

M U N I
S C I

C5730 Biochemie - seminář

Mgr. Lukáš Faltinek

podzim 2024

M U N I
S C I

Sacharidy

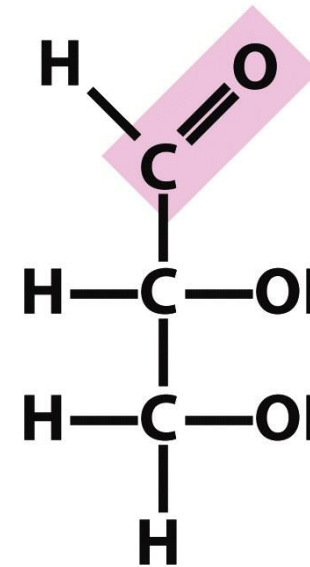
Charakteristika

➤ z chemického hlediska polyhydroxyaldehydy (**aldosy**) nebo polyhydroxyketony (**ketosy**)

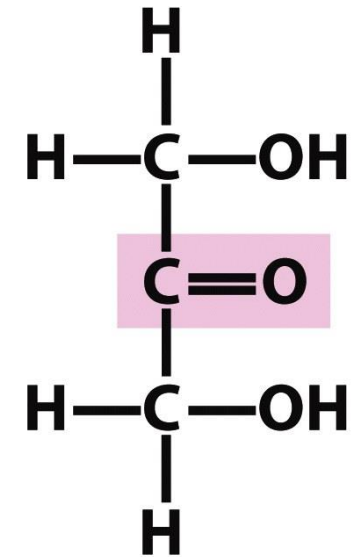
➤ základní stavební jednotkou monosacharid

➤ 3 až 7 atomů C

➤ triosy, tetrosy, pentosy, hexosy a heptosy



**Glyceraldehyde,
an aldotriose**



**Dihydroxyacetone,
a ketotriose**

Figure 7-1a
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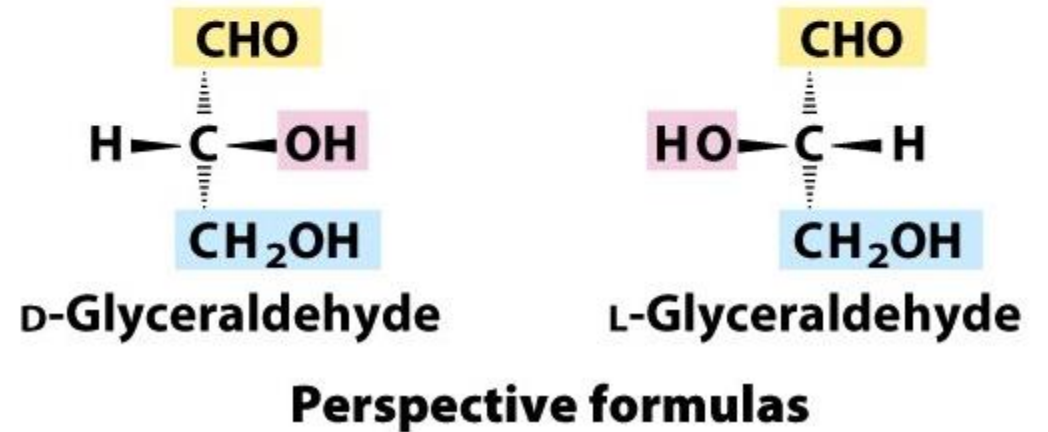
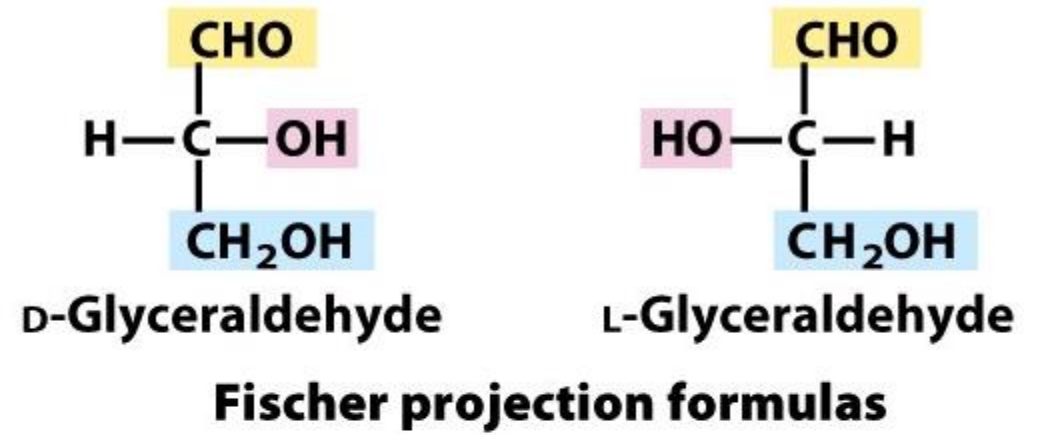
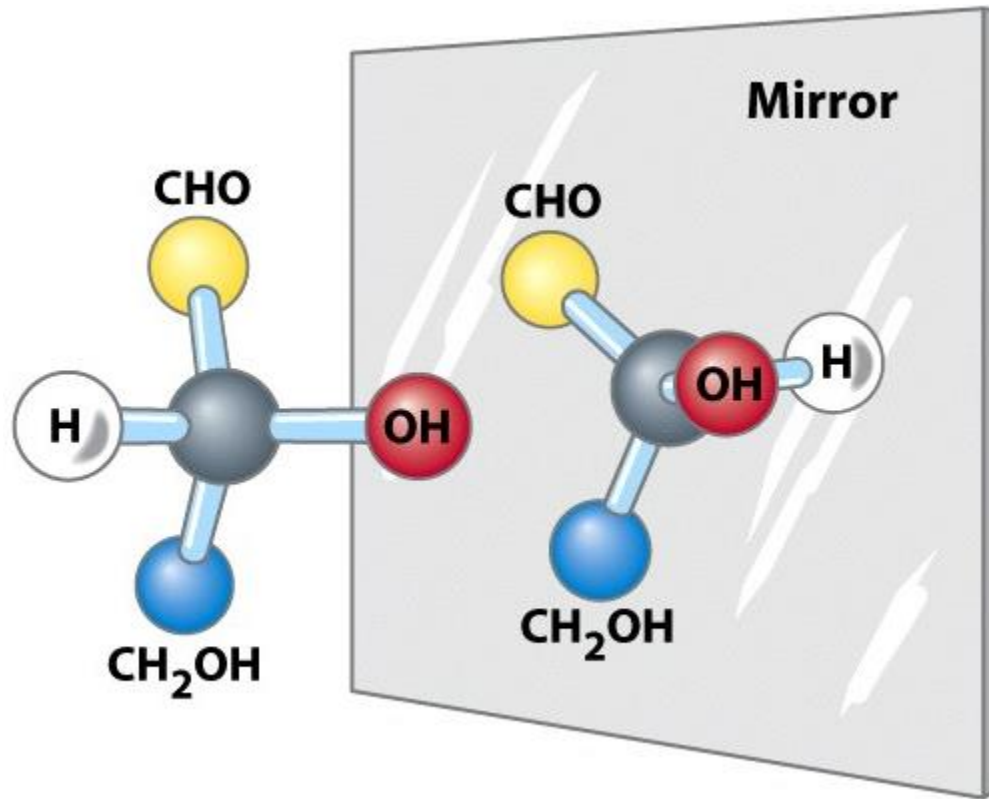


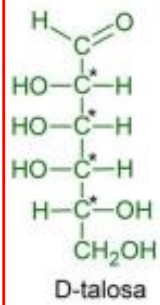
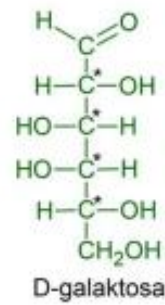
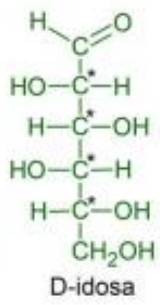
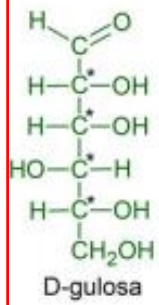
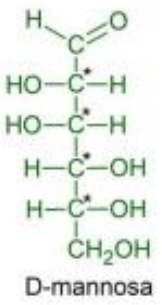
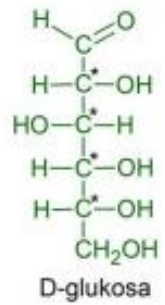
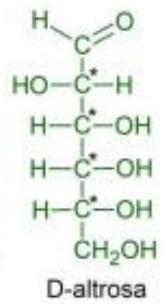
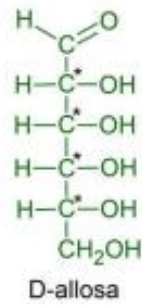
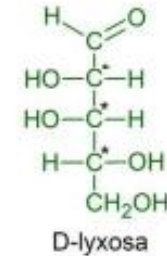
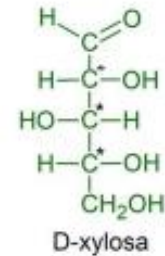
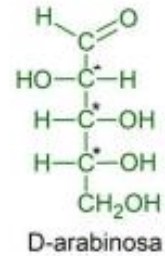
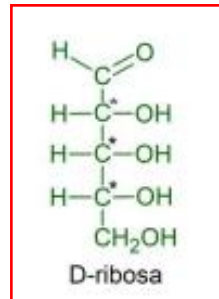
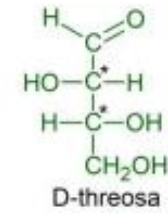
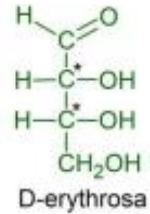
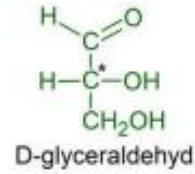
Figure 7-2

