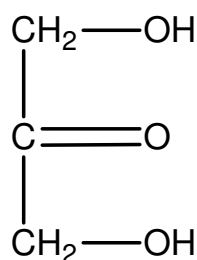
- A lipid-és fehérjemolekulák mozgása (diffúziója) oldalirányban szabad, átfordulásuk gátolt
- A membránban minden transzport szabályozottan zajlik (?): porinok, csatornák,....
- Polaritás: a két oldal nem ekvivalens!
- Membránfehérjék: integráns + perifériális

Cukrok

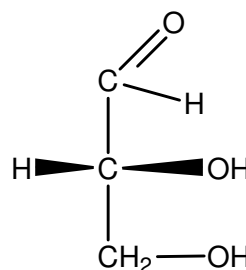
- Polihidroxi-alkoholok vagy polihidroxi-ke-tonok
- Szénatomszám szerint: trió-zok, tetró-zok, pentó-zok, hexó-zok, heptó-zok...
- Nyílt láncú és gyűrűs formák (pentó-zoknál és hexó-zoknál)
- Polimerizáció: mono-, di, ... poliszaccharidok
- Királis molekulák: a természetben D-konfigurációjú cukrok fordulnak elő



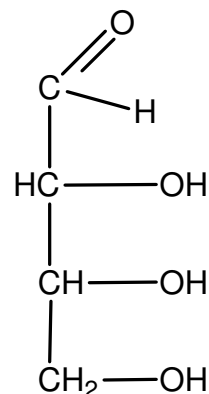
glicerinaldehid
(aldotrióz)



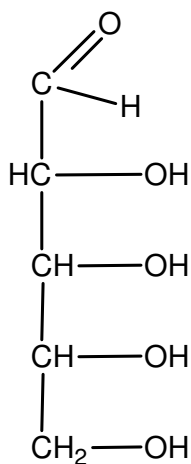
dihidroxi-aceton
(aldoketóz)



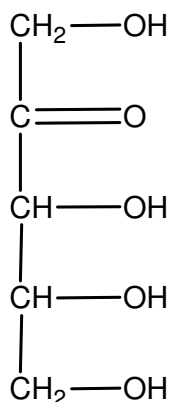
D-glicerinaldehid



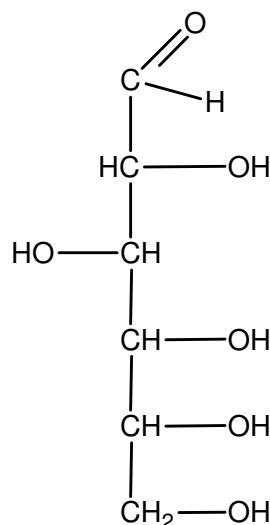
eritróz



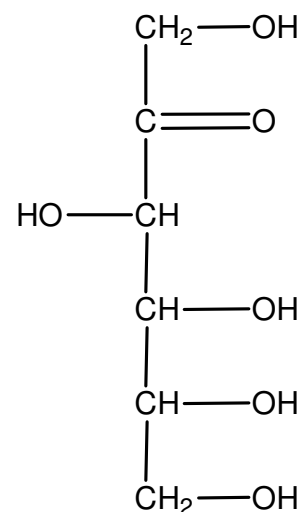
ribóz



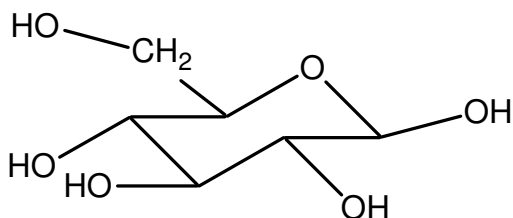
ribulóz



glükóz

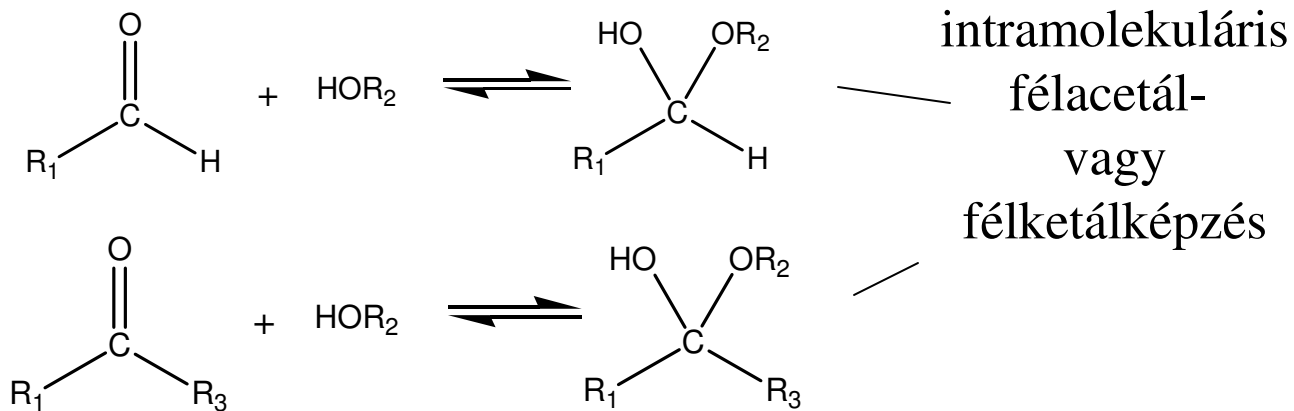


fruktóz

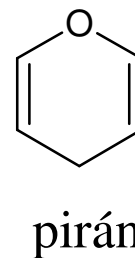
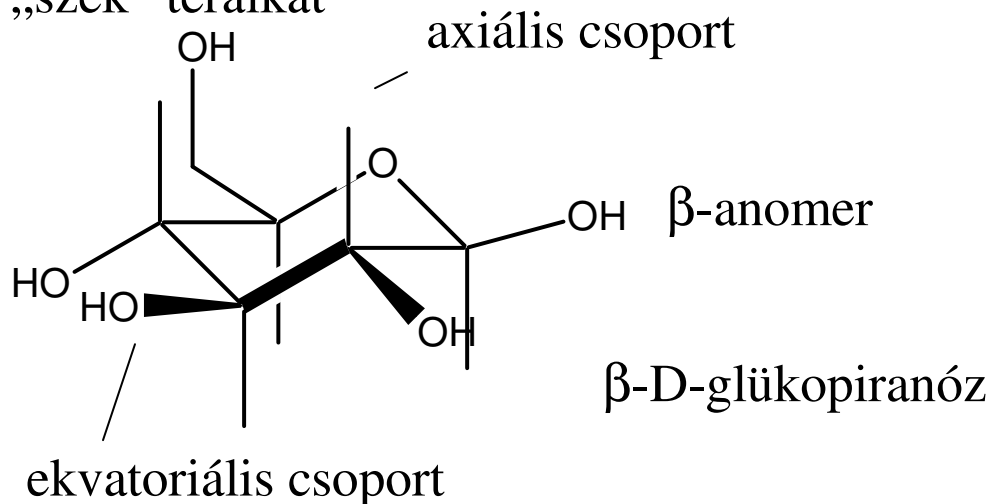


β -D-glükóz

Cukrok: gyűrűs formák

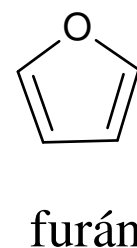
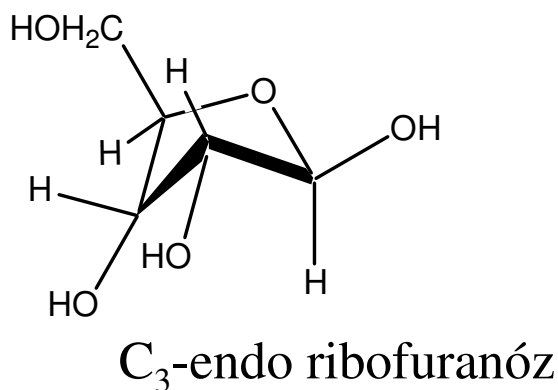
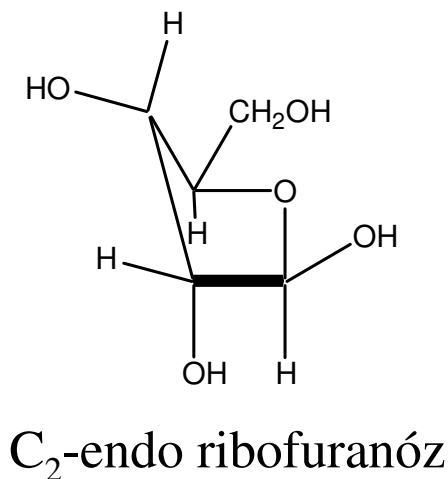


