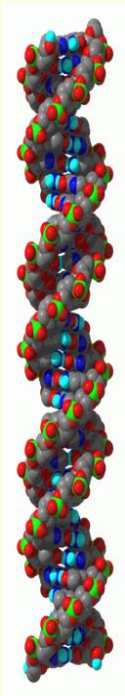
Contenidos teóricos



Unidad temática 1. Diseño molecular de vida.

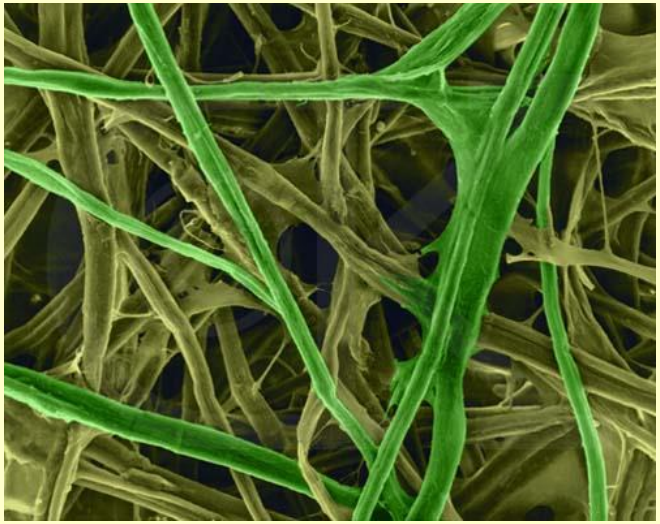
Tema 1. El agua como disolvente

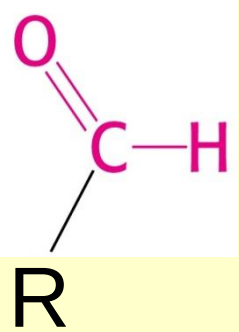
Tema 2. Principales biomoléculas presentes en los seres vivos y su relación estructura-función: proteínas, glúcidos, lípidos y ácidos nucleicos.

Tema 3. Enzimas. Cinética y regulación.

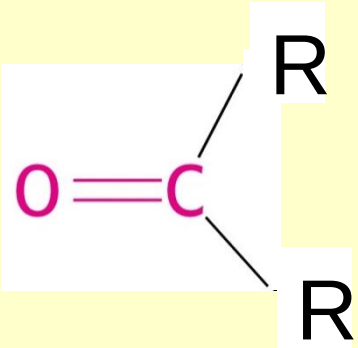
Tema 11. Estructura y función de glúcidos

- **Concepto y funciones biológicas**
- **Monosacáridos: estructura, clasificación y propiedades físico-químicas**
- **Disacáridos. Enlace glicosídico**
- **Polisacáridos de reserva y estructurales**
- **Proteoglucanos, glucoproteínas y glucolípidos**



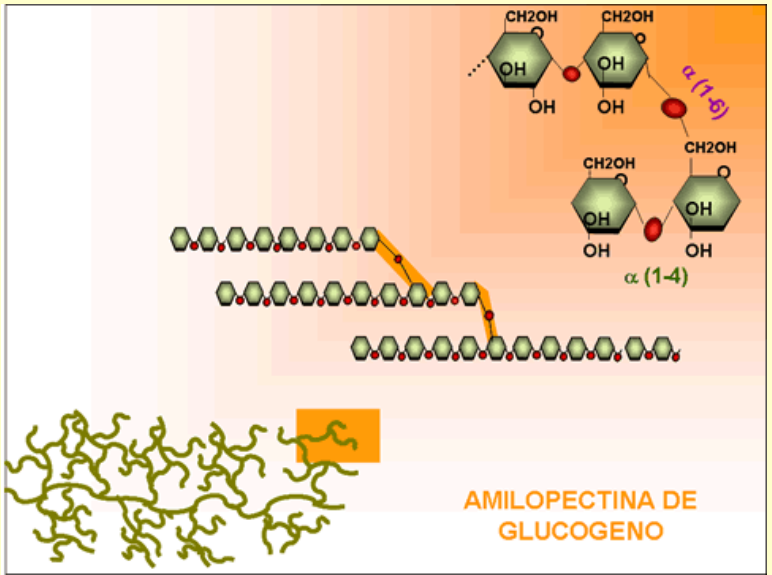


Aldehído



Cetona

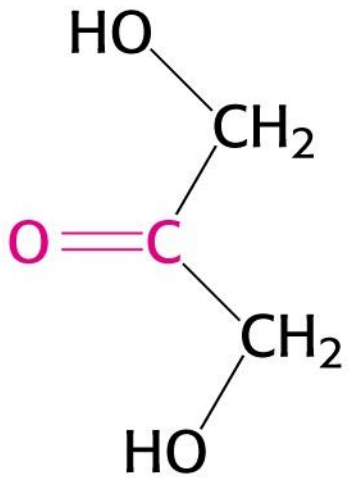
Hidratos de carbono



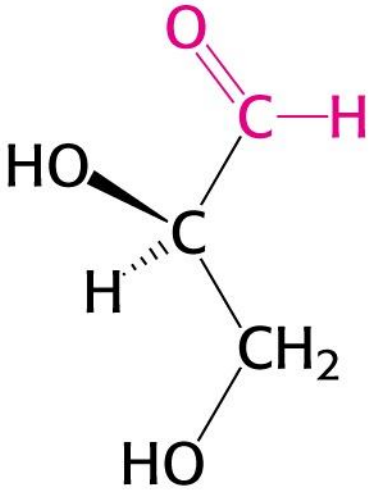
Monosacáridos

Monosacáridos: triosas

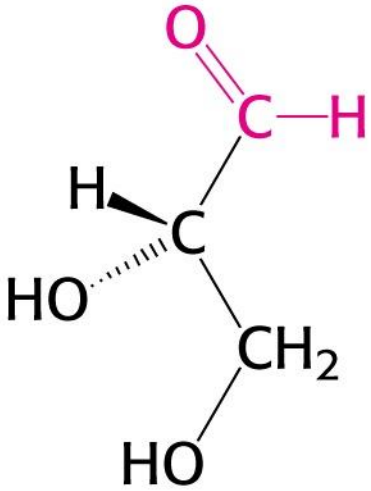
- **Cadenas lineales de carbono unidos por enlaces simples C-C**
- **Contienen de 3 a 7 átomos de C**



Dihidroxiacetona (cetosa)