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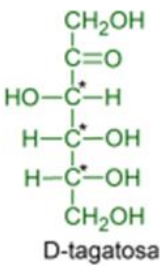
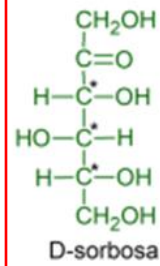
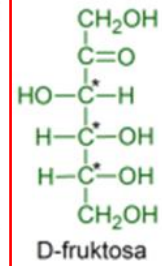
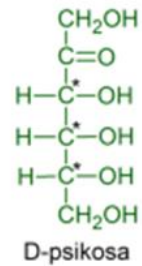
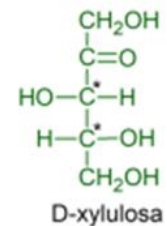
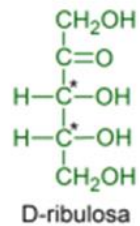
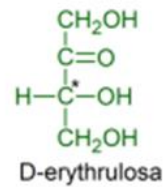
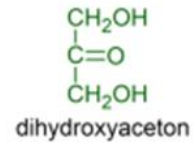
Přehled aldós

Počít stereoisomerů: 2^n



Přehled ketos

Počet stereoisomerů: 2^n



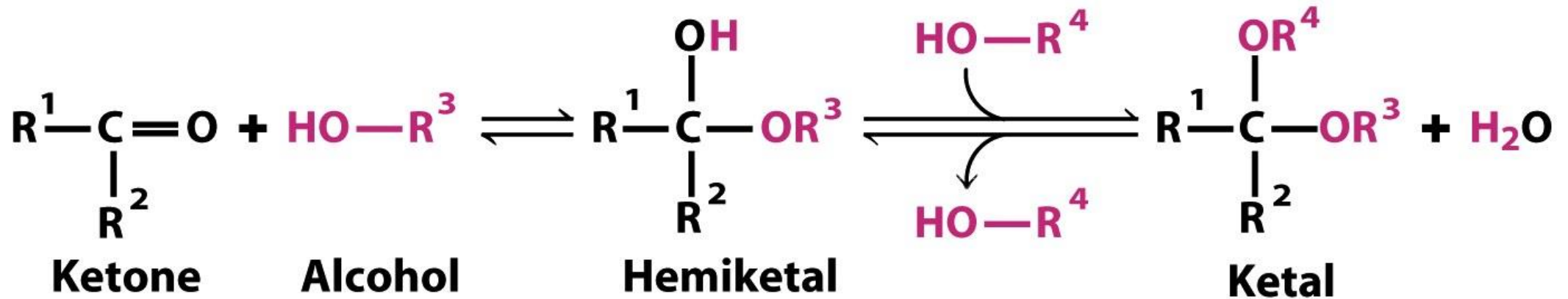
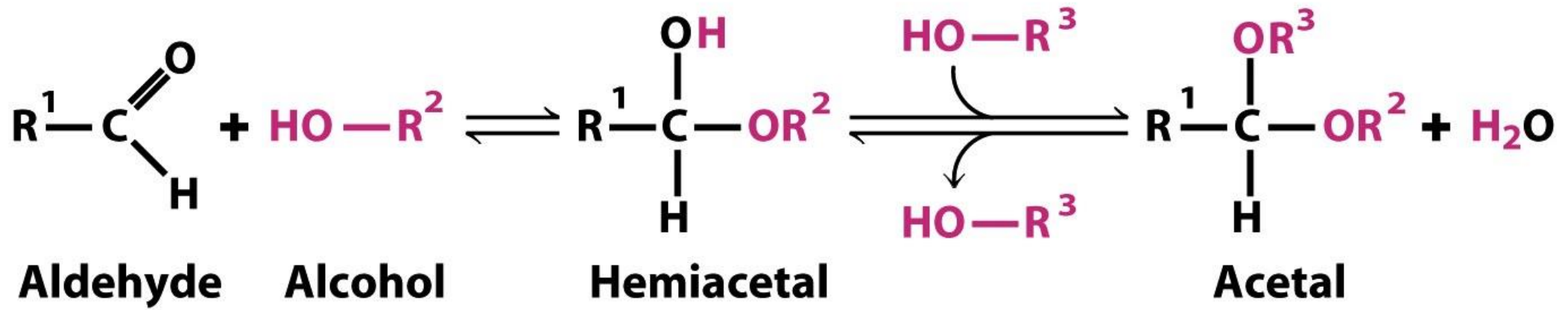


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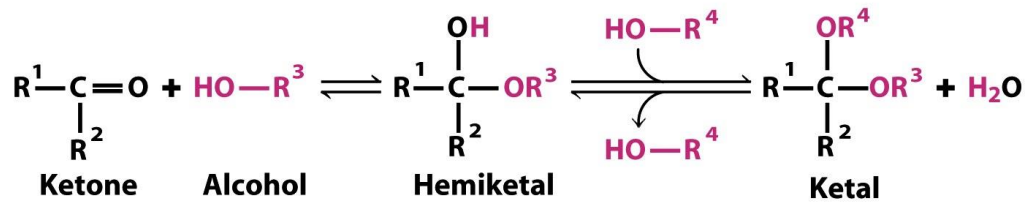
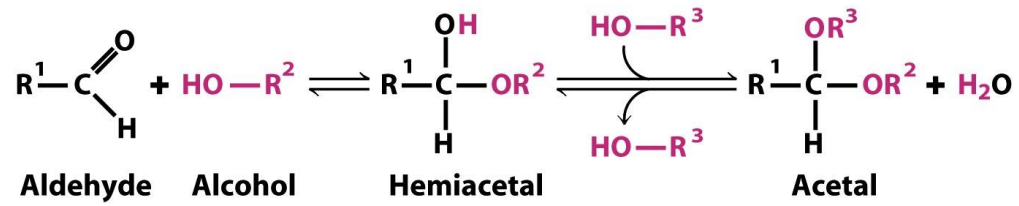


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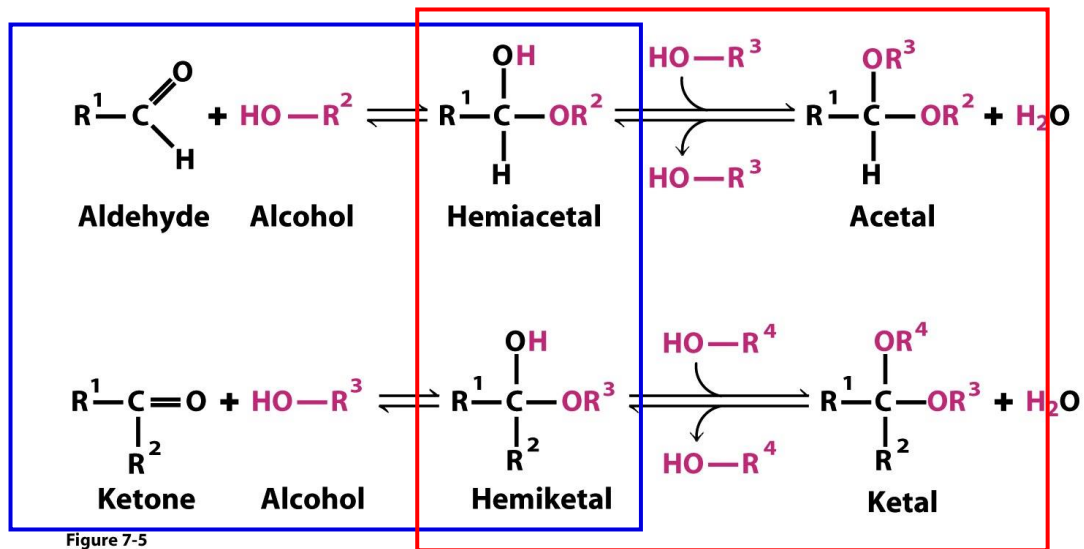