„szék” téralkat

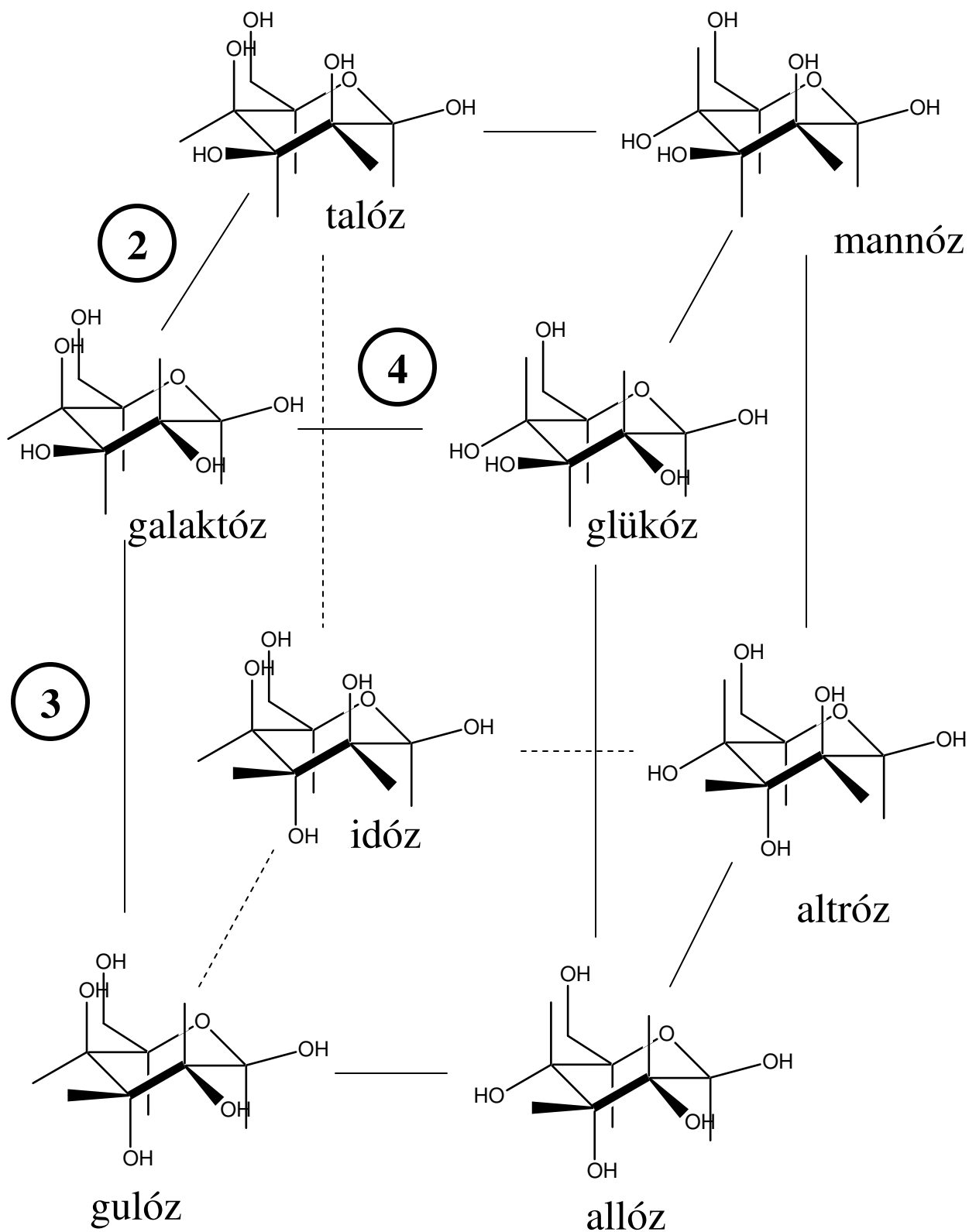


az α -anomer: a CH_2OH és a glikozidos OH ellentétes oldalon áll

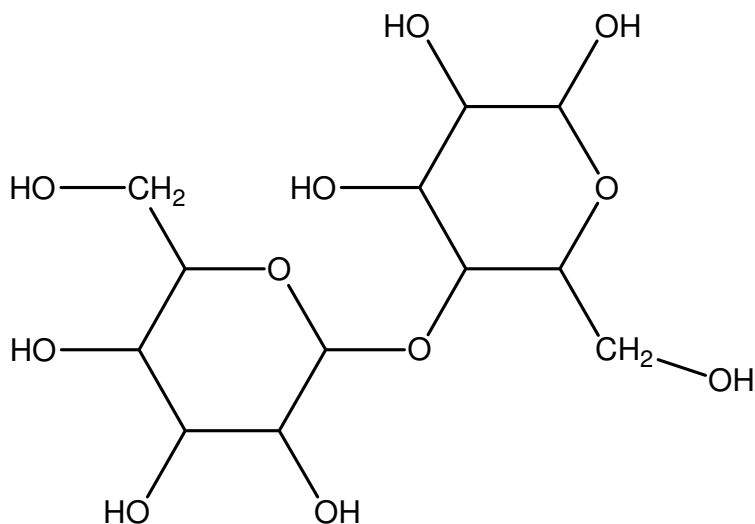
„boríték” téralkat (4 atom egy síkban)



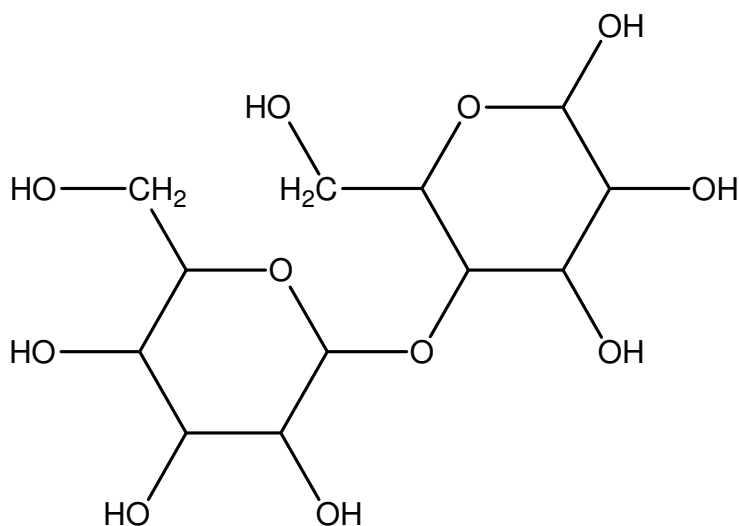
Cukorkocka („kockacukor”; KöKÉL 1992/3-4)



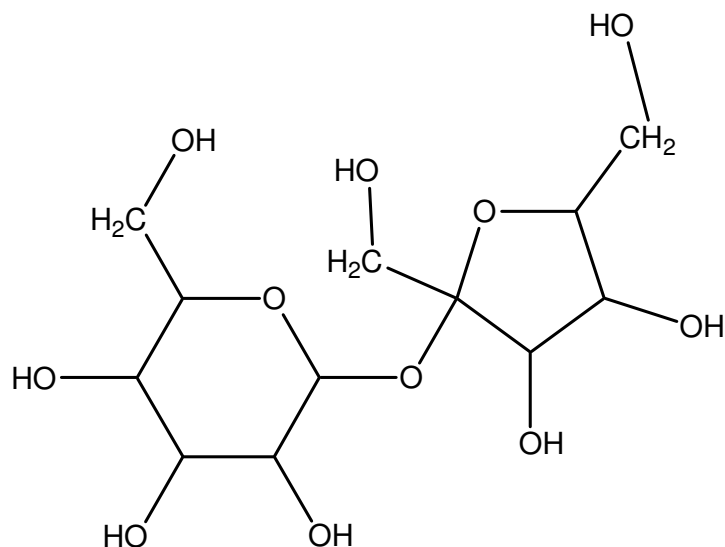
Cukrok: diszaccharidok



cellobióz:
2 β -D-glükóz
(cellulóz)