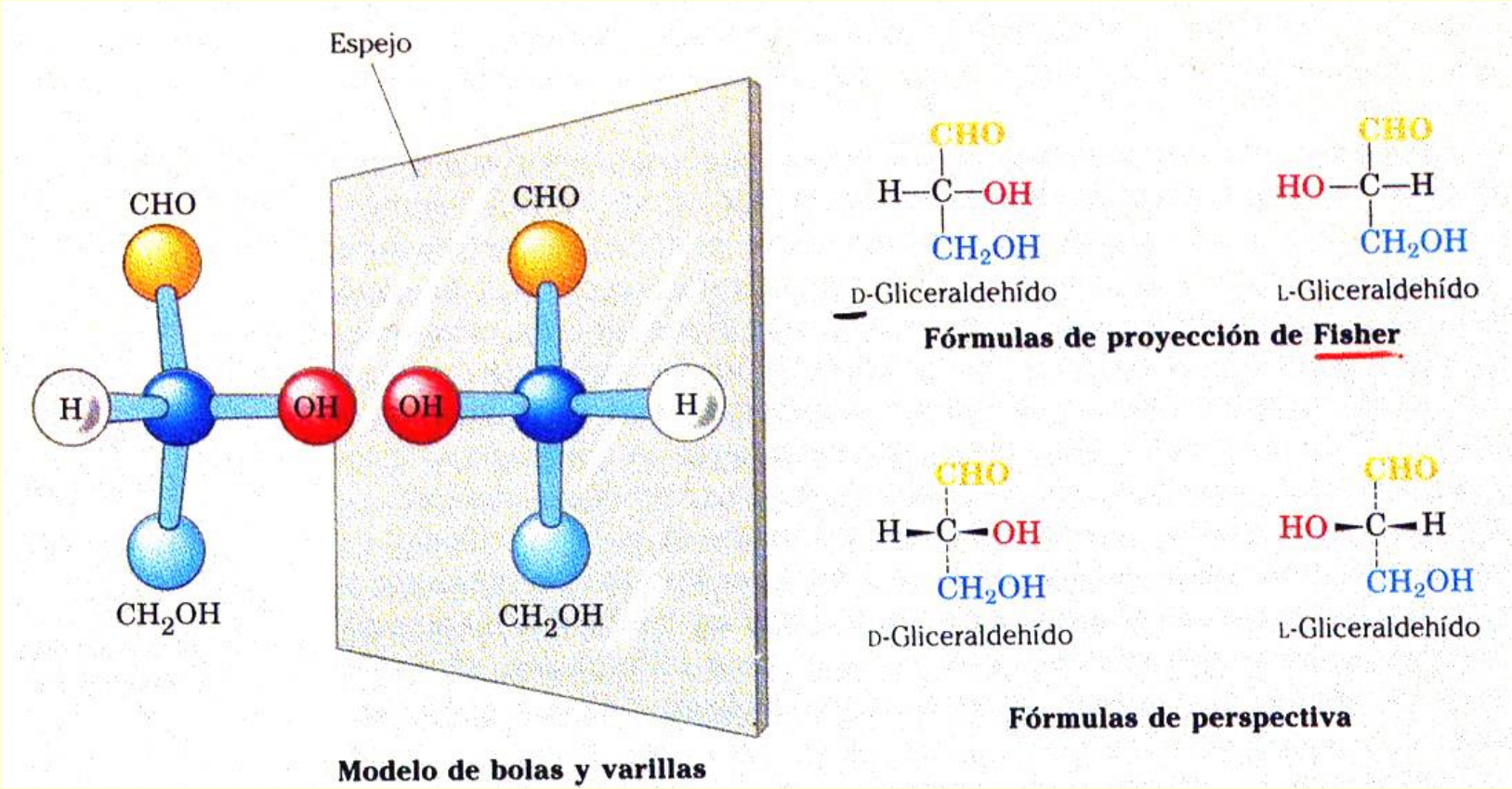


D-gliceraldehído (aldosa)

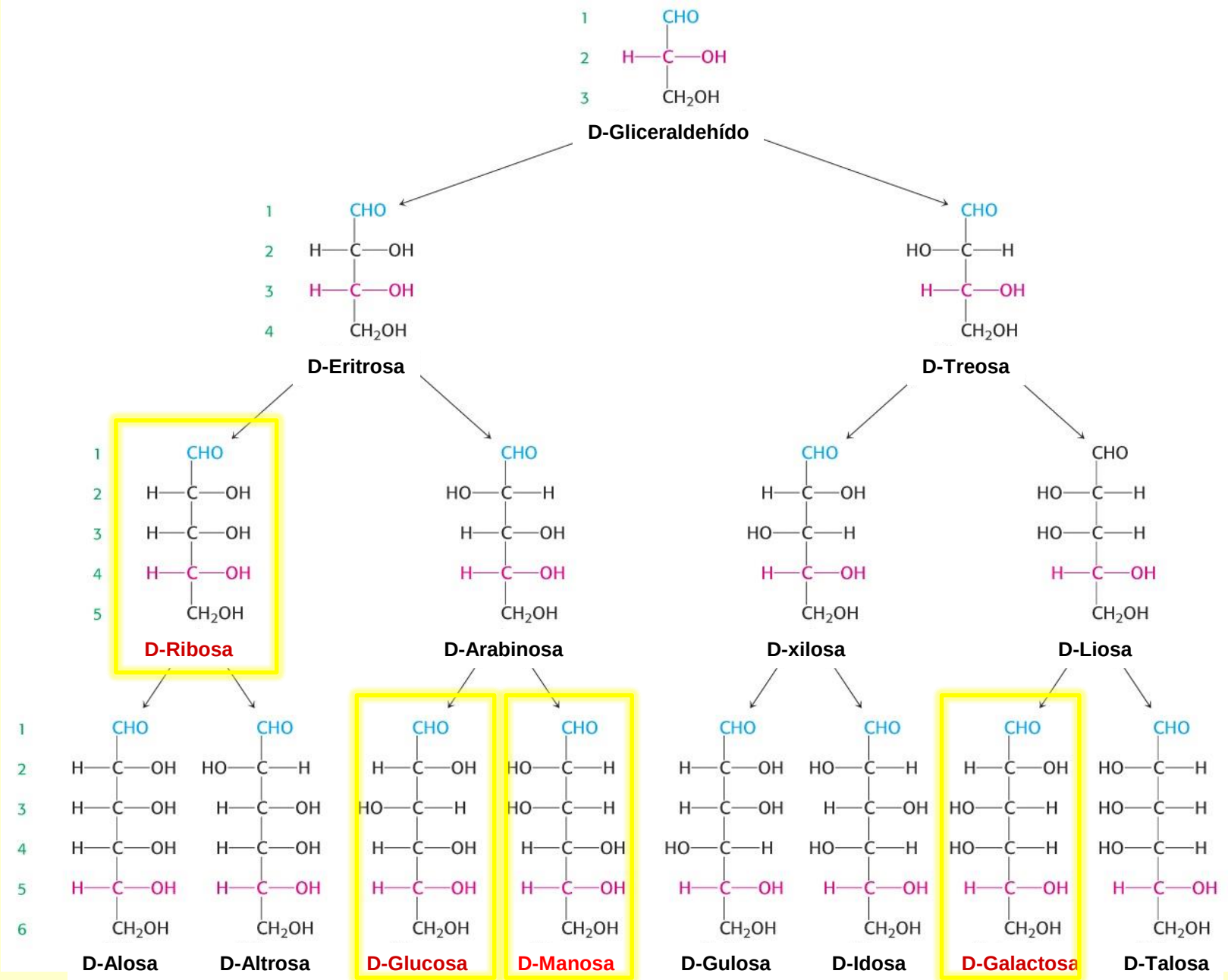


L-gliceraldehído (aldosa)