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Glykosidová vazba: vznik vyšších sacharidů



Intramolekulární reakce: vznik cyklické formy cukrů

Anomery a mutarotace

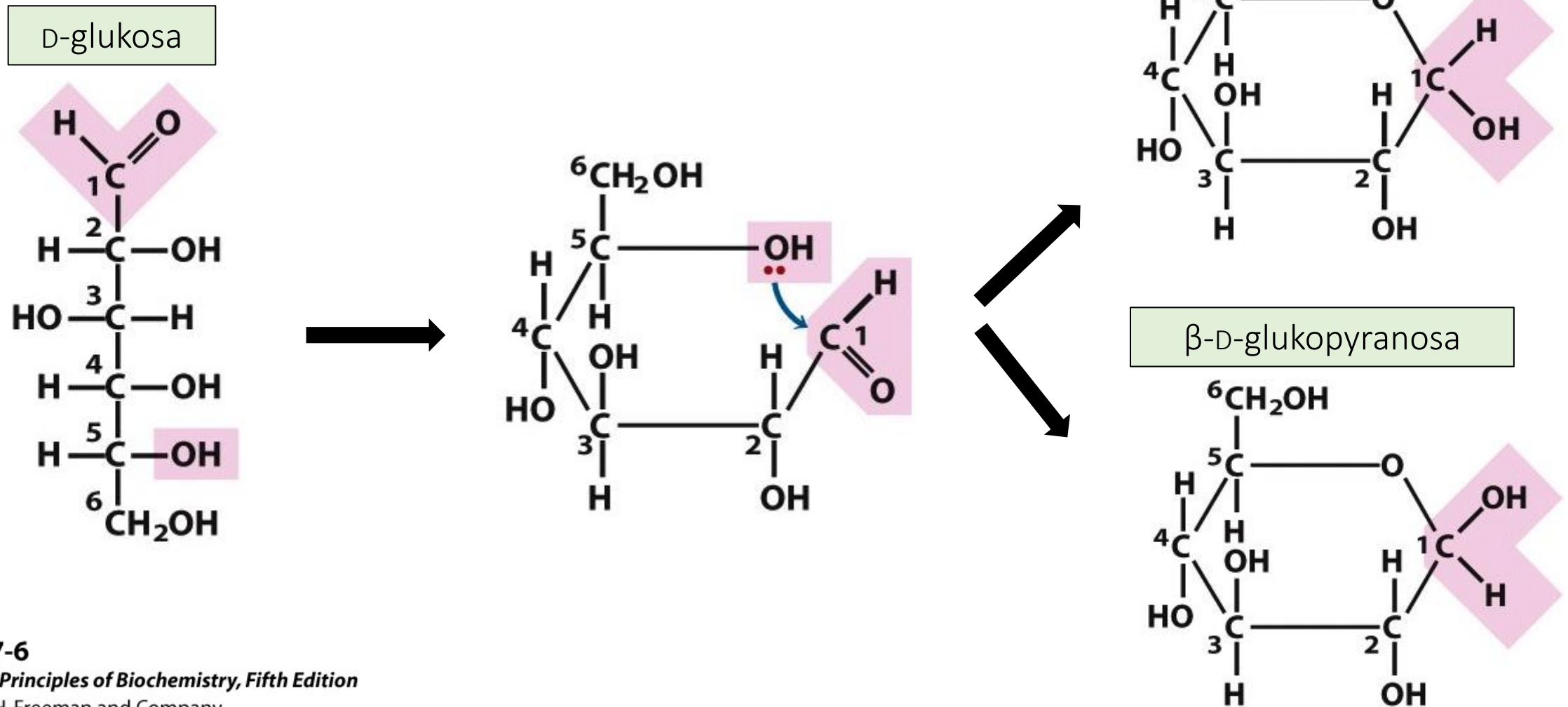
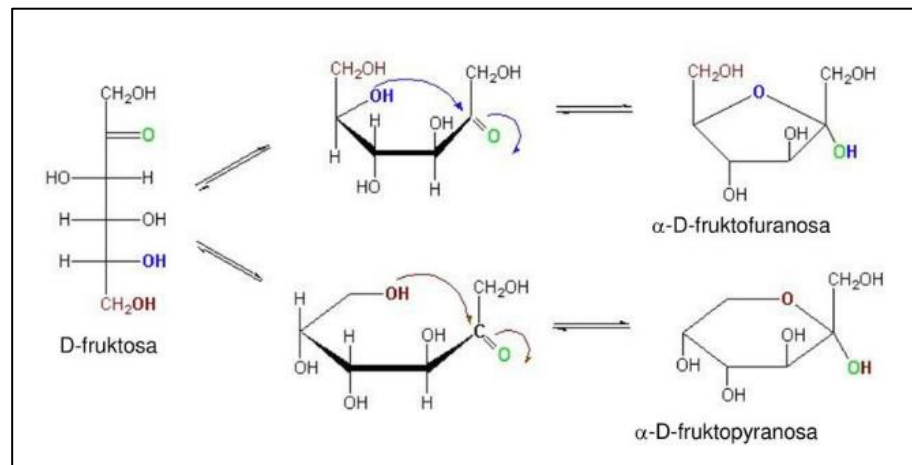
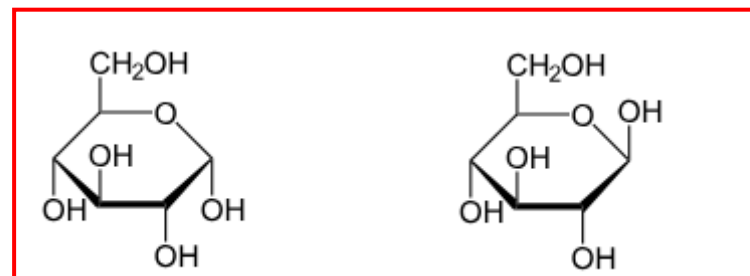
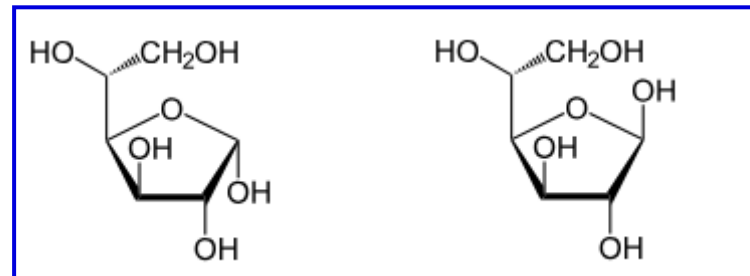
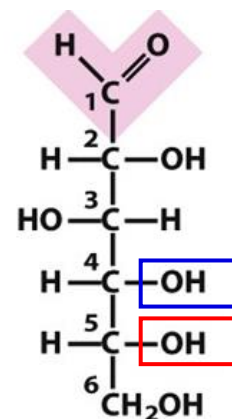
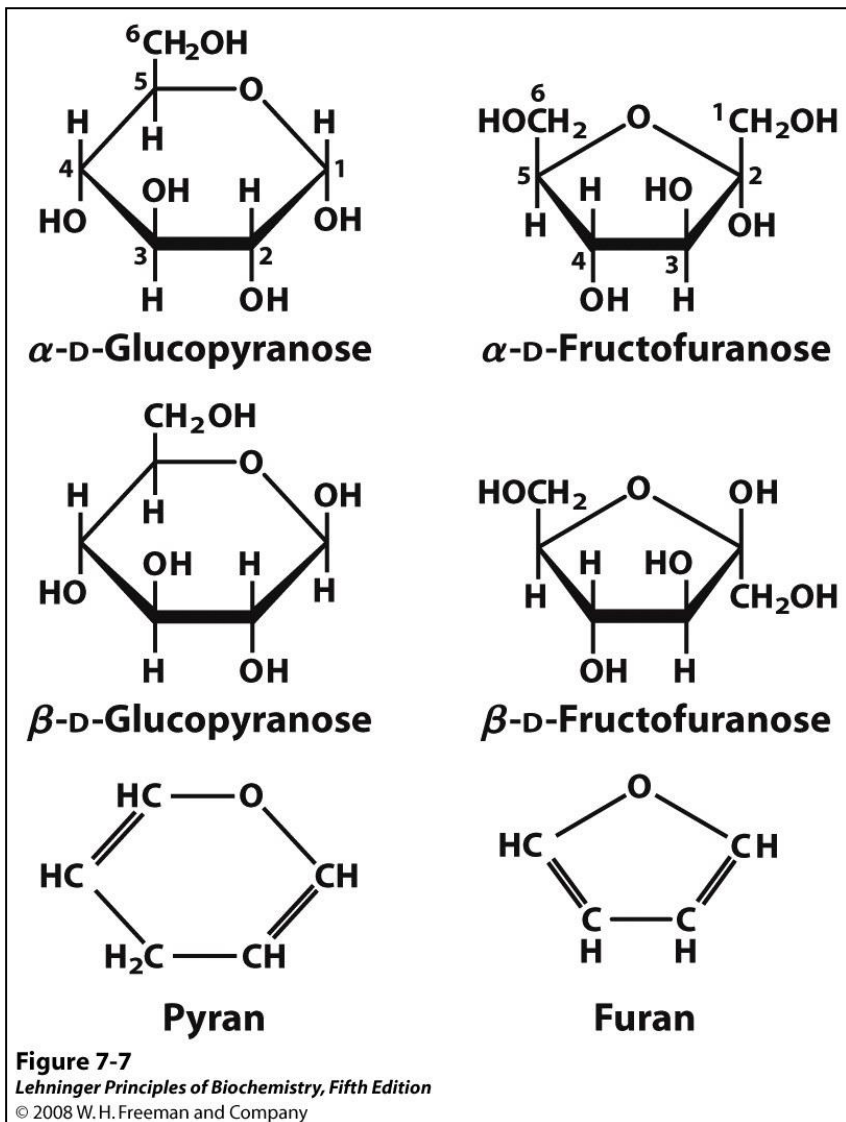
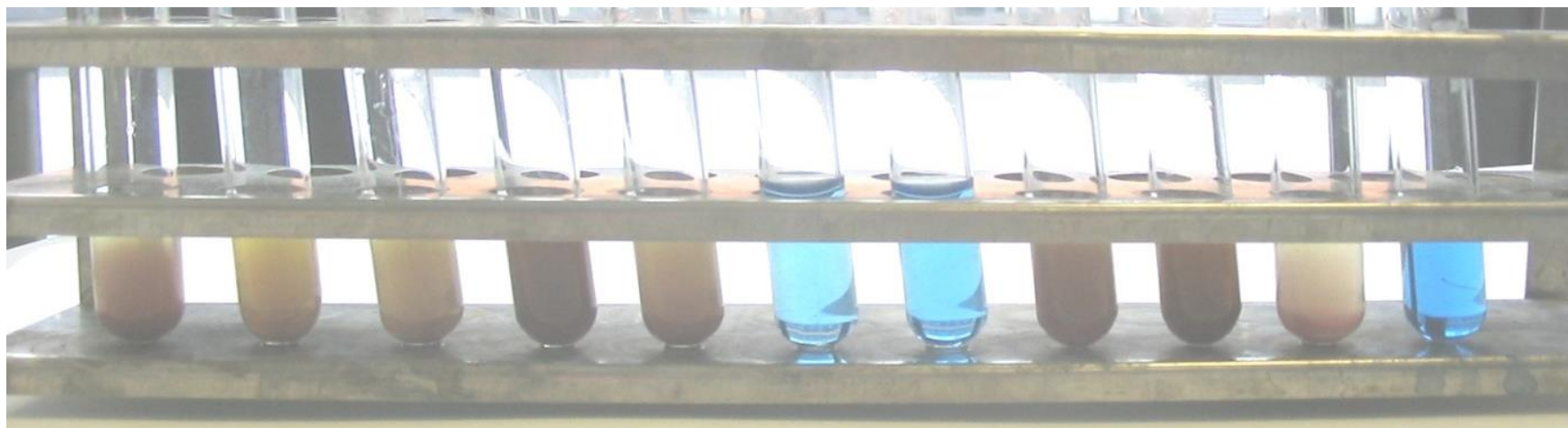
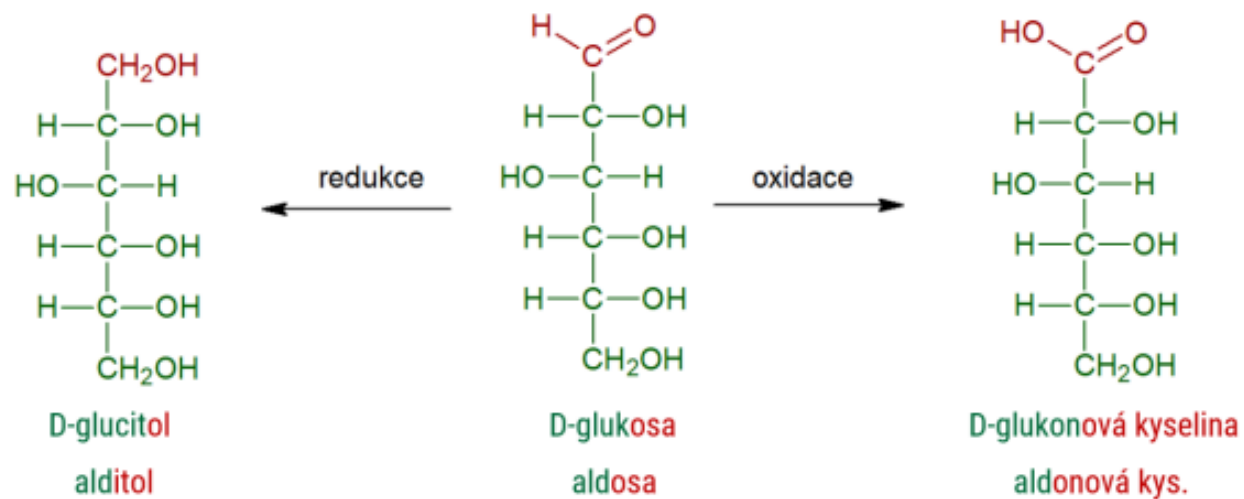