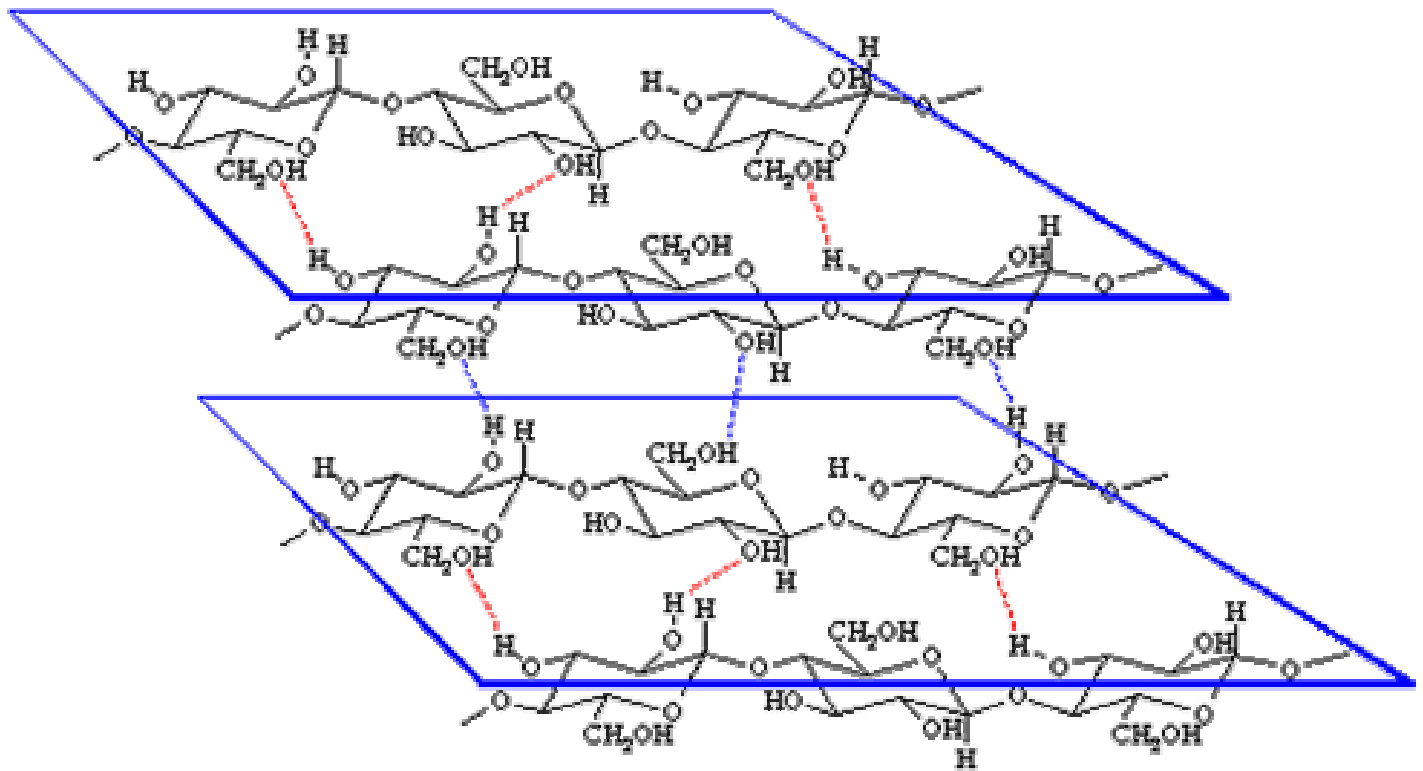
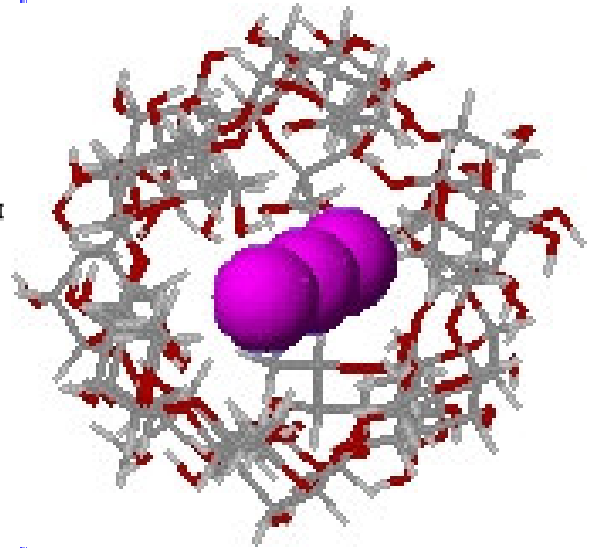
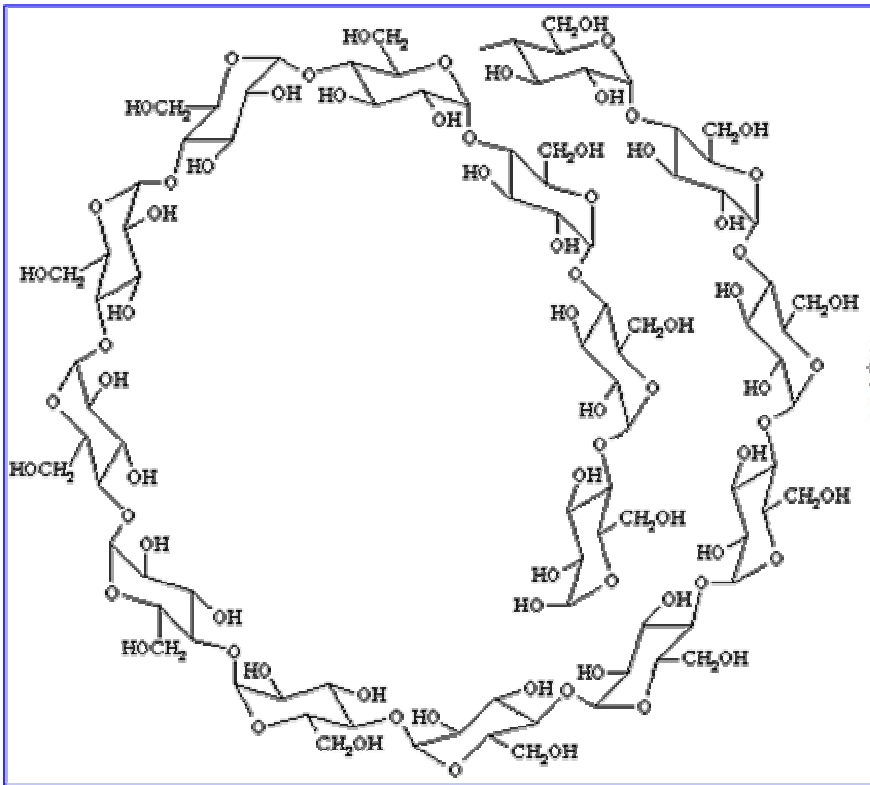


maltóz:
2 α -D-glükóz
(keményítő: maltodextrin)

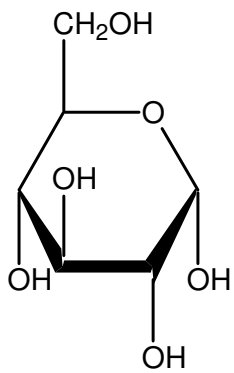


szacharóz:
1 α -D-glükóz és
1 β -D-fruktóz

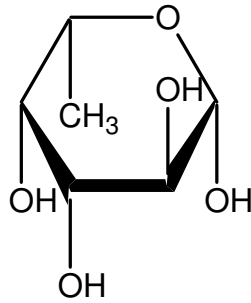
Cukrok: poliszaccharidok



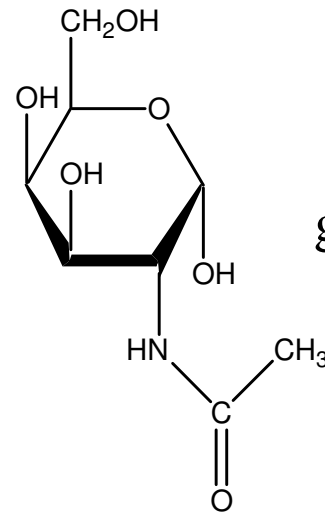
Cukrok: módosított cukrok



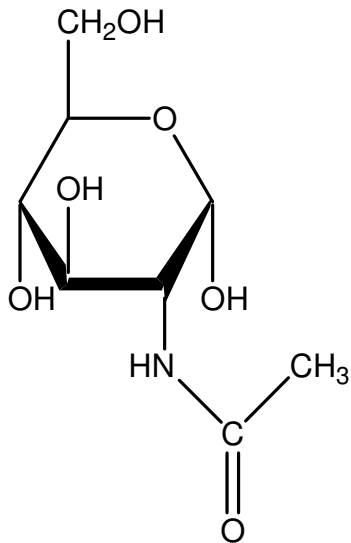
glükóz (Glc)



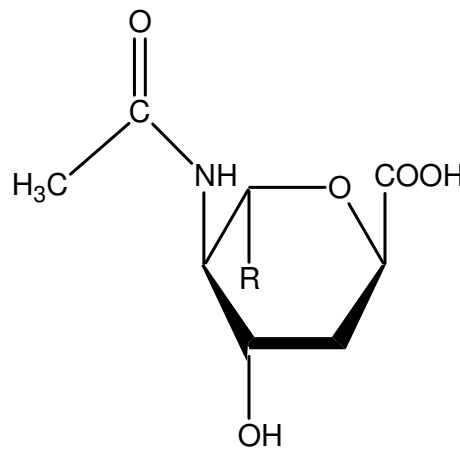
fukóz (Fuc)



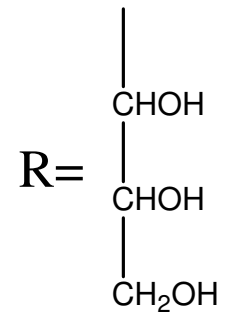
N-acetil-
galaktózamin
(GalNAc)



N-acetil-
glükózamin
(GlcNAc)