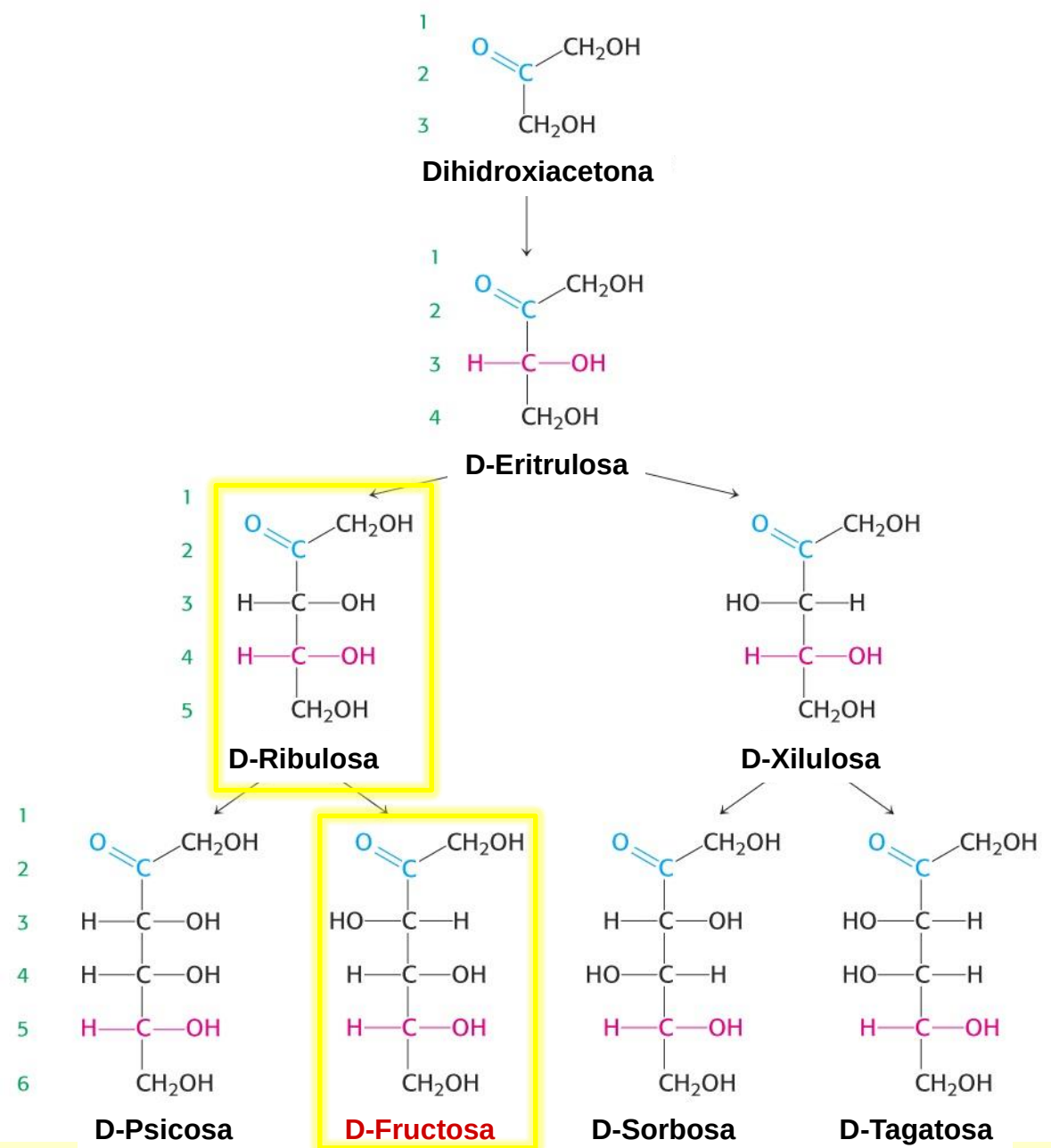
Proyecciones de Fischer de las triosas



D-aldosas

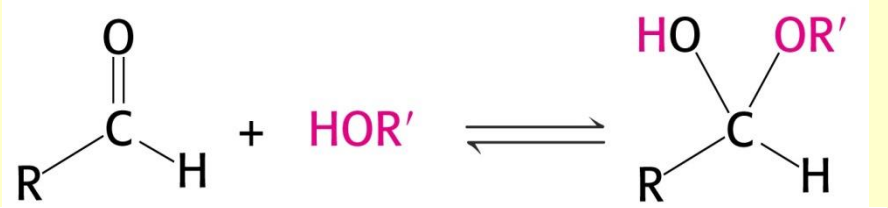

D-Gliceraldehído
D-Eritrosa
D-Treosa
D-Ribosa
D-Arabinosa
D-xilosa
D-Liosa
D-Alosa
D-Altrosa
D-Glucosa
D-Manosa
D-Gulosa
D-Idosa
D-Galactosa
D-Talosa

D-cetosas

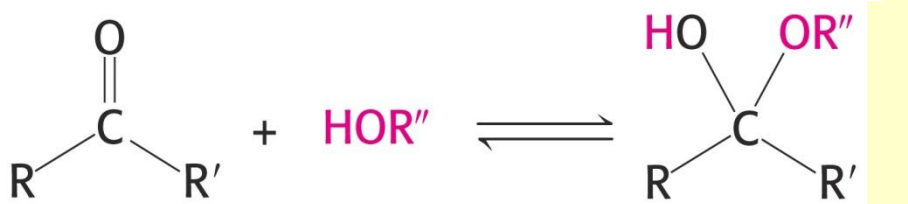

Dihidroxiacetona
D-Eritrulosa
D-Ribulosa
D-Xilulosa
D-Psicosa
D-Fructosa
D-Sorbosa
D-Tagatosa

Estructura cíclica de monosacáridos

- En solución acuosa los monosacáridos de 5 o más C están en forma cíclica
- Reacciones alcoholes con aldehídos

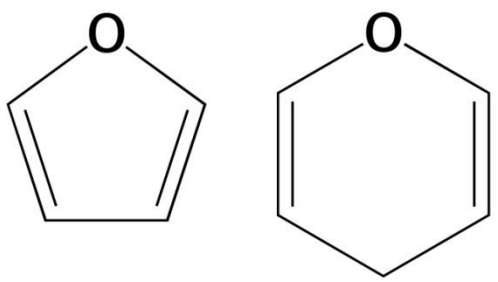


Aldehído **Alcohol** **Hemiacetal**



Cetona **Alcohol** **Hemiquetal**

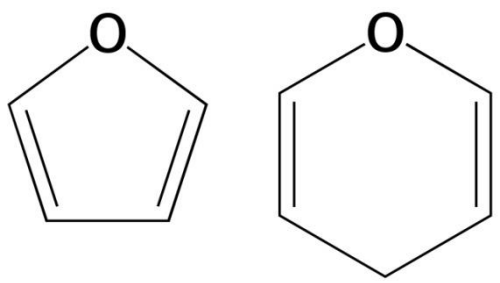
Furanosa



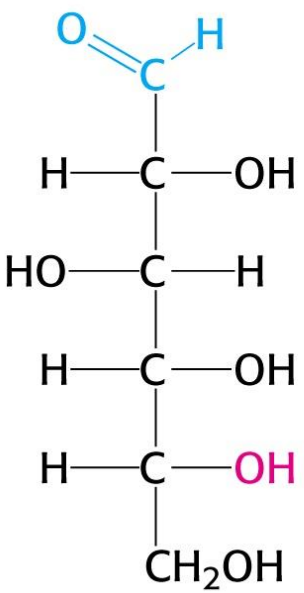
Piranosa

Furano **Pirano**

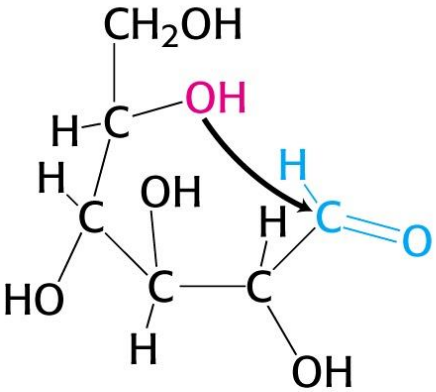
Estructura cíclica de los monosacáridos

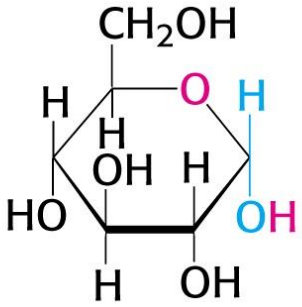


Furano Pirano

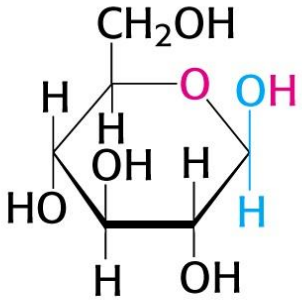


D-Glucosa
(forma abierta)



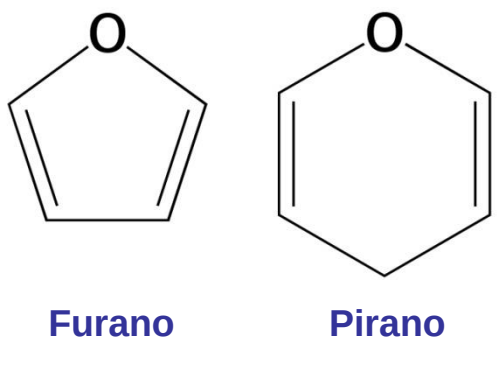


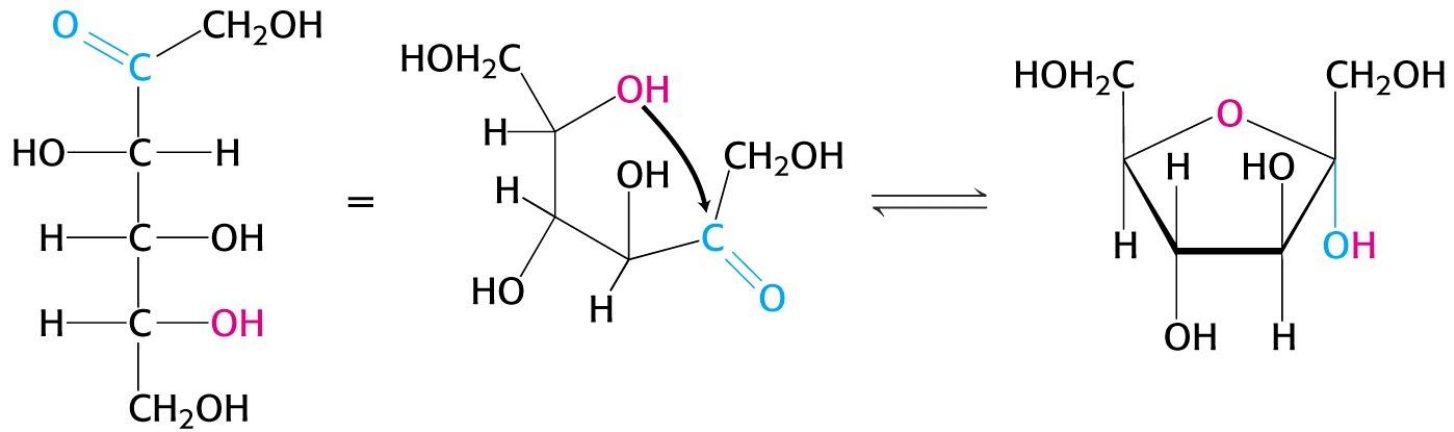
α-D-Glucopiranosa



β-D-Glucopiranosa

Estructura cíclica de los monosacáridos



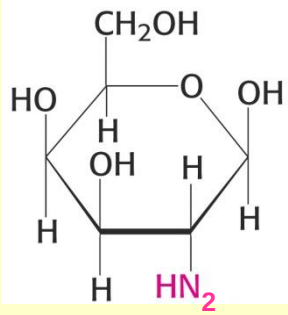


D-Fructosa
(forma abierta)