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Pyranosy a furanosy



Oxidace a redukce sacharidů



Fehlingova reakce

- modrá skalice
- vinan sodno-draselný
- NaOH

Deriváty sacharidů

- aldonové kyseliny
- uronové kyseliny
- alditoly
- aminosacharidy
- N-acetylsacharidy
- deoxysacharidy

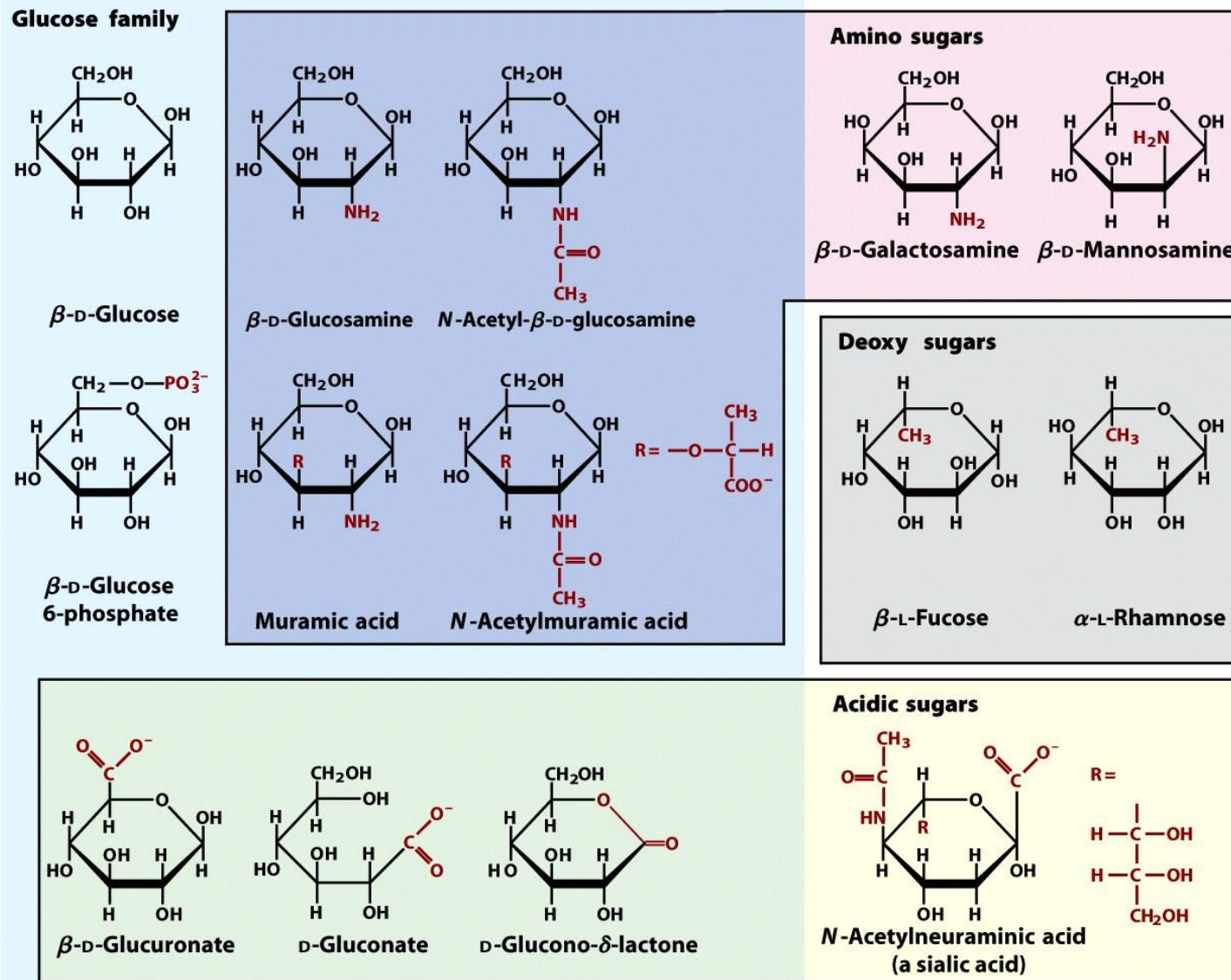


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Rozdělení

- monosacharidy
- oligosacharidy: 2 až 10 monosacharidových jednotek
- polysacharidy: více než 10 monosacharidových jednotek (až tisíce)