sziálsav



Az AB0 vércsoportrendszer

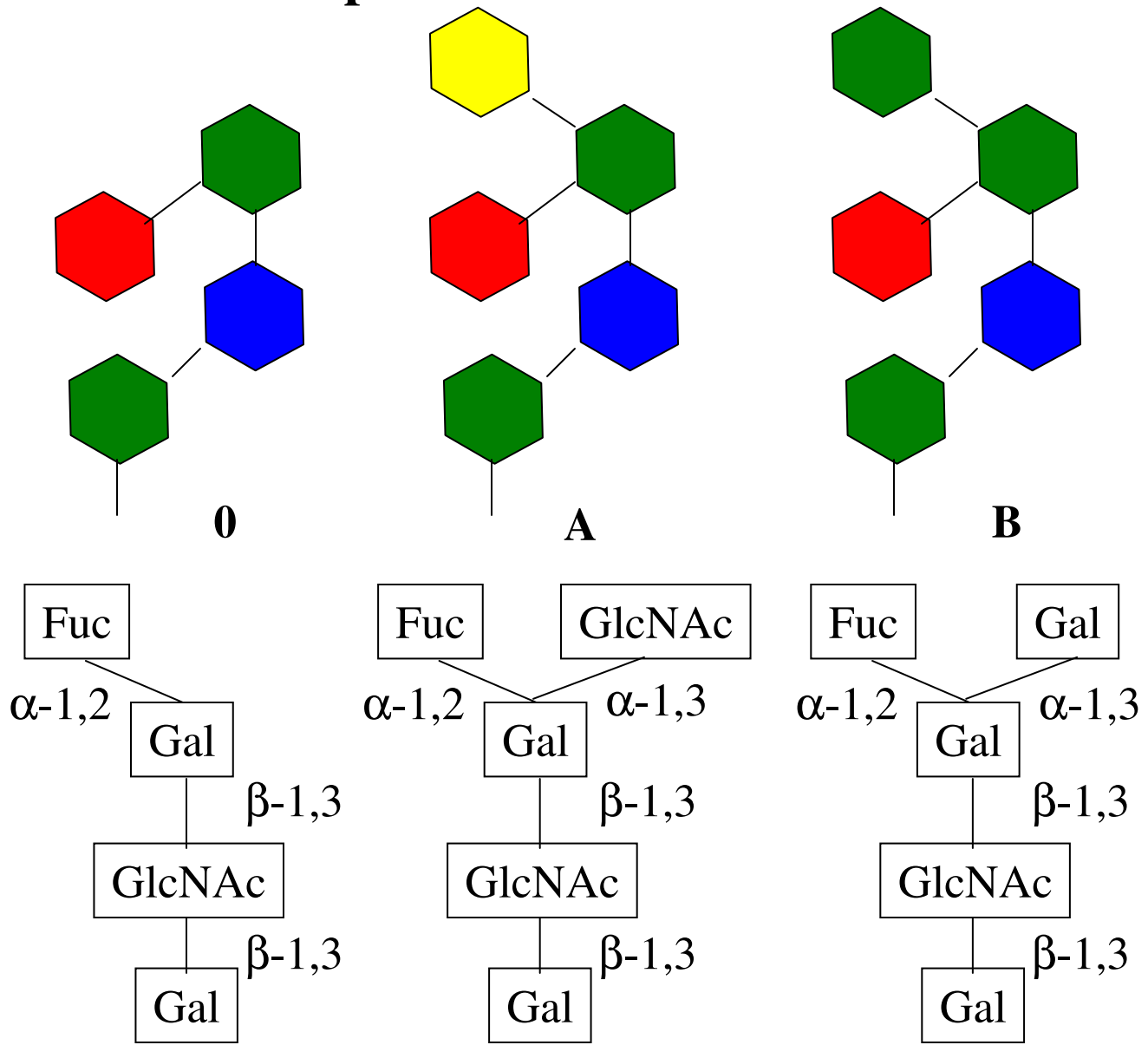
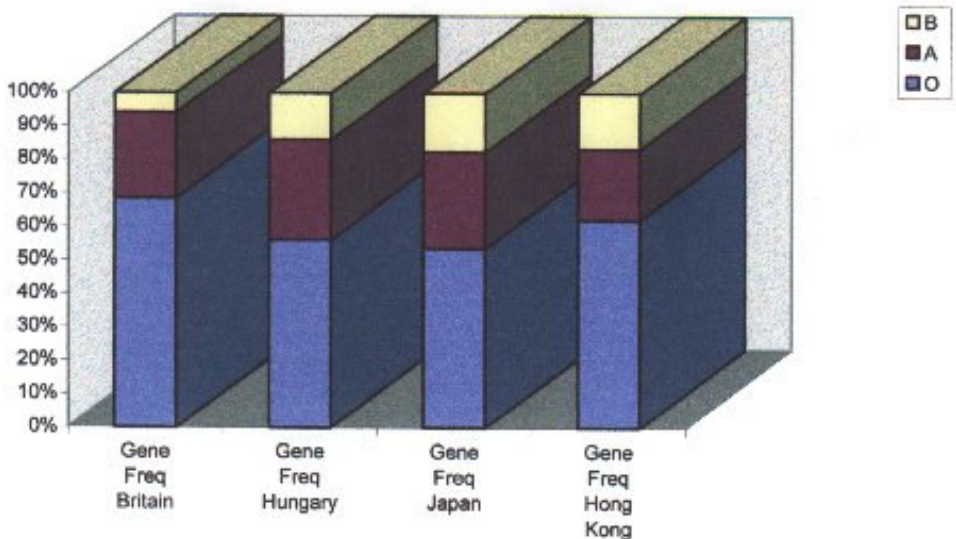


Fig 2: A comparison of the ABO Gene Frequency for Four Different Ethnic Populations. (8)(17)(18)(19)



Nukleinsavak: építőkövek

- DNS: adenin (A), citozin (C), guanin (G), timin (T)

Chargaff-szabályok: A=T, G=C, magyarázat:

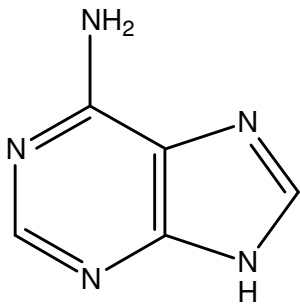
bázispárosodás

cukorrész: dezoxiribóz (deoxyribose)

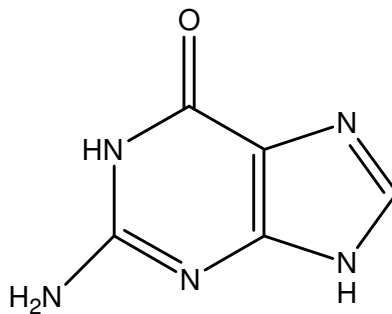
- RNS: adenin (A), citozin (C), guanin (G), uracil (U)

nem érvényesek a Chargaff-szabályok

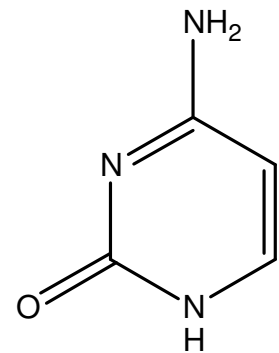
cukorrész: ribóz



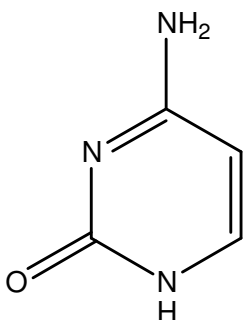
adenin



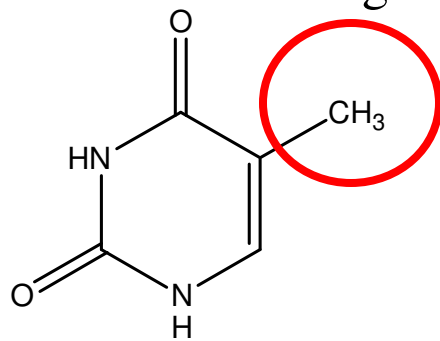
guanin



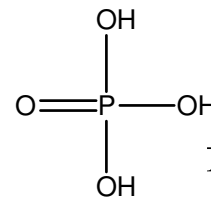
citozin



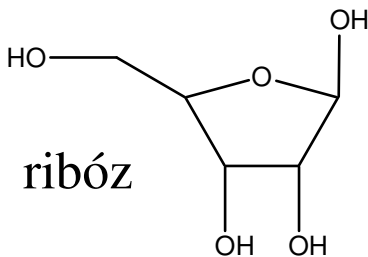
uracil



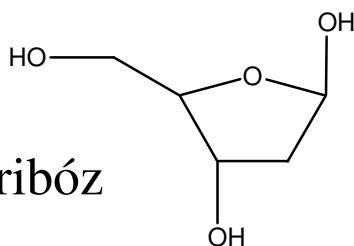
timin



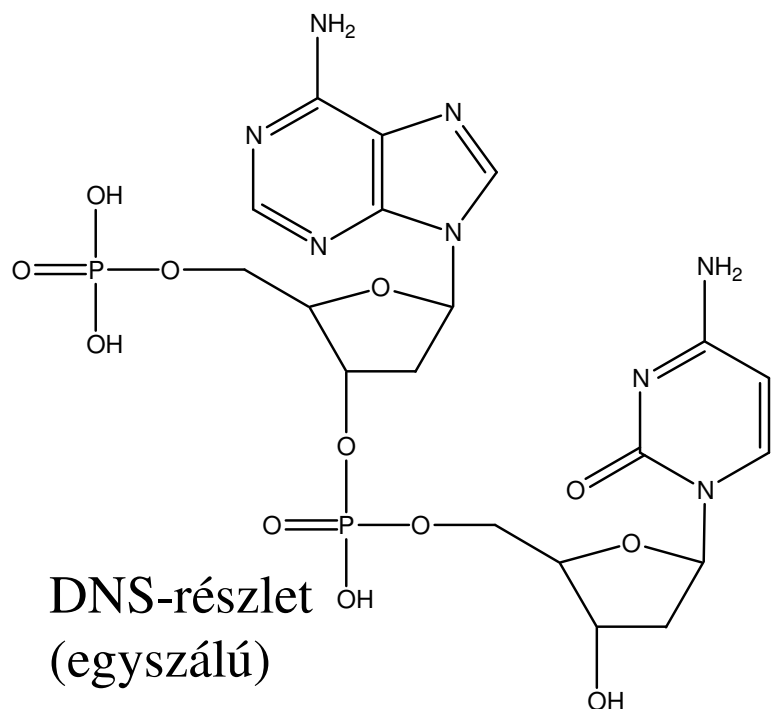
foszforsav



ribóz

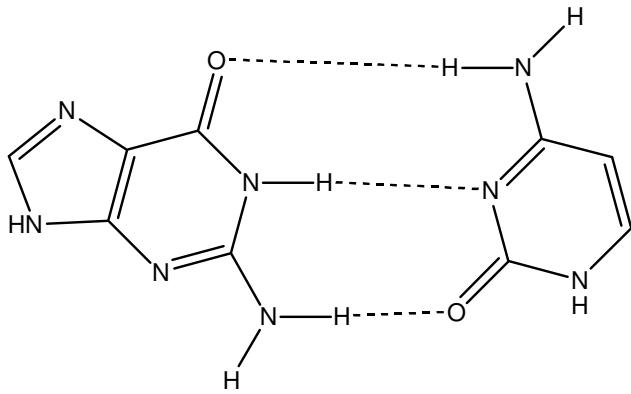


2-dezoxiribóz

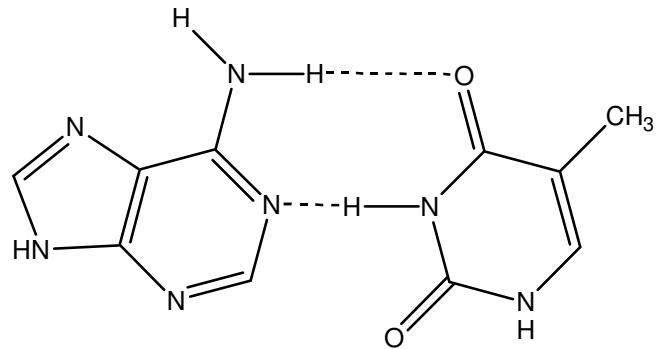


DNS-részlet
(egyszálú)