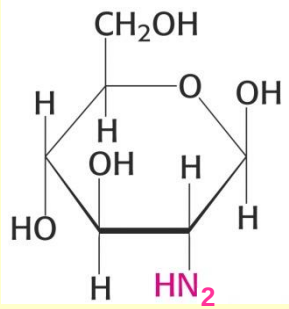
α-D-Fructofuranosa

Derivados de hexosas: Aminoazucares

- Sustitución de grupo –OH por NH_2
- Generalmente es el –OH del C2

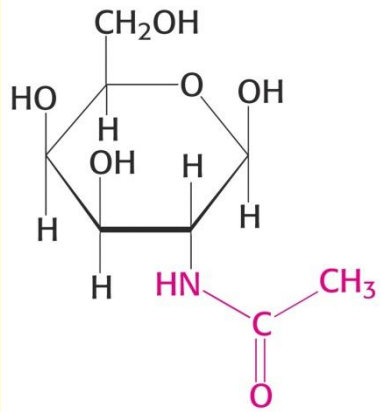


β-D-galactosamina

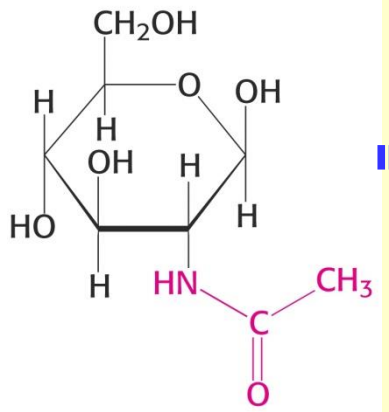


β-D-glucosamina

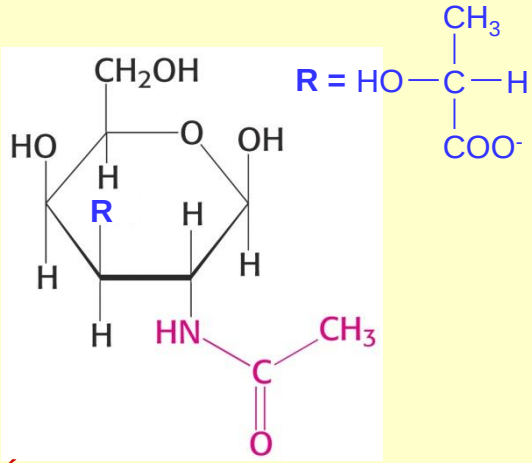
- El grupo NH_2 puede condensarse con ácido acético



β-D-acetilgalactosamina
(GalNac)



β-D-acetilglucosamina
(GlcNac)