Vznik vyšších sacharidů

- reakce hemiacetalu/hemiketalu s alkoholem
- vznik acetalu/ketalu
- vznik glykosidové vazby
- kondenzace
- volný hemiacetal -> redukující sacharidy
- bez hemiacetalu -> neredukující sacharidy

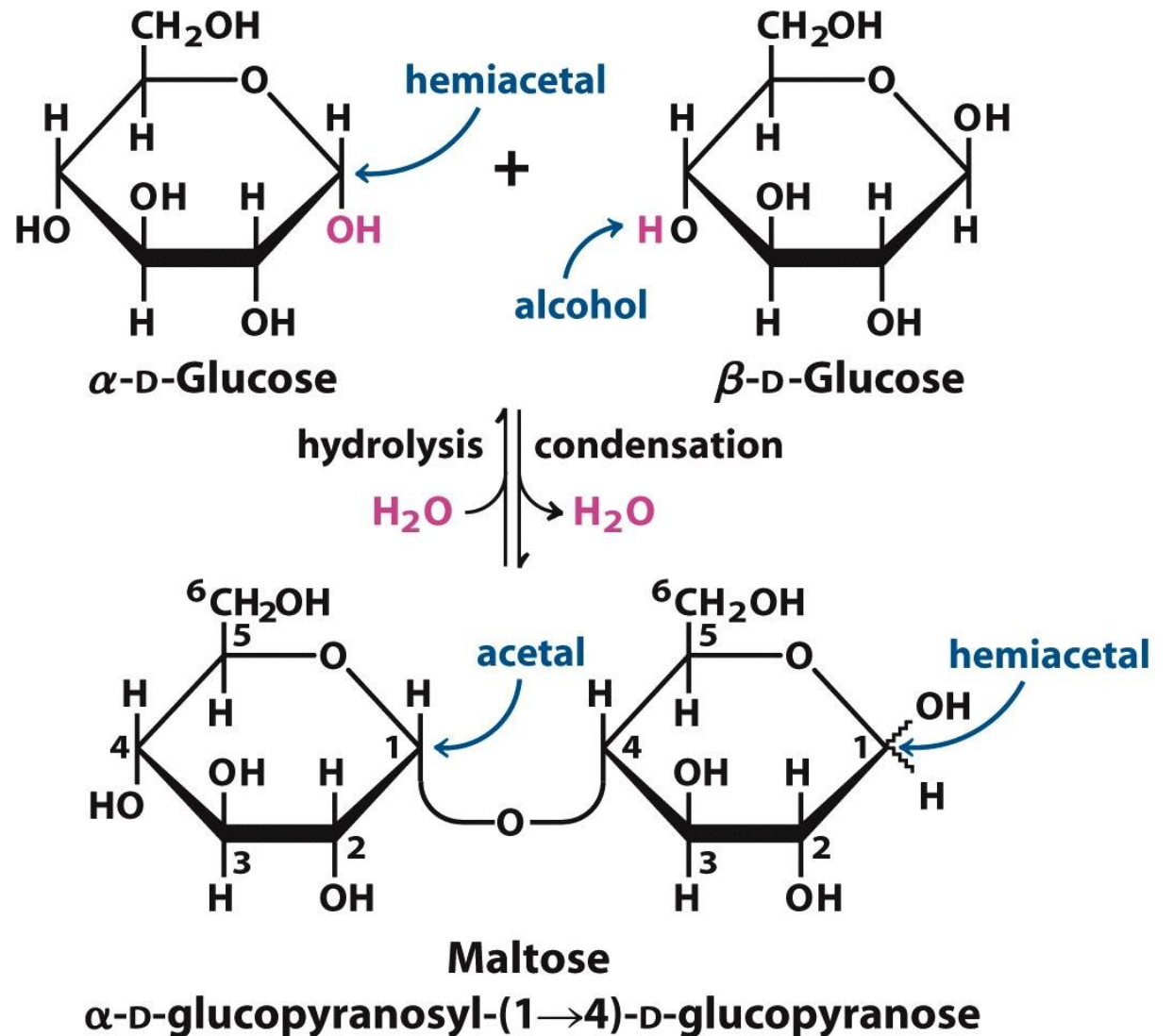


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Oligosacharidy

➤ DISACHARIDY:

- maltosa, laktosa, sacharosa, trehalosa

➤ TRISACHARIDY:

- rafinosa (Gal-Glc-Fru)

➤ VYŠŠÍ OLIGOSACHARIDY:

- tetrasacharidy: rostliny
- pentasacharidy: lidské mléko
- epitopy antigenů krevních skupin