Nukleinsavak: egybetűs kódok



guanin-citozin:
3 hidrogénhíd

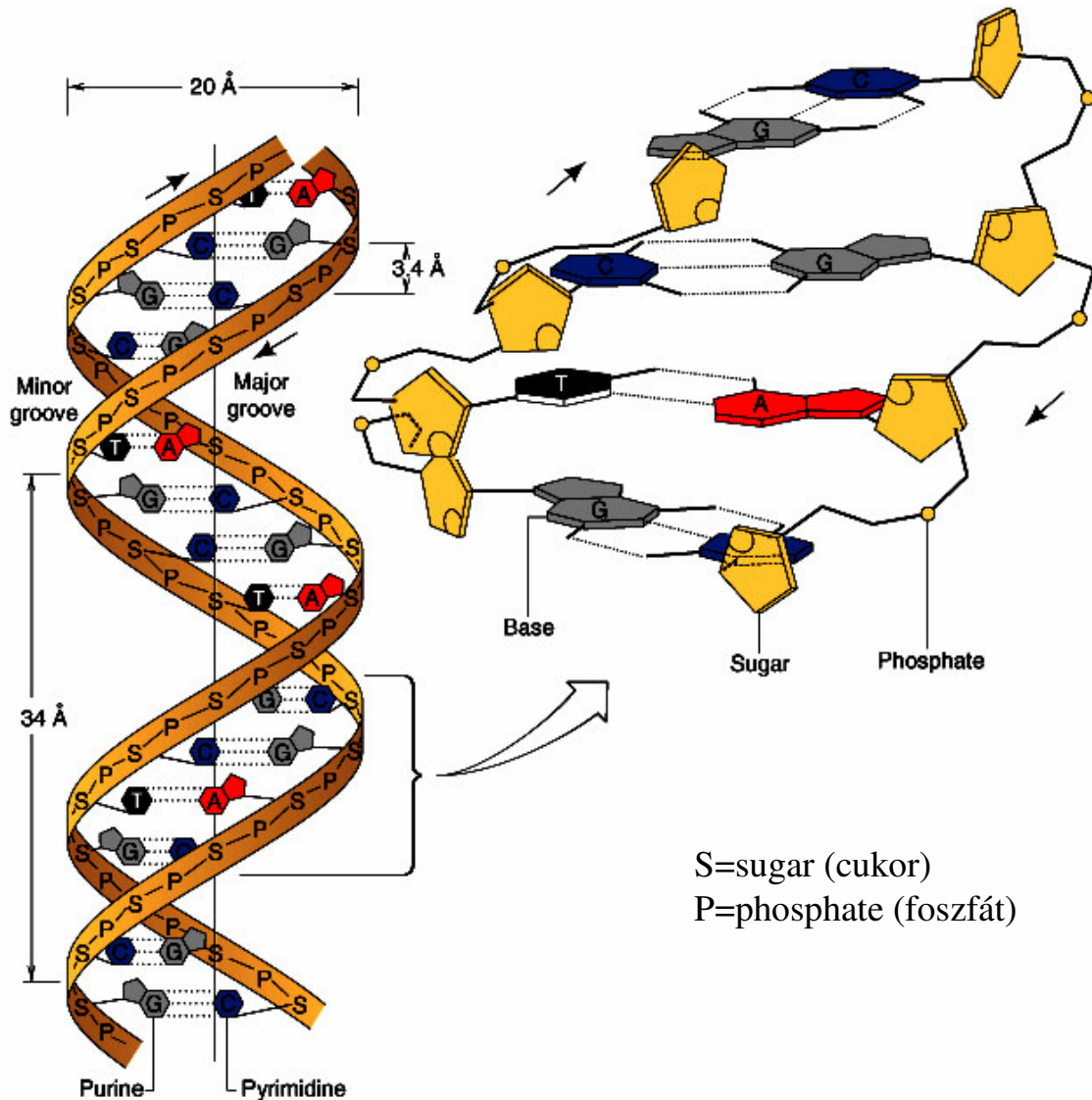
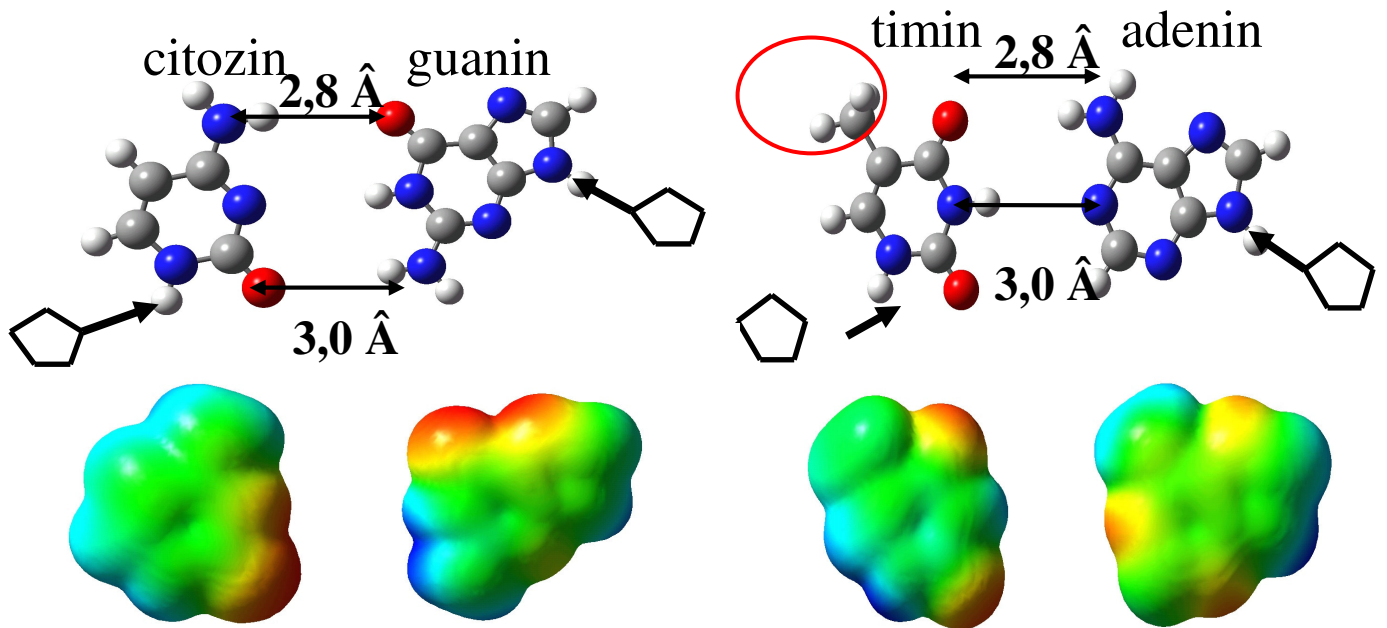


adenin-timin:
2 hidrogénhíd

<i>Kód</i>	<i>Nukleotid(ok)</i>	<i>Jelentés</i>	<i>Komplementer</i>
A	A (adenin)		T
C	C (citozin)		G
G	G (guanin)		C
T	T (timin)		A
M	A vagy C	aMino	K
R	A vagy G	puRine	Y
W	A vagy T	Weak (értsd: H-híd)	W
S	C vagy G	Strong (értsd: H-híd)	S
Y	C vagy T	pYrimidine	R
K	G vagy T	Keto	M
V	A vagy C vagy G	nem T	B
H	A vagy C vagy T	nem G	D
D	A vagy G vagy T	nem C	H
B	C vagy G vagy T	nem A	V
X/N	A vagy C vagy G vagy T	aNy	N
•	nem A, C, G vagy T		•