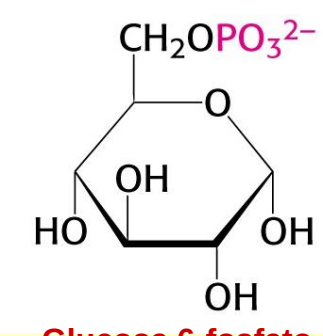


Ácido N-acetilmurámico

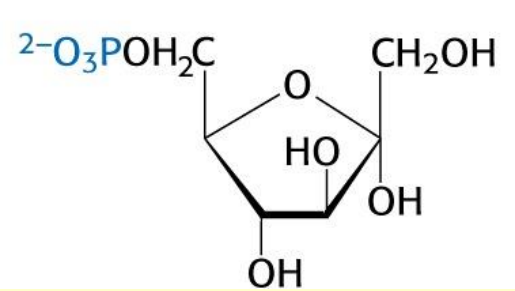
Derivados de hexosas

Azúcares fosfato y sulfato

- Esterificación de un grupo –OH con ácido fosfórico o ácido sulfúrico



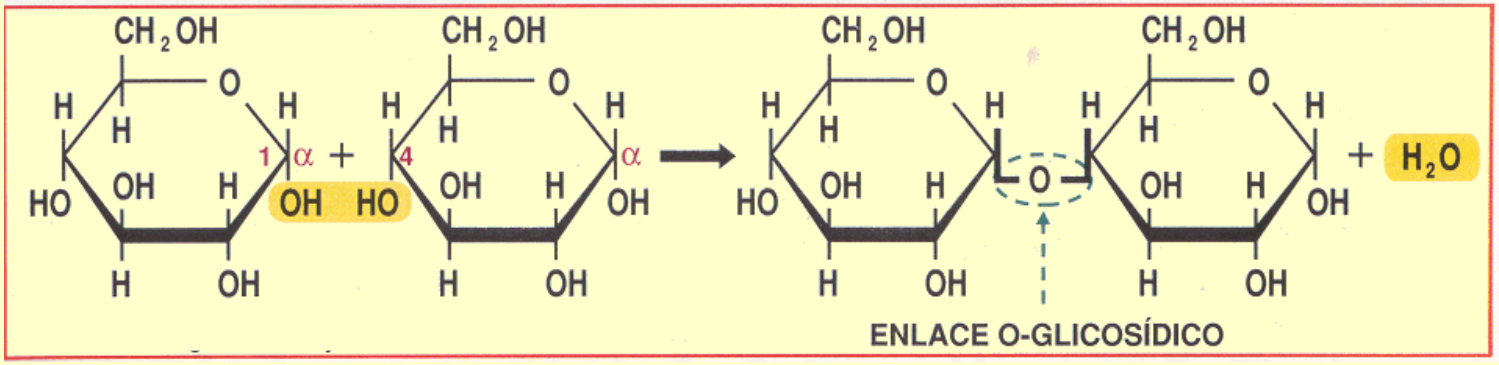
Glucosa 6-fosfato

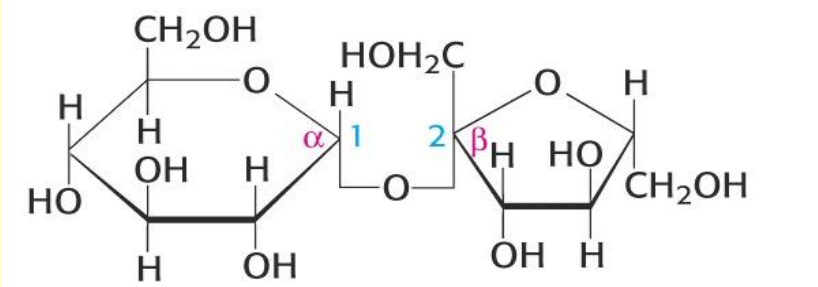


Fructosa 6-fosfato

- Azúcares fosfato participan en muchas reacciones del metabolismo

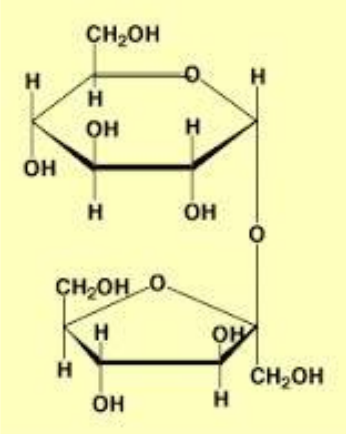
Disacaridos

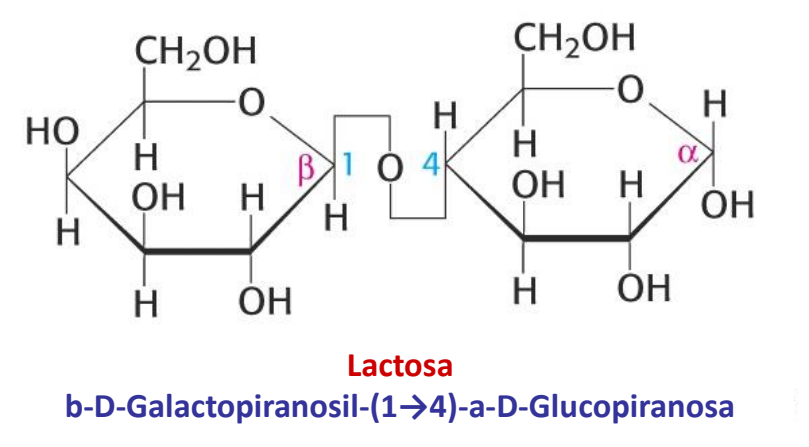




Sacarosa

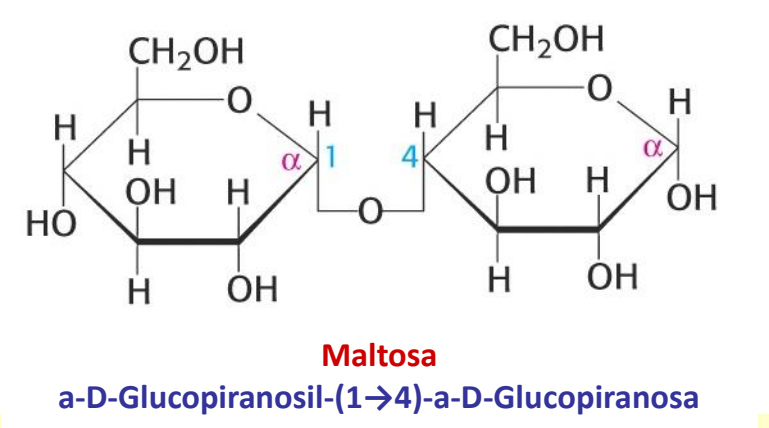
a-D-Glucopiranosil-(1→2)-b-D-Fructofuranosa





Lactosa

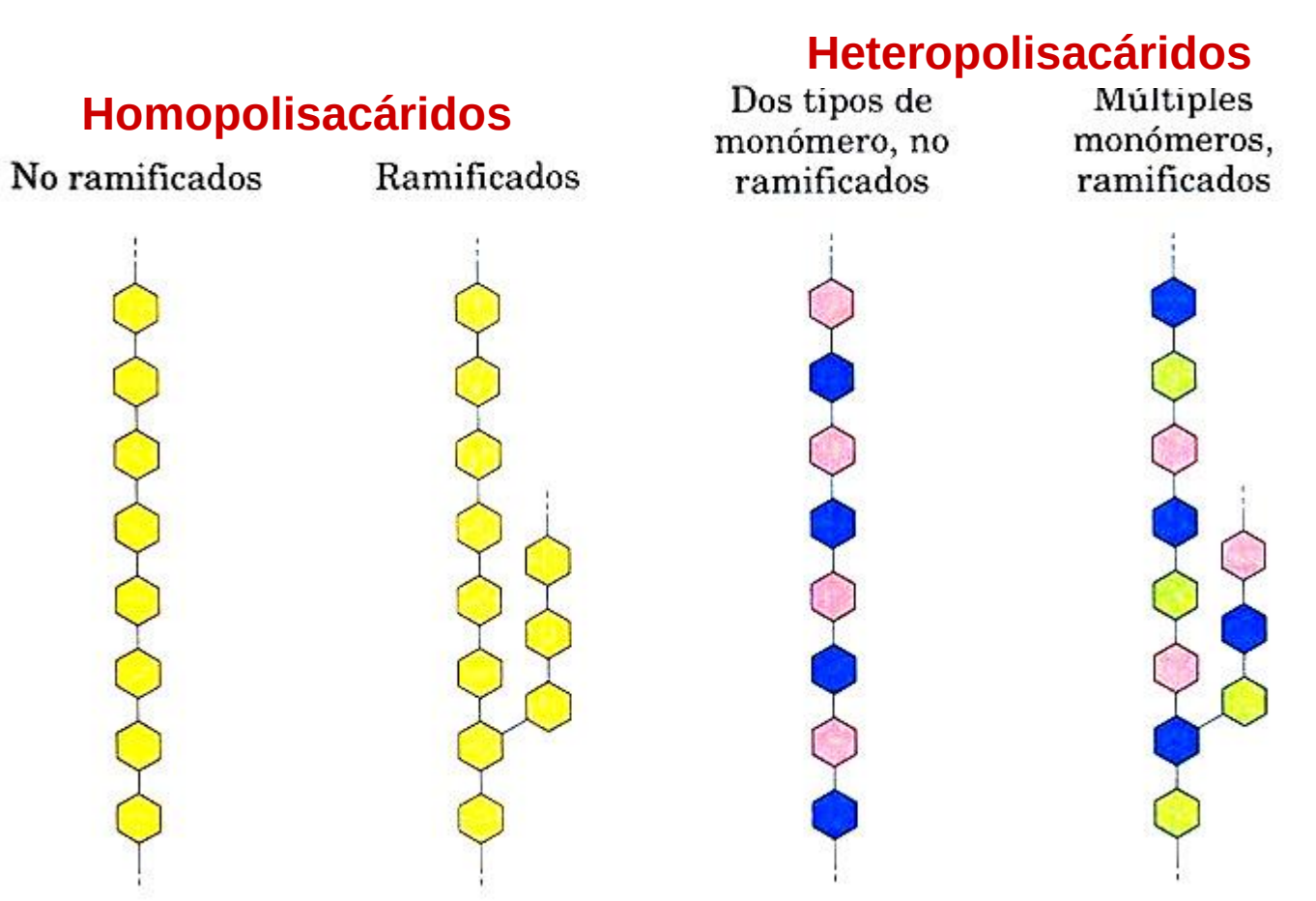
b-D-Galactopiranosil-(1→4)-a-D-Glucopiranosa