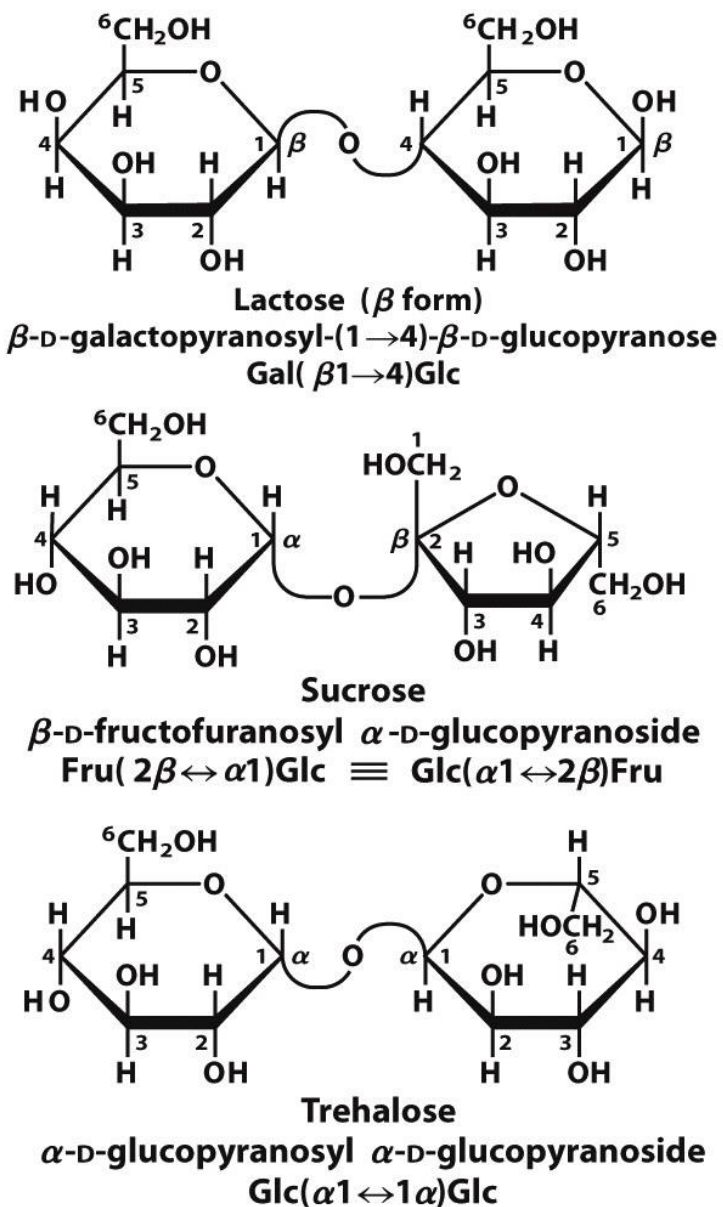


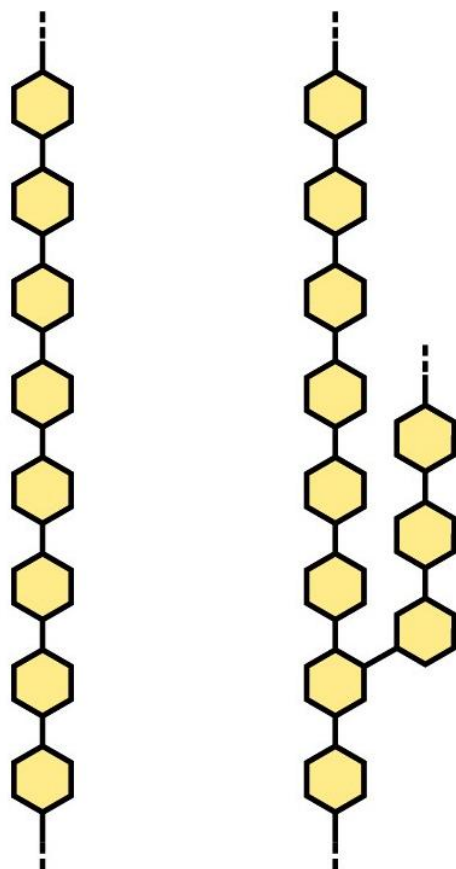
Figure 7-12

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Polysacharidy

HOMOPOLYSACHARID



HETEROPOLYSACHARID

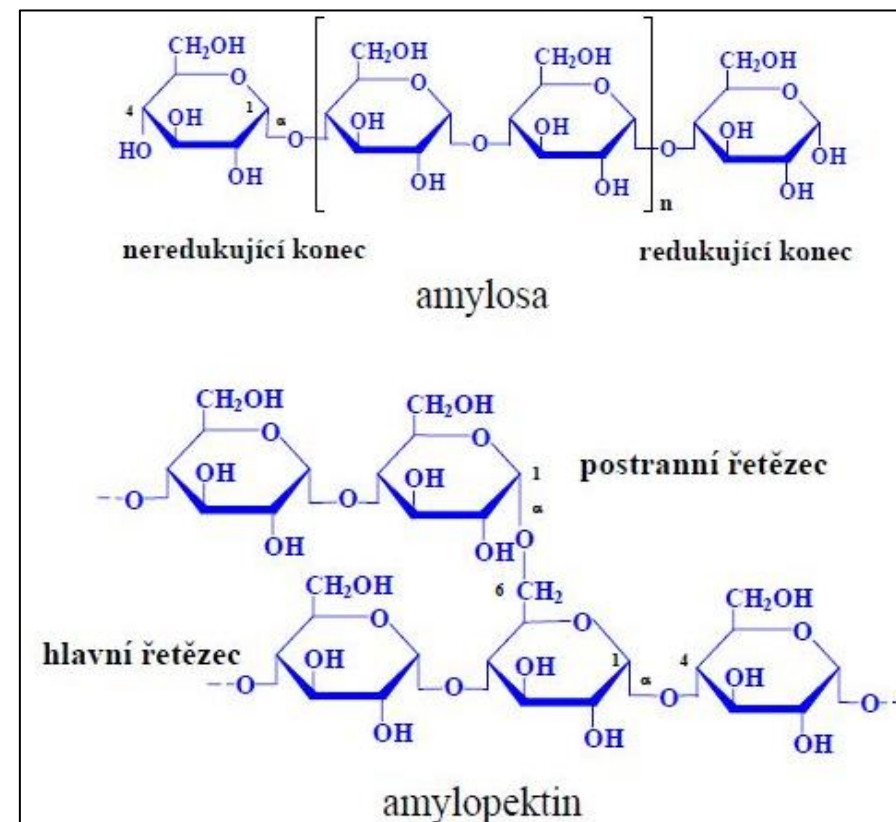
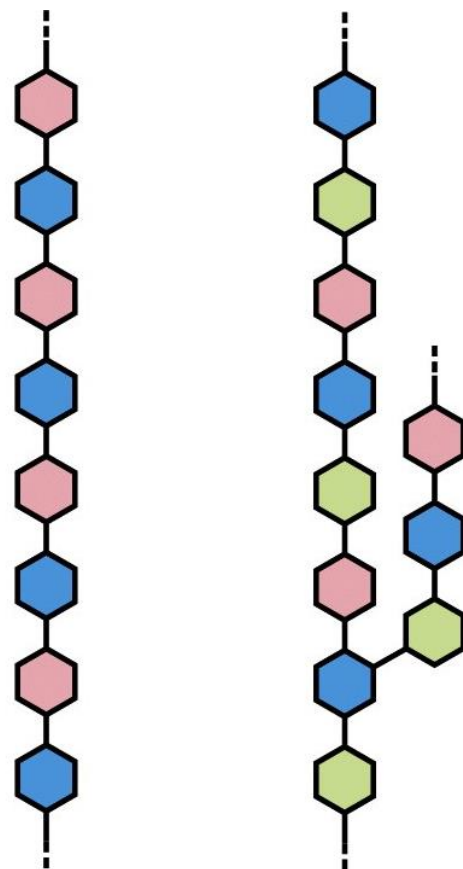


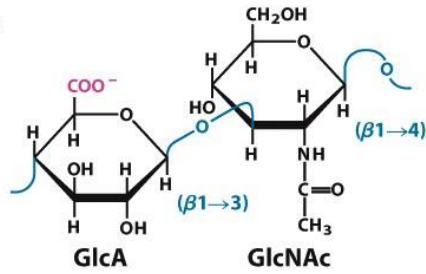
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Glycosaminoglycan

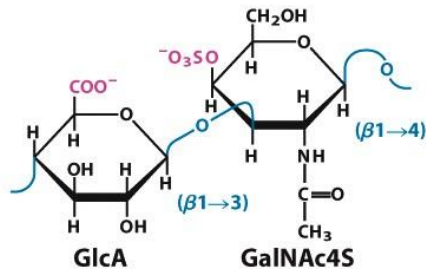
Repeating disaccharide

Number of disaccharides per chain

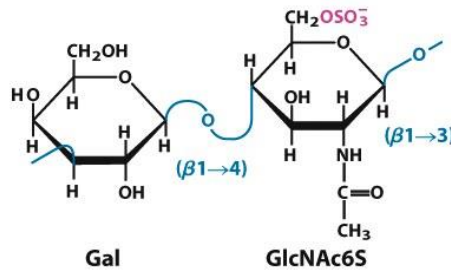
Hyaluronate
~50,000



Chondroitin 4-sulfate
20-60



Keratan sulfate
~25



Heparin
15-90

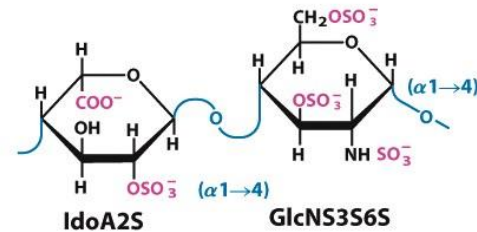
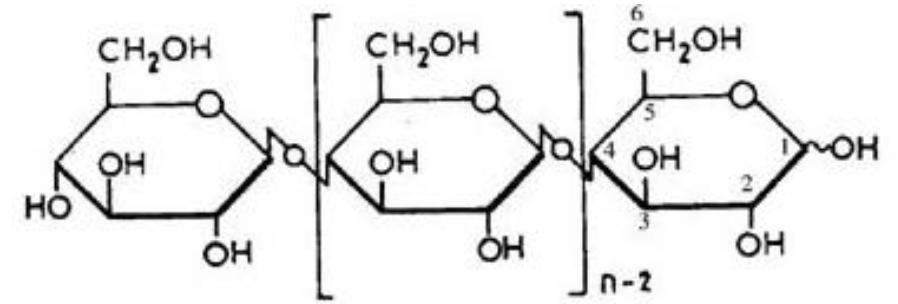


Figure 7-22 part 1

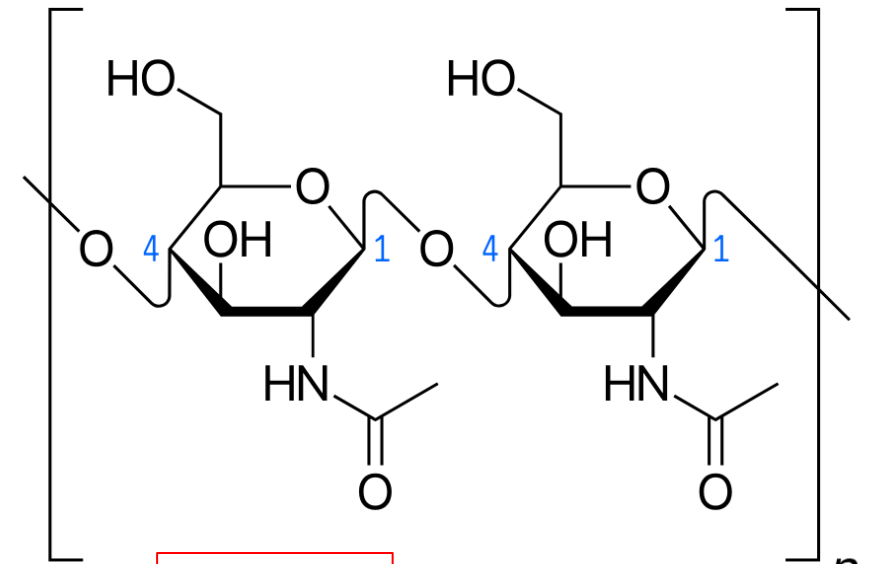
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CELULOZA