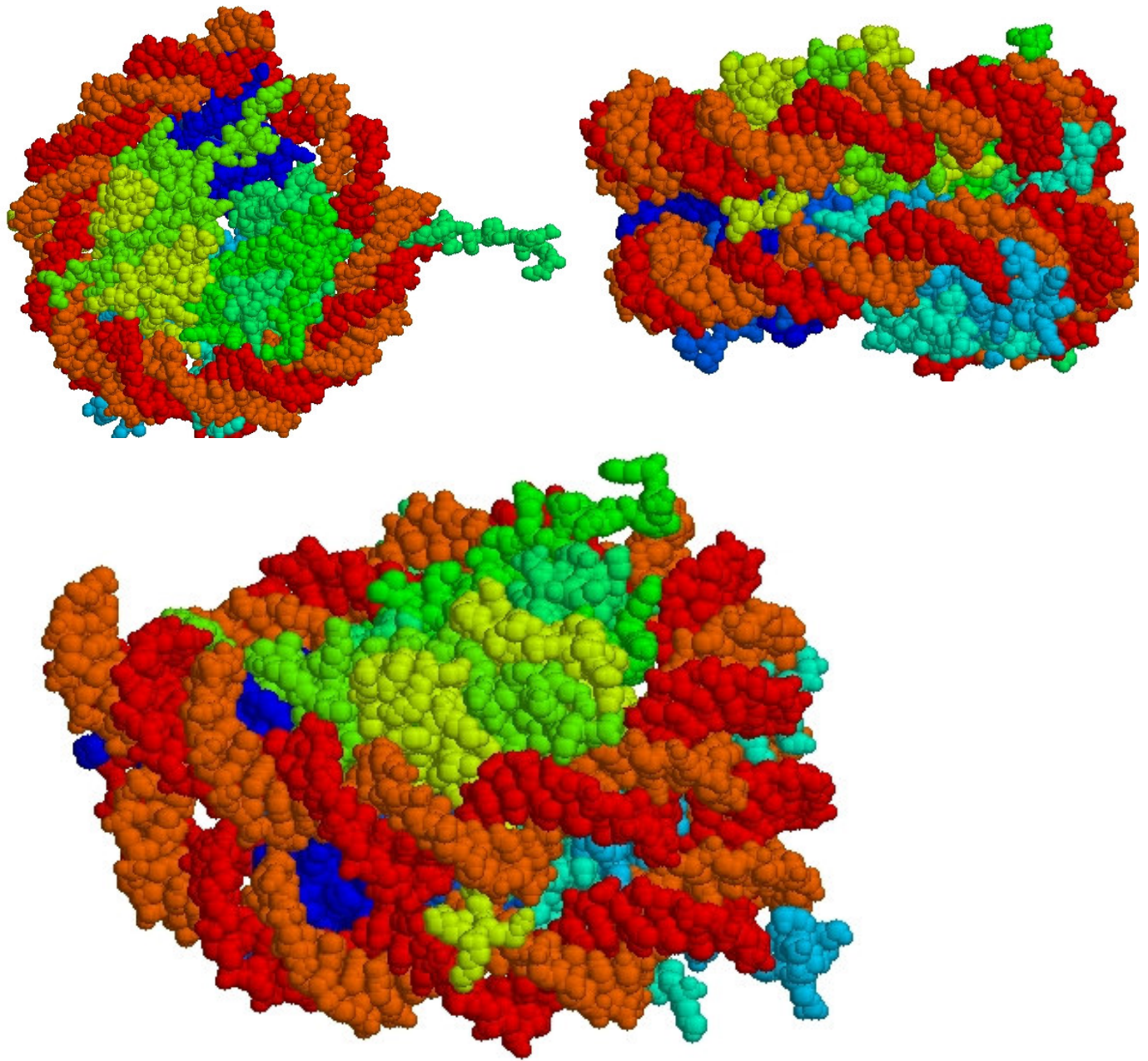
A DNS-szekvenciákban előfordul, hogy egy nukleotid leolvasása nem egyértelmű, vagy jelölni szeretnénk az egy pozícióban lehetséges polimorfizmusokat

DNS: A bázispárok közötti molekuláris kölcsönhatások csak a 3D-ben nyerik el valódi jelentőségüket:

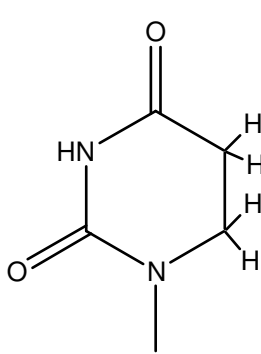


A nukleoszóma

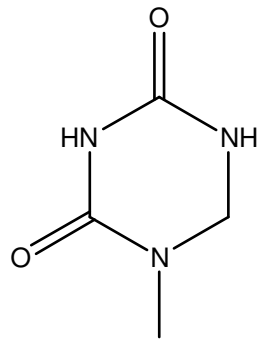
- Eukariótákban a genetikai állomány térbeli szerveződésének alapegysége + fontos génszabályozó szerep
- Mag (hisztonfehérjék): {H2A, H2B, H3, H4} x 2



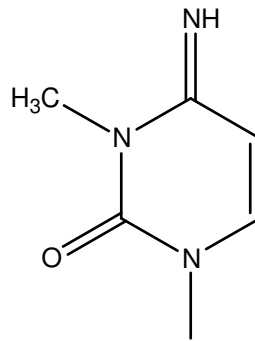
Nukleinsavak:módosított bázisok



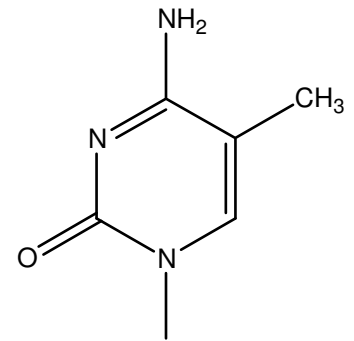
dihidouridin



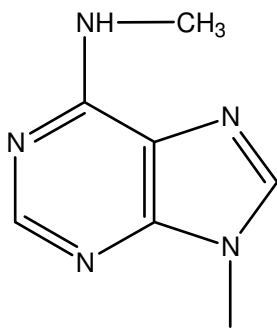
pszeudouridin



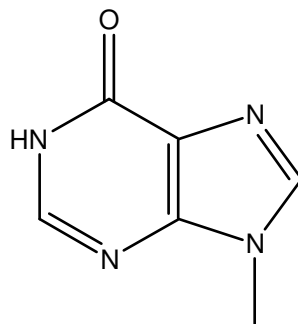
3-metilcitudin



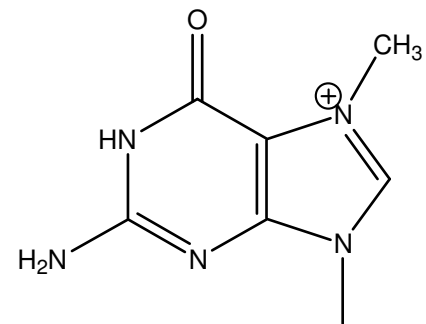
5-metilcitudin



6-metiladenozin

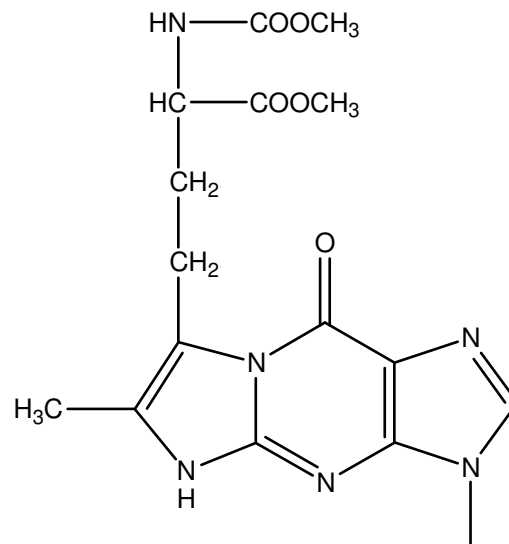
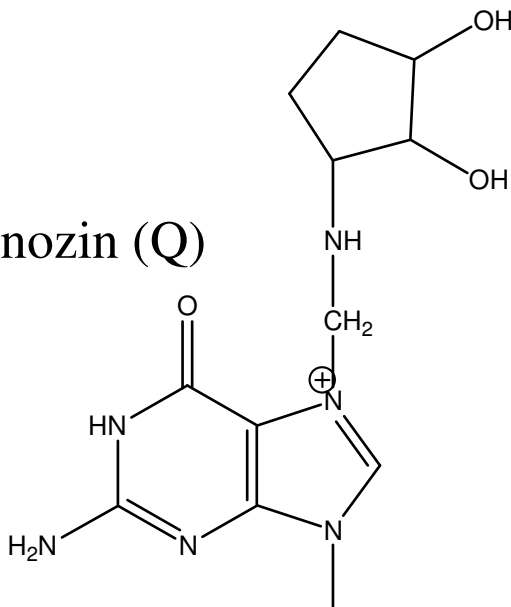


inozin



7-metilguanozin

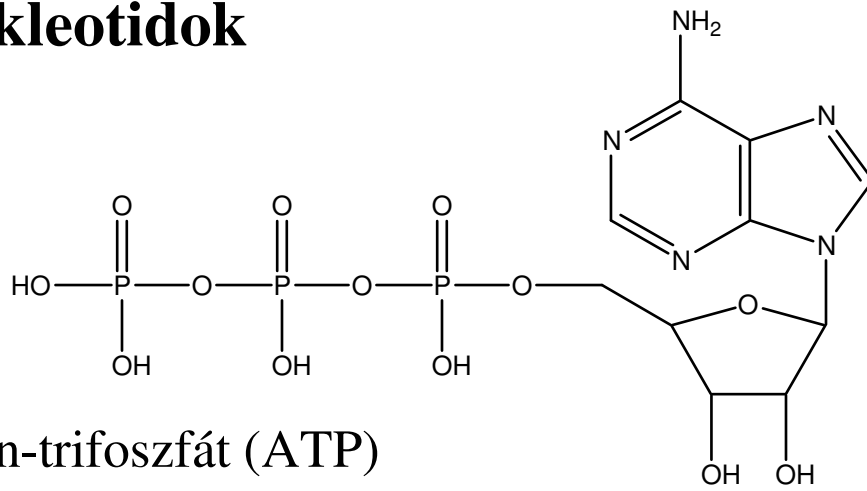
Quenozin (Q)