Maltosa

a-D-Glucopiranosil-(1→4)-a-D-Glucopiranosa

Polisacáridos

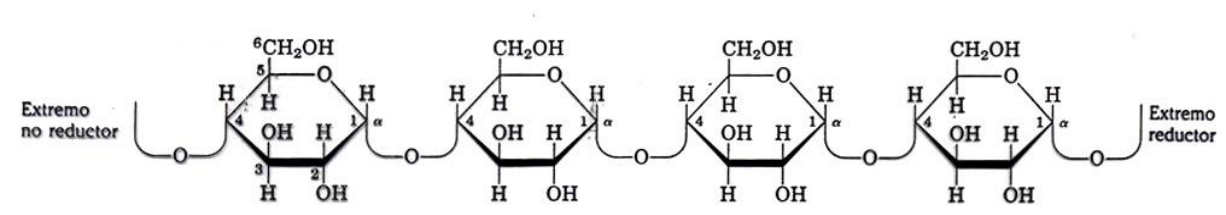


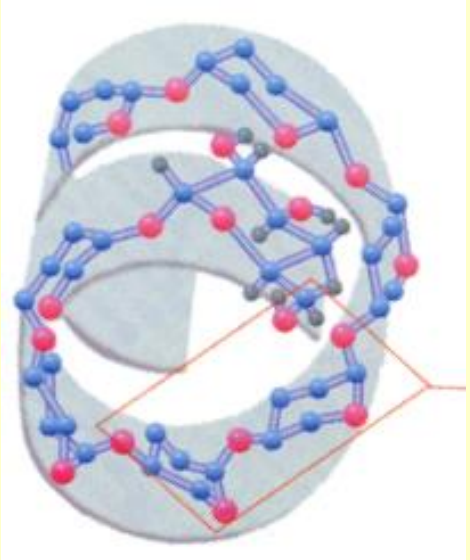
Reserva: Almidón y Glucógeno

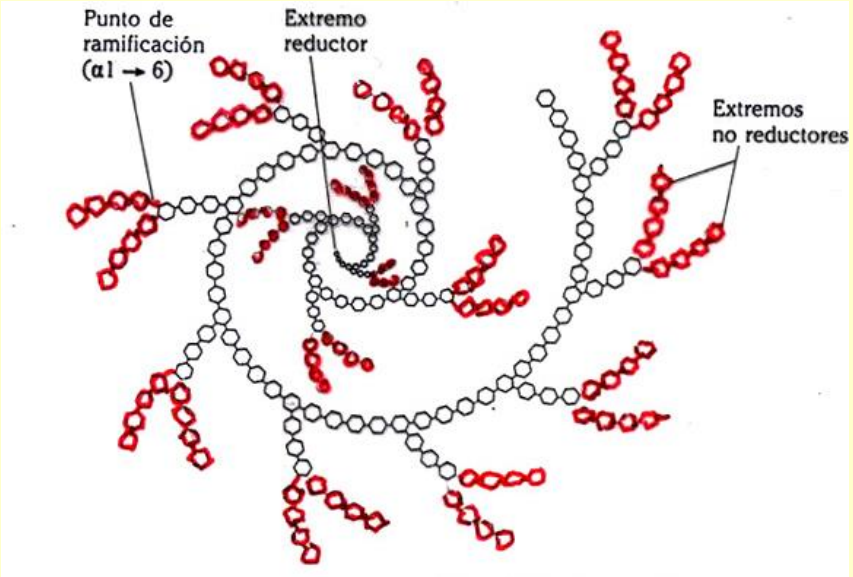
Estructural: Celulosa, glicosaminoglicanos, peptidoglucanos, proteoglucanos

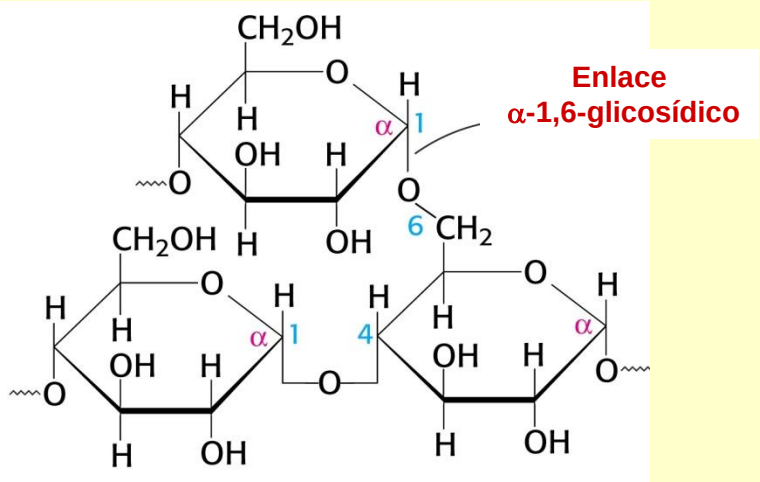
Homopolisacáridos: Almidón

Amilosa: Cadenas D-glucosa (α 1-4)





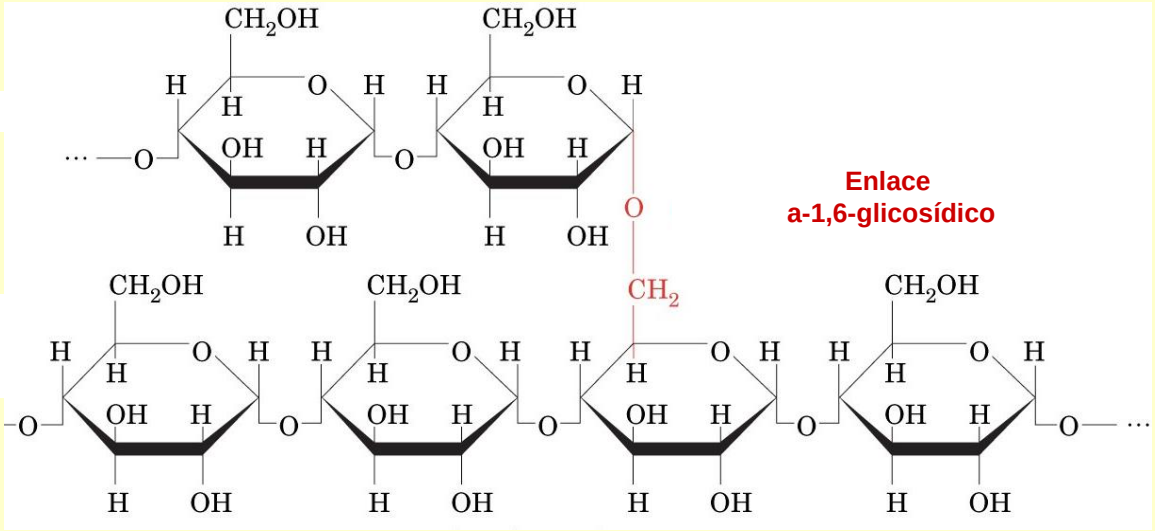


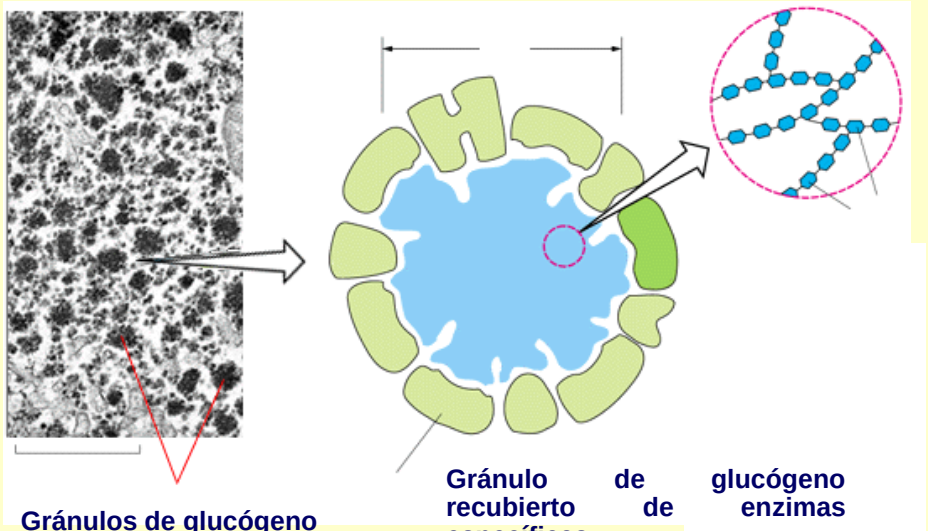


Amilopectina: Cadenas D-glucosa(α 1- 4) con ramificaciones (α 1- 6)