Některé významné polysacharidy



CHITIN

Glykosylace

- posttranslační modifikace
- v buňce probíhá na ER a GA
- N: asparagin, arginin
- O: serin, threonin, tyrosin
- P: fosfoserin
- C: tryptofan

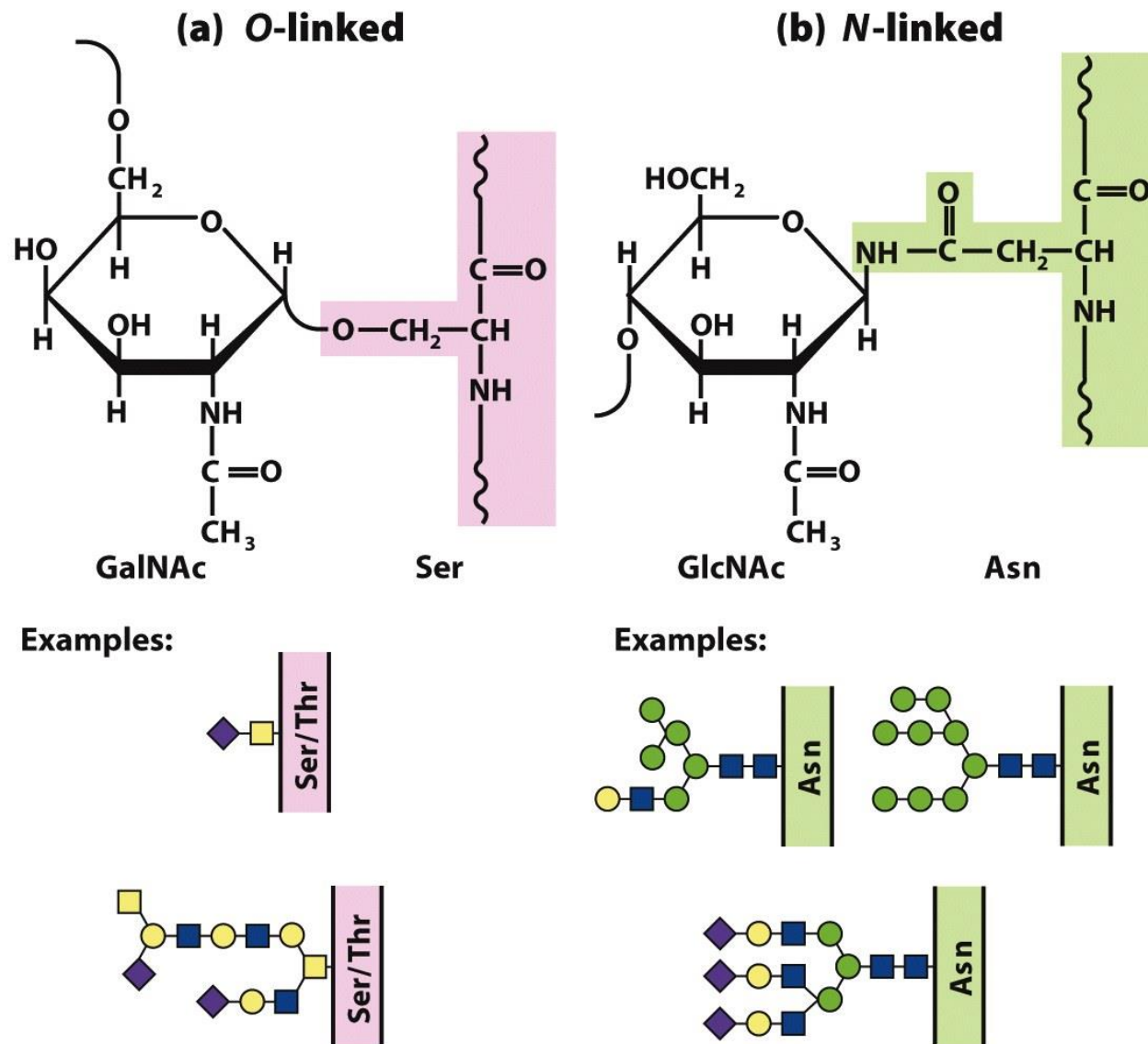
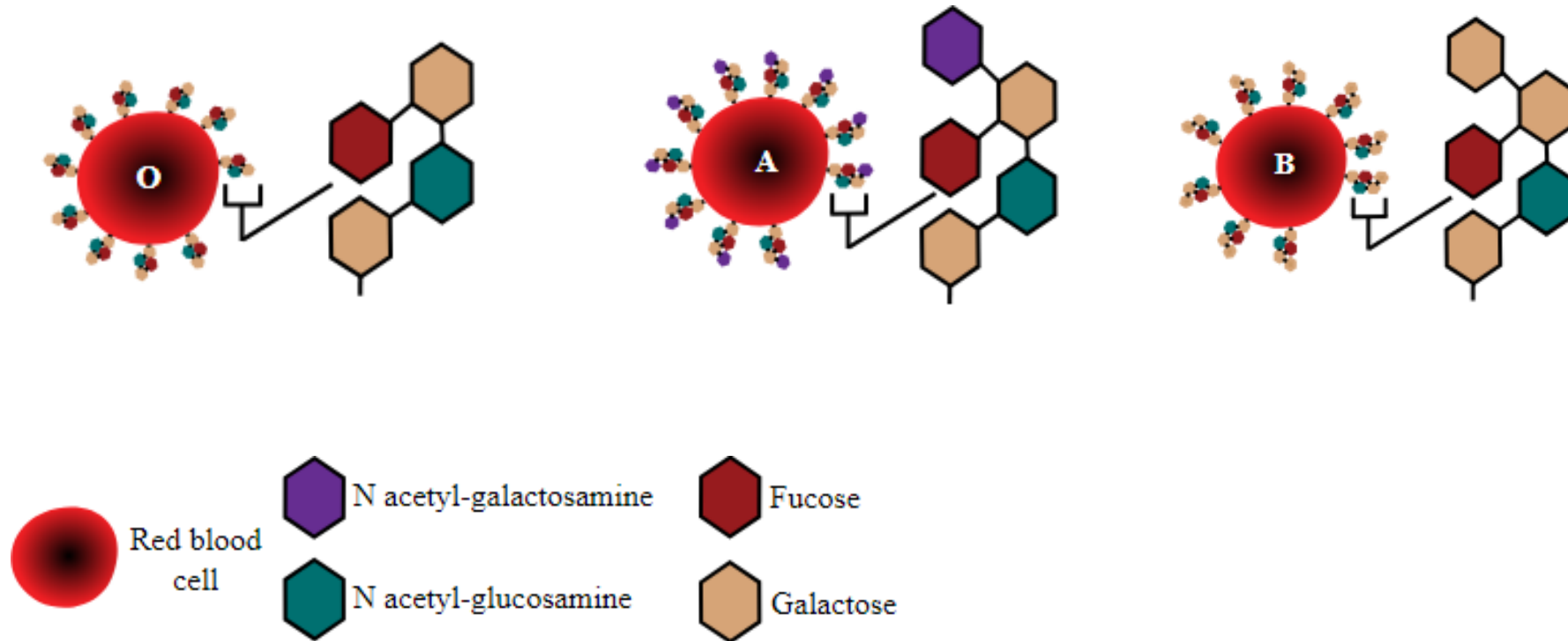


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Krevní systém ABO

- krevní skupiny ABO systému se liší antigeny na povrchu erytrocytů
- antigeny jsou **glykolipidy**: oligosacharidy napojené na vnější lipidovou molekulu v plasmatické membráně