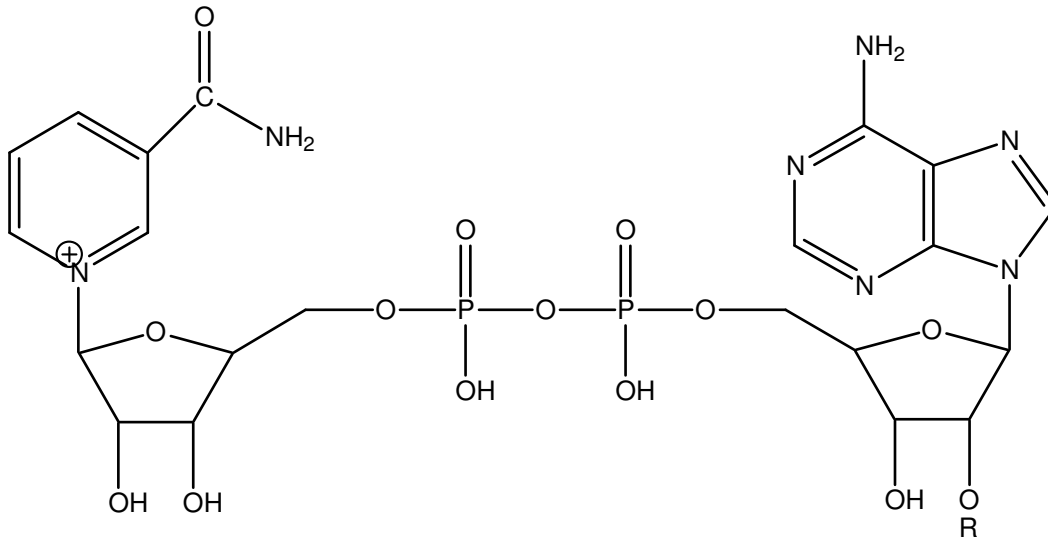
Wyozin (Y)

- A módosítások a nukleinsavba már beépült bázisokon történnek
- Kivétel: Q bázisok: egy enzim a beépült G-t egy szabadon elkészült Q-ra cseréli

Egyéb nukleotidok

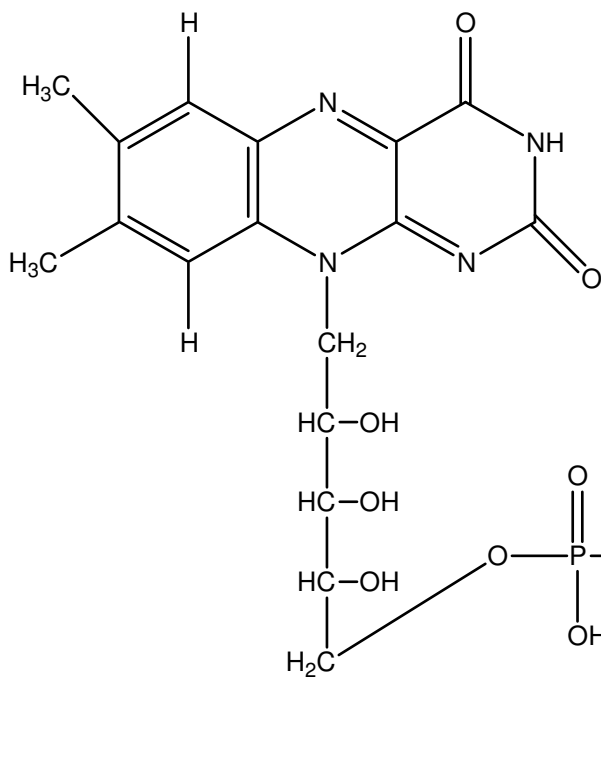


Adenozin-trifoszfát (ATP)



R=H: Nikotinamid-adenin-dinukleotid (NAD)

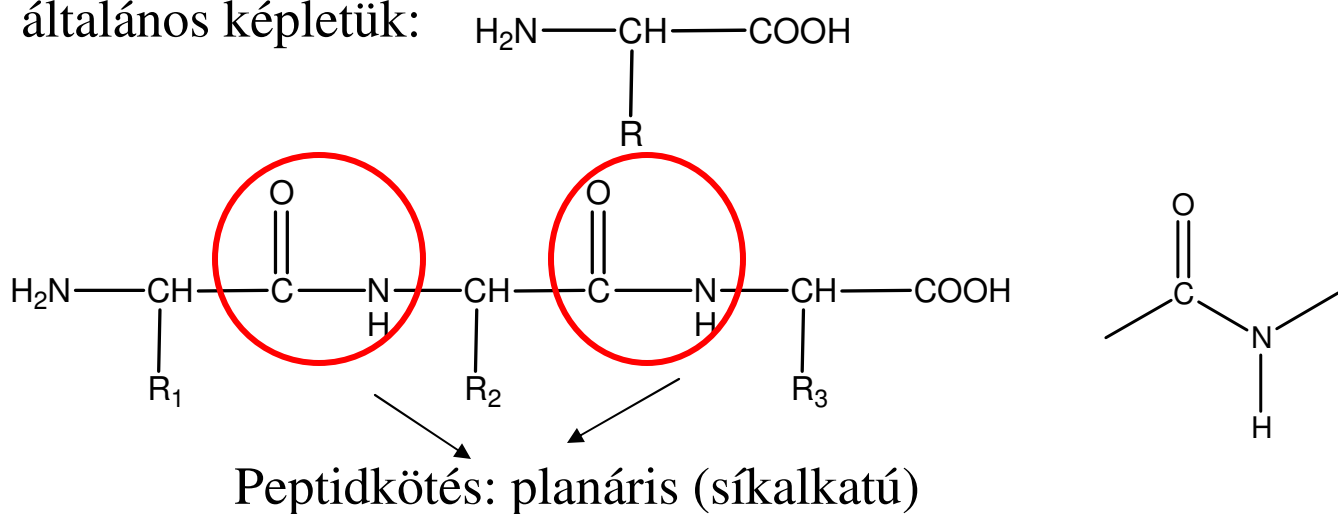
R=foszfát: Nikotinamid-adenin-dinukleotid-foszfát (NADP)



Flavin-adenin-dinukleotid (FAD)

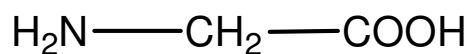
Aminosavak és fehérjék

- Fehérjék: α -aminosavakból felépülő heteropolimerek
- Az aminosavak peptidkötéssel (amidkötéssel) kapcsolódnak egymáshoz
- Az aminosavak az oldalláncukon különböznek, általános képletük:

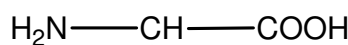


- Hagyományosan 20 fehérjealkotó aminosavat sorolnak fel
- Az aminosavakat az oldallánc alapján csoportosíthatjuk:
 - Apoláros – poláros – töltött
 - Alifás – aromás

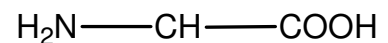
Apoláros aminosavak:



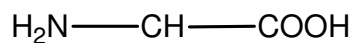
glicin (Gly, G)



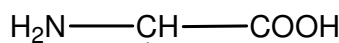
valin (Val, V)



alanin (Ala, A)



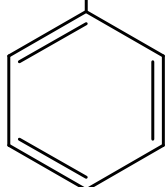
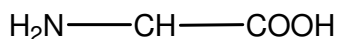
leucin (Leu, L)



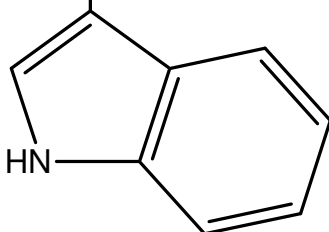
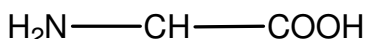
izpleucin (Ile, I)

Aminosavak és fehérjék

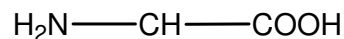
Apoláros aminosavak:



fenilalanin (Phe, F)

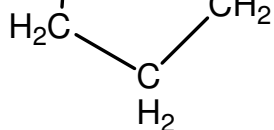
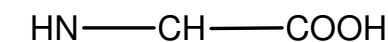


triptofán (Trp, W)



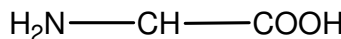
metionin (Met, M)

Apoláros, ráadásul szigorúan véve iminosav:

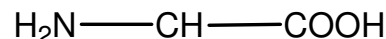


prolin (Pro, P)

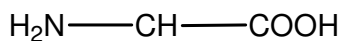
Poláros aminosavak:



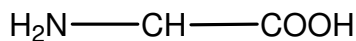
szerin (Ser, S)



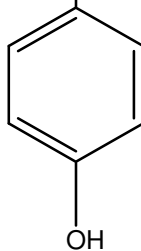
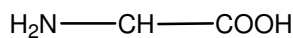
treonin (Thr, T)



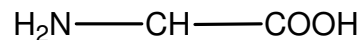
aszparagin (Asn, N)



glutamin (Gln, Q)



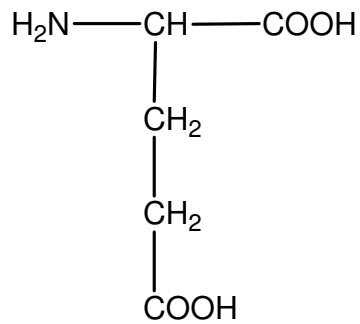
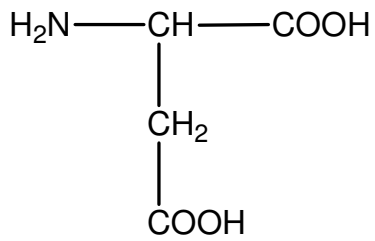
tirozin (Tyr, Y)