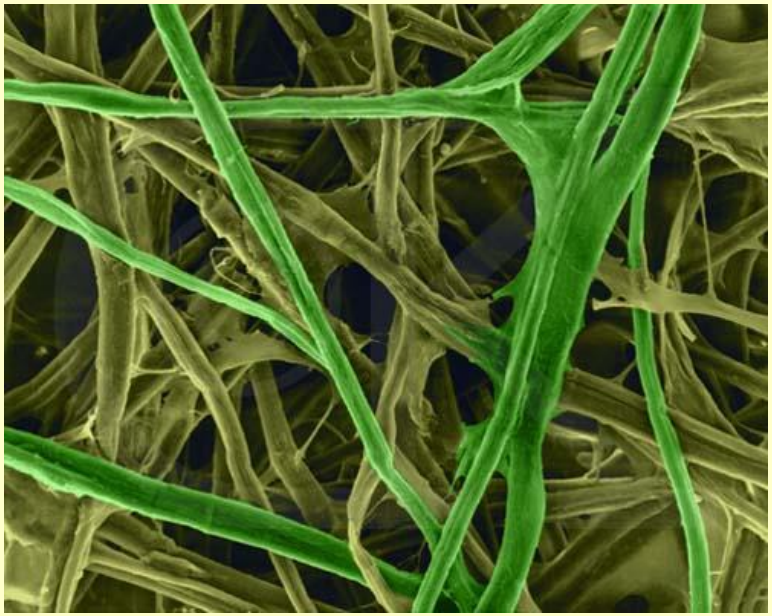
Homopolisacáridos: Glucógeno

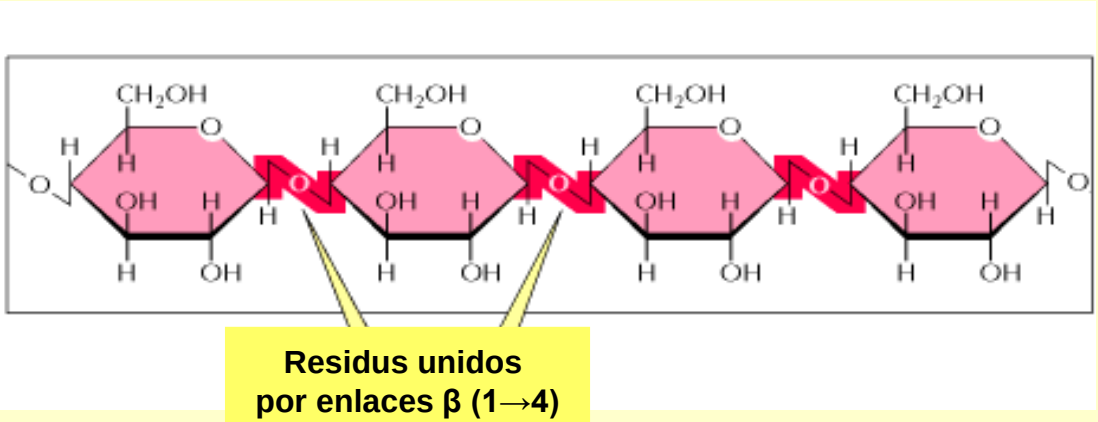
Cadenas glucosa (α 1–4) con ramificaciones (α 1–6)