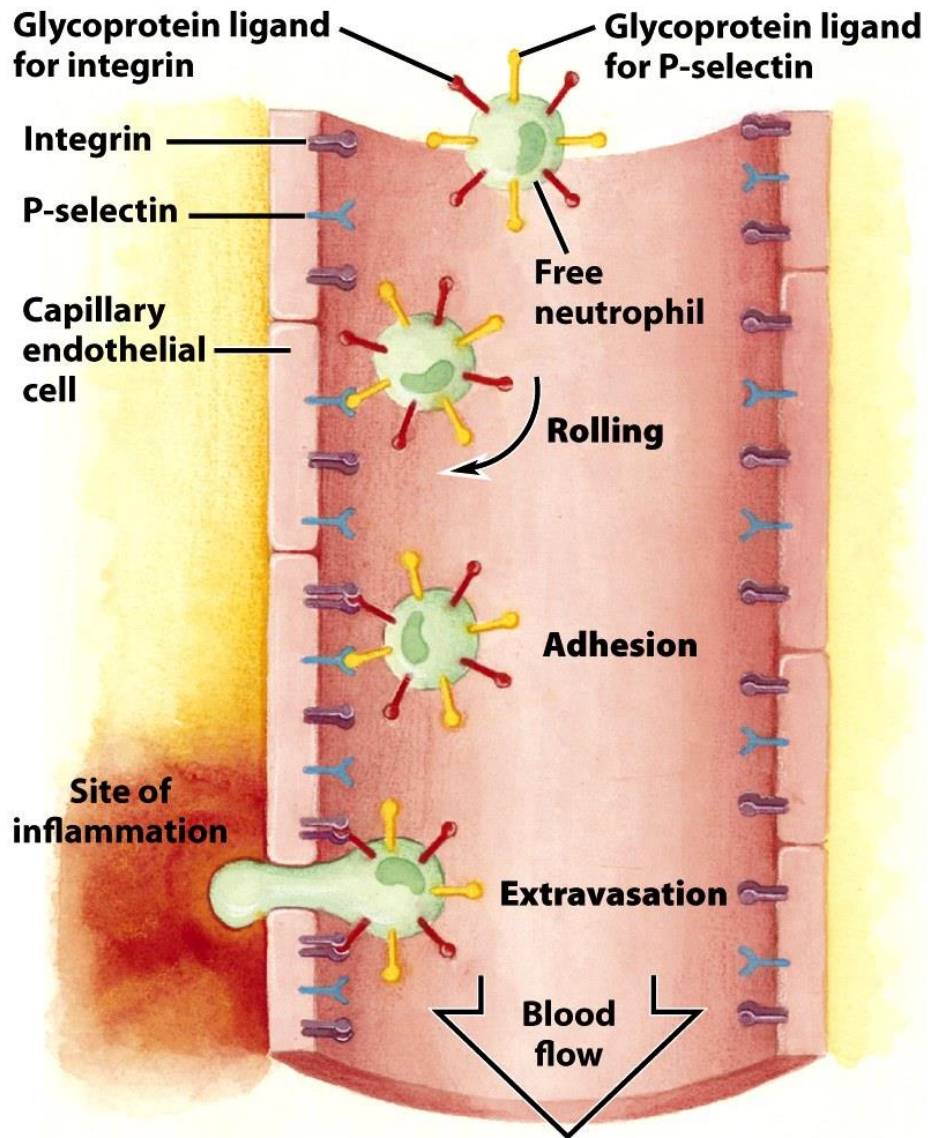
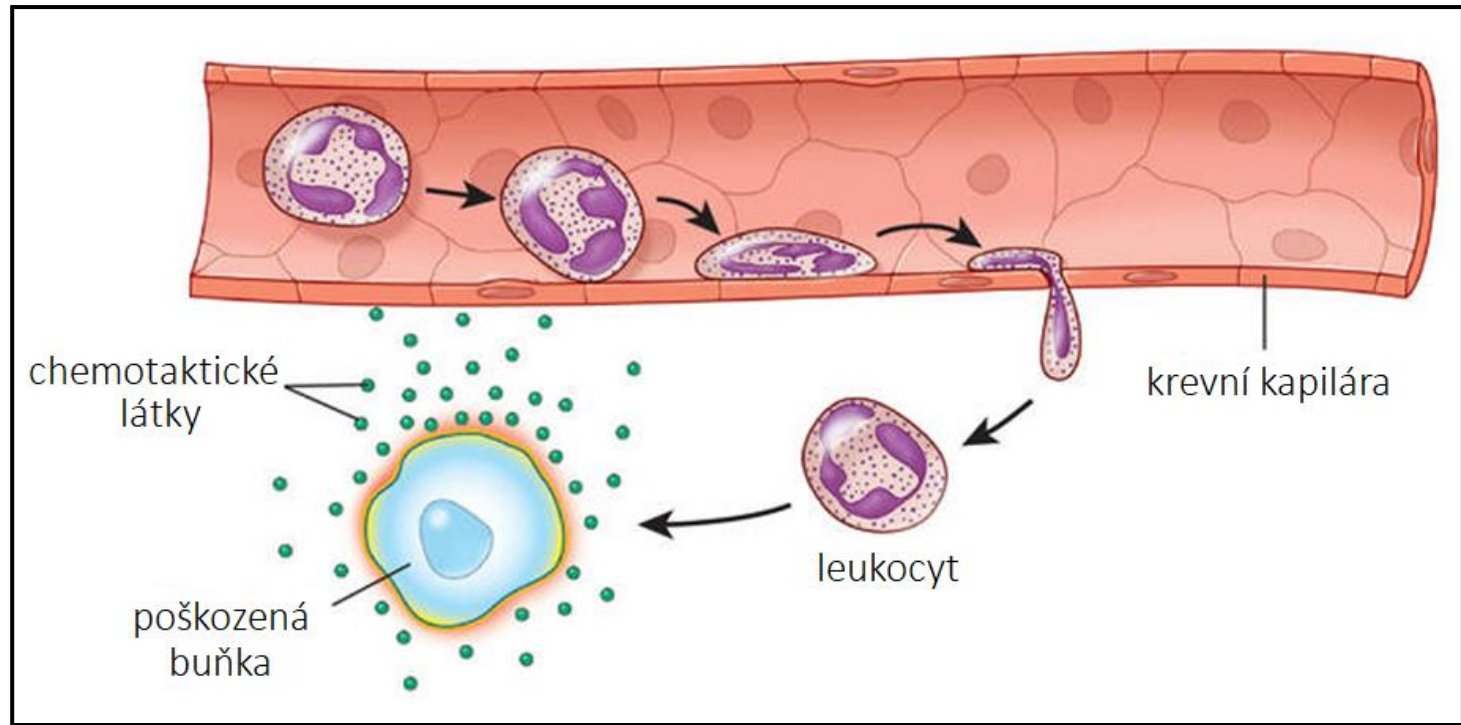
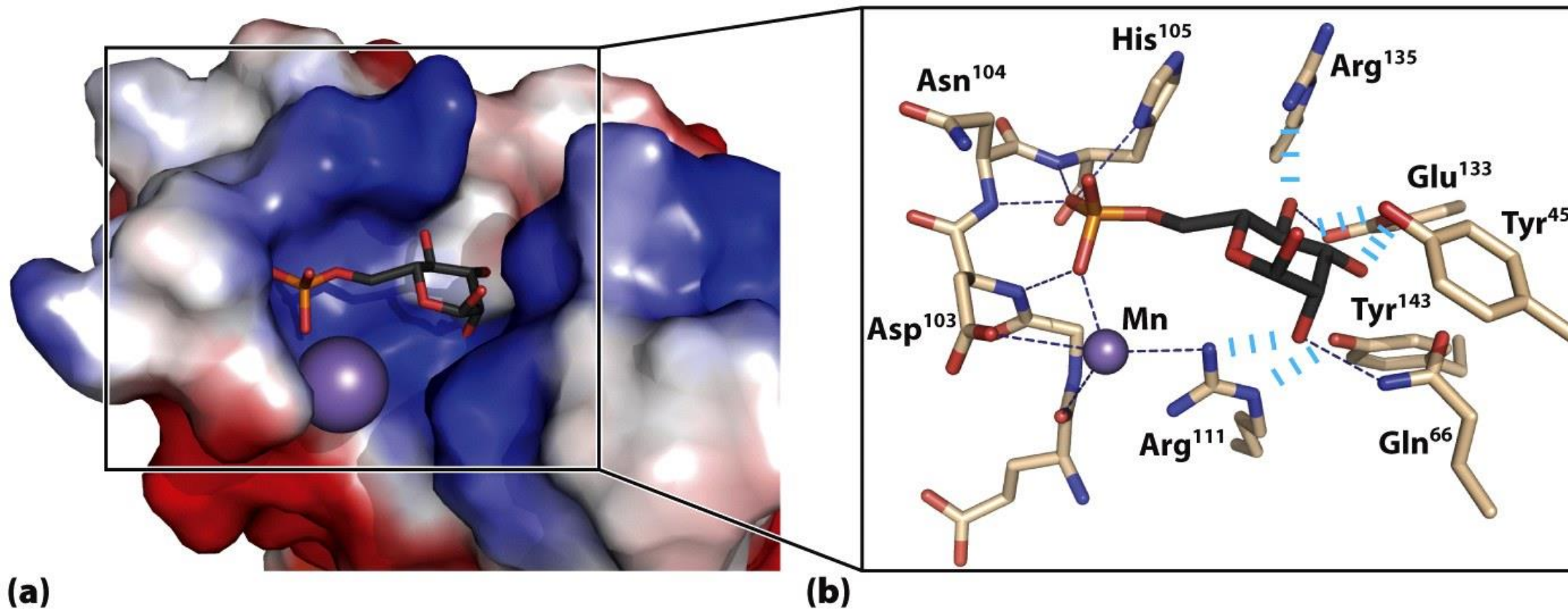


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Interakce lektinů a sacharidů v procesu diapedézy



Princip interakce protein-sacharid



(a)

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(b)

Hemaglutinace