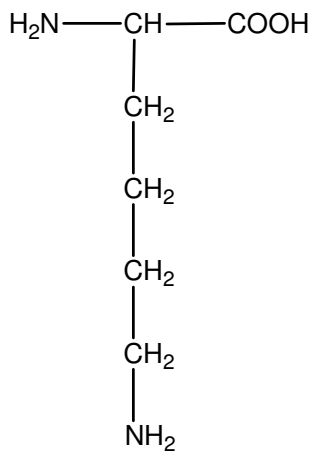
cisztein (Cys, C)

Aminosavak és fehérjék

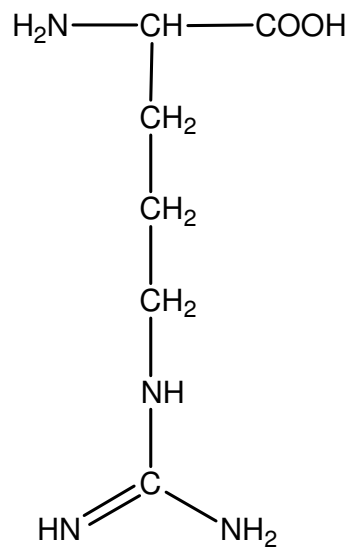
Töltött aminosavak:



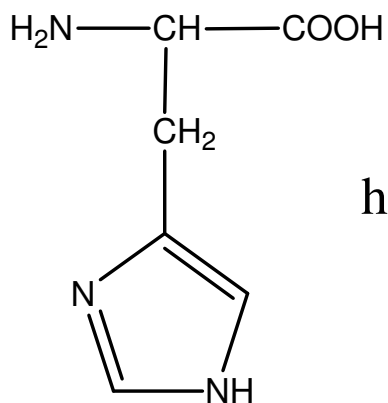
aszparaginsav (Asp, D) glutaminsav (Glu, E)



lizin (Lys, K)

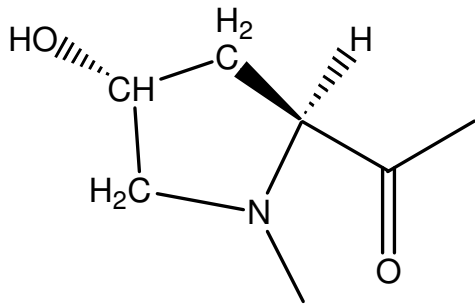


arginin (Arg, R)

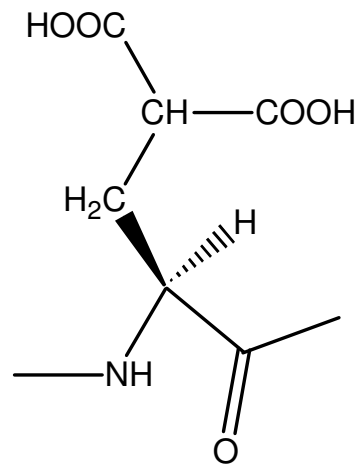


hisztidin (His, H)

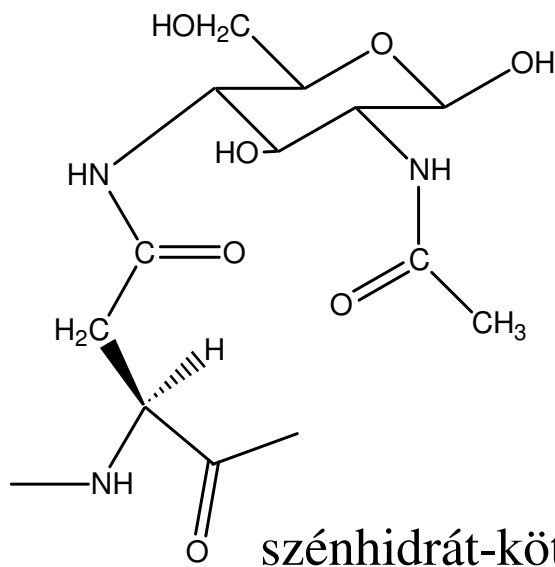
Módosított aminosavak



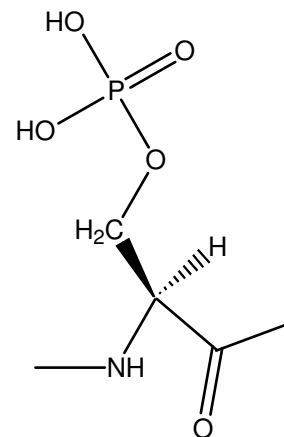
Hidroxiiprolin (Hyp, O)



γ -karboxi-glutaminsav



szénhidrát-kötött Asn

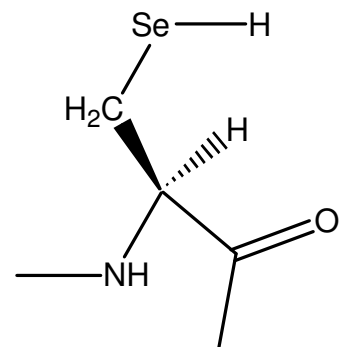


foszfoserin

- Utólagos (poszttranszlációs) módosítások
- A szelenocisztein transzláció közben épül be!

Van még:

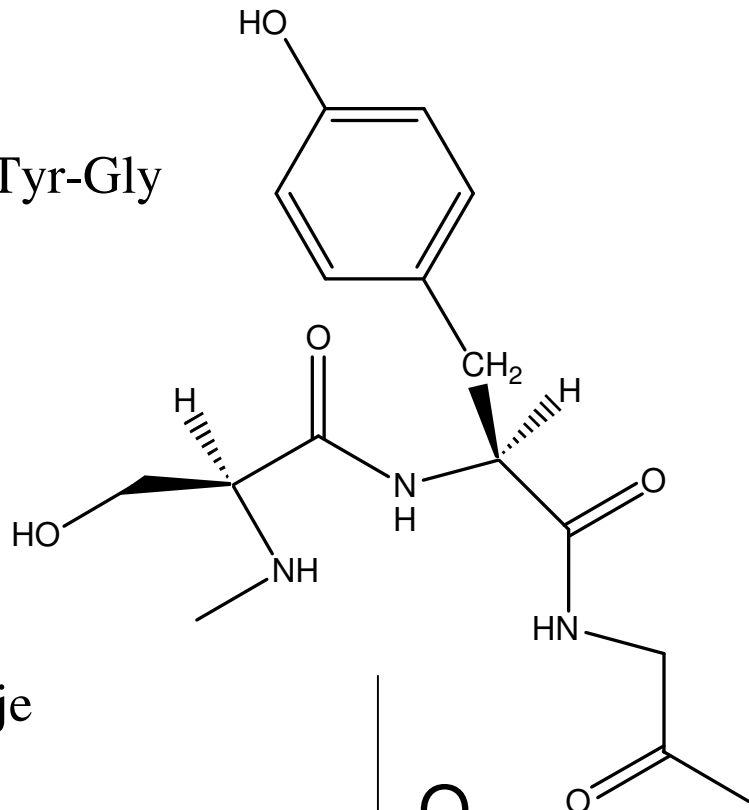
- foszfo-Thr, foszfo-Tyr
- metil-lizin, acetil-lizin
- N-terminális acetiláció v. metiláció



szelenocisztein

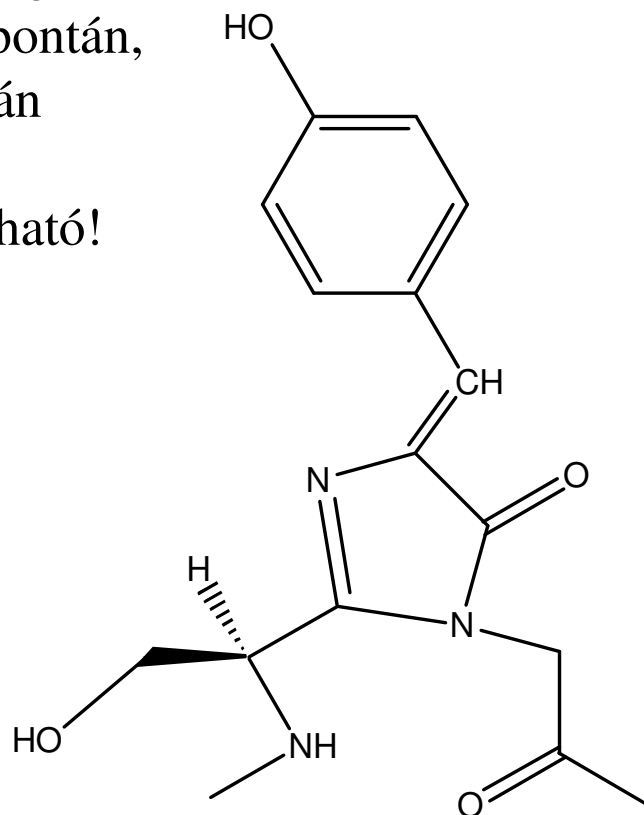
Módosított aminosavak: GFP

Ser-Tyr-Gly



- Zöld fluoreszcens fehérje (GFP)
- Medúzából származik
- Géntechnológiai jelentőség: világító sejtek, szövetek (egér!)
- A fluoreszcens csoport spontán, a fehérje feltekeredése után alakul ki
- Szintetikusan reprodukálható!

O₂



Aminosavak és fehérjék

Néhány fehérjékben előforduló csoport jellemző pK_a értéke

Csoport	Sav	Bázis	Tipikus pK_a
Terminális α -karboxicsoprot			3,1
Aszparaigsav, glutaminsav			4,1
Hisztidin			6,0
Terminális α -aminocsoport			8,0
Cisztein			8,3
Tirozin			10,9
Lizin			10,8
Arginin			12,5

A szekvencia alapján jósolható a fehérjemolekulák izoelektromos pontja