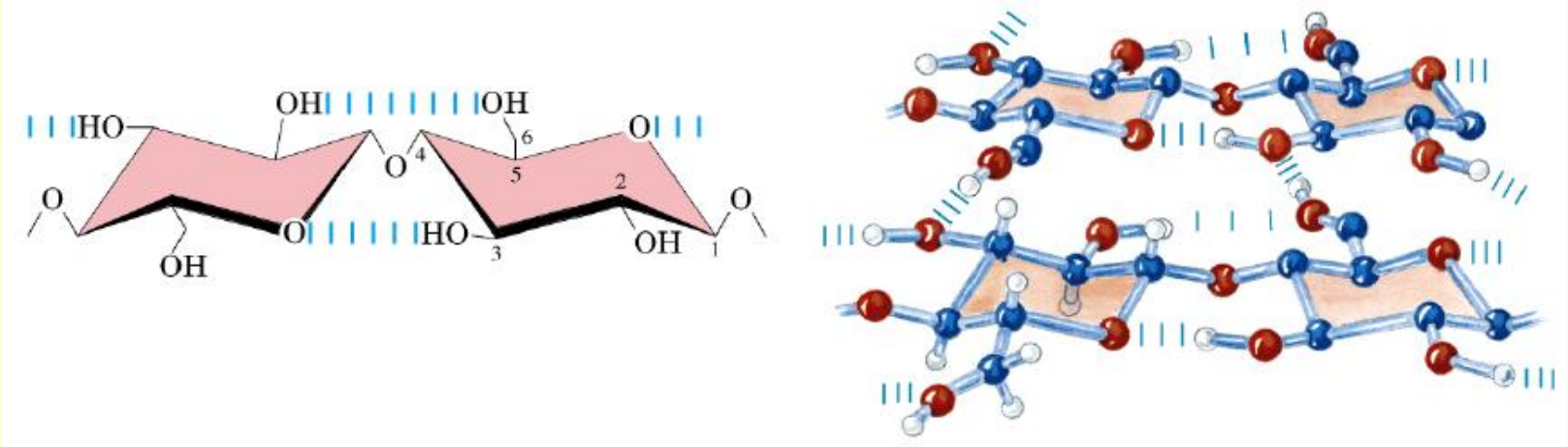




Homopolisacáridos: Celulosa



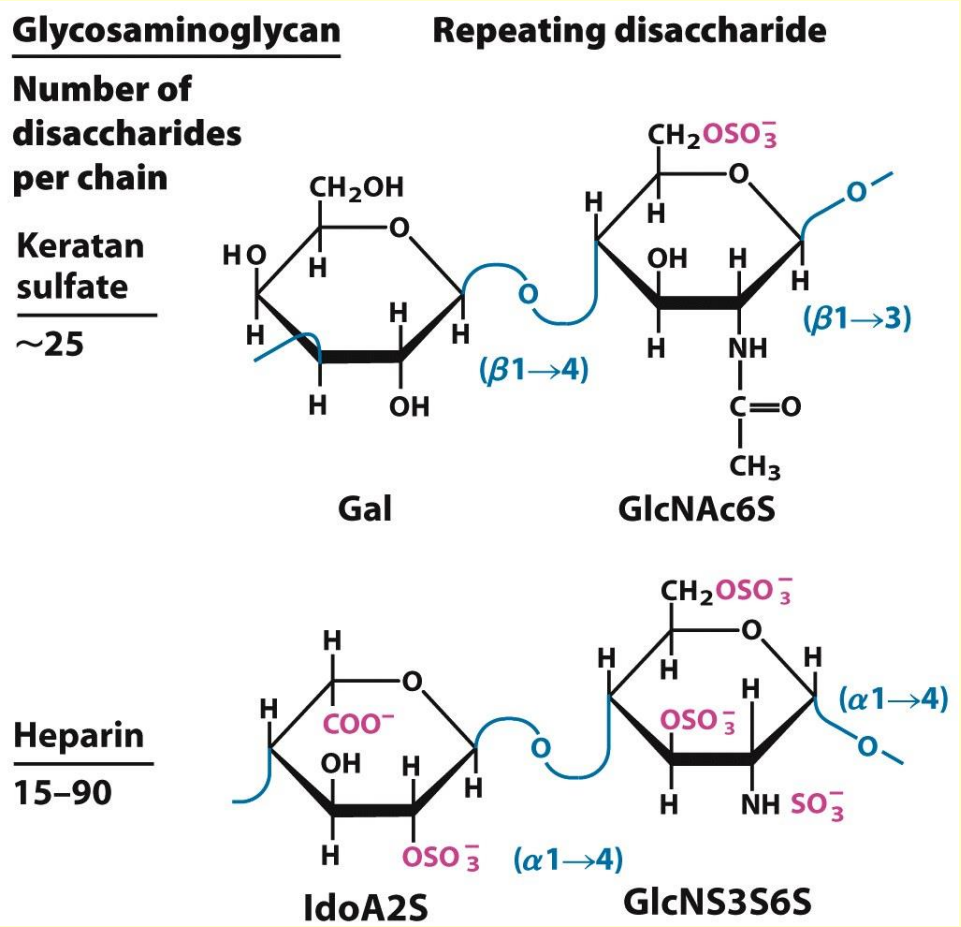


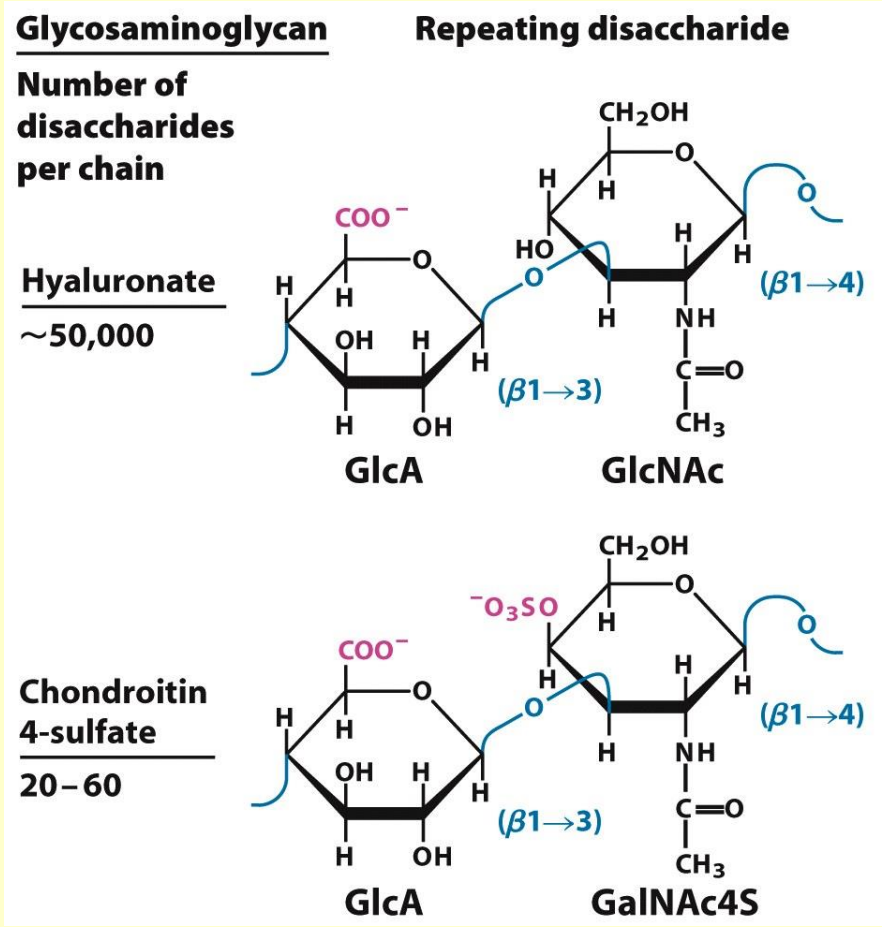


Heteropolisacáridos: Glicosaminoglicanos

- Unidades repetidas de disacáridos de aminoazúcar y ácido urónico

  (N-acetilglucosamina/N-acetilgalactosamina + ác glucurónico)n





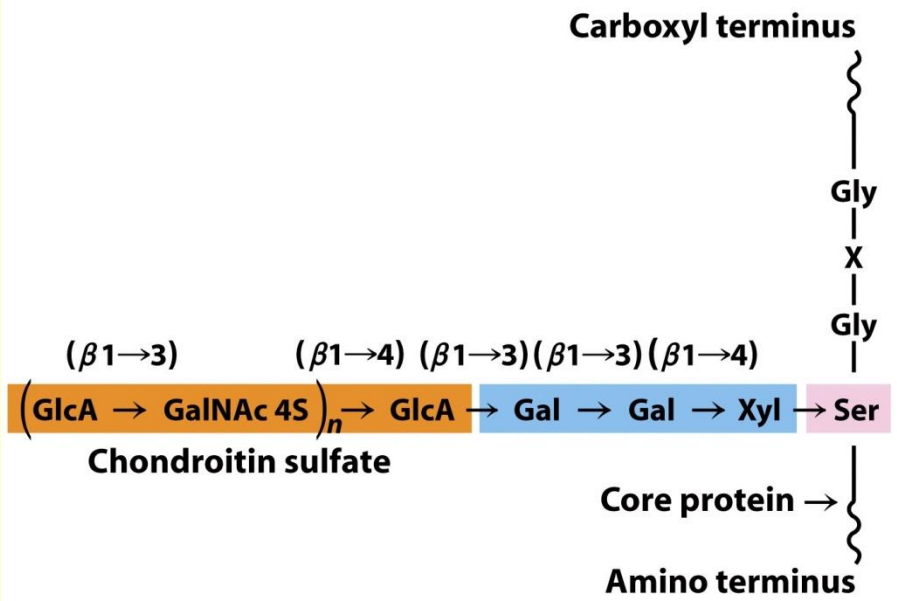
GlcA: Acido glucurónico

GalNAc: N-Acetil Galactosamina

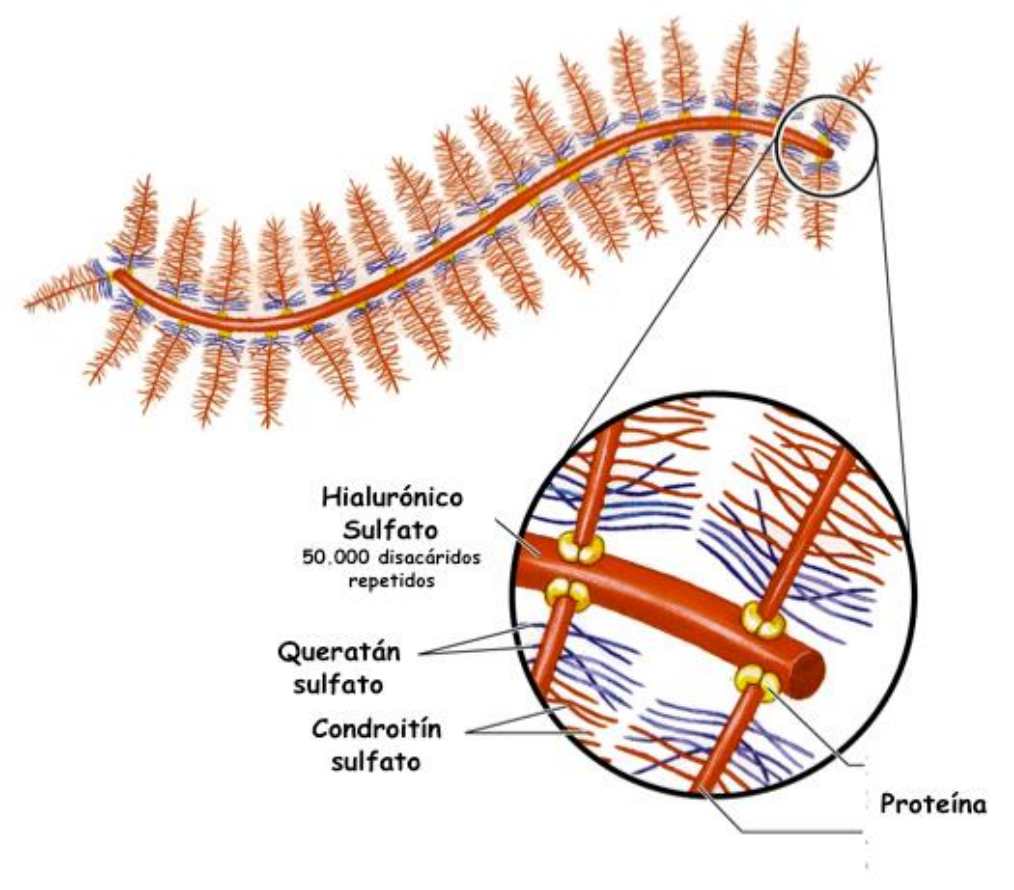
GlcNAc: N-Acetil Glucosamina

Proteoglicanos

- Funciones:
  - Componentes tejido conjuntivo
  - Lubricantes
  - Interacciones célula-célula y célula-matriz
  - Unión a ligandos extracelulares



Proteoglicanos



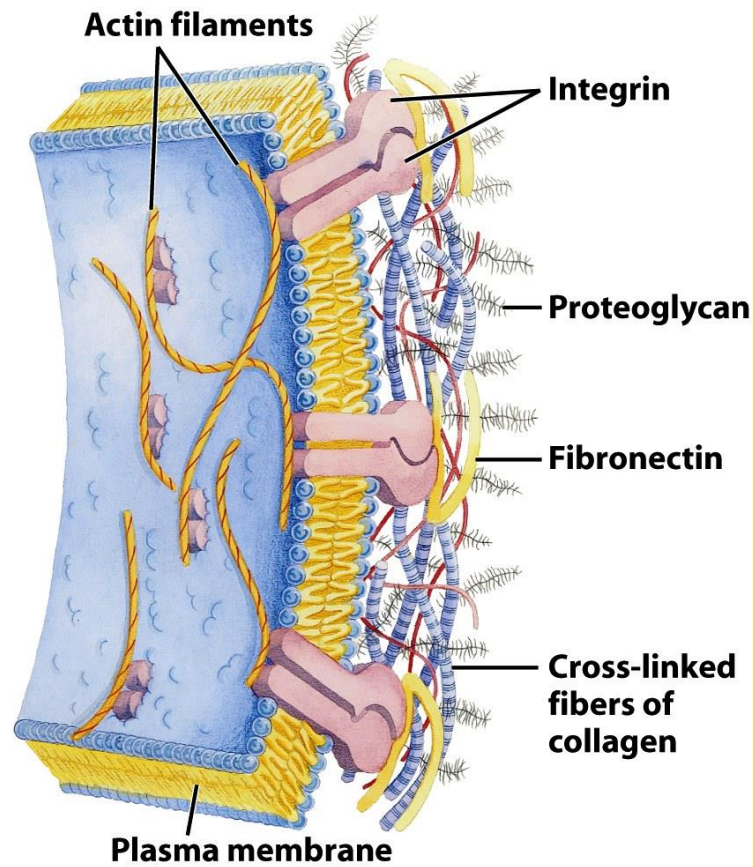


Figure 7-28
Lehninger Principles of Biochemistry, Fifth Edition
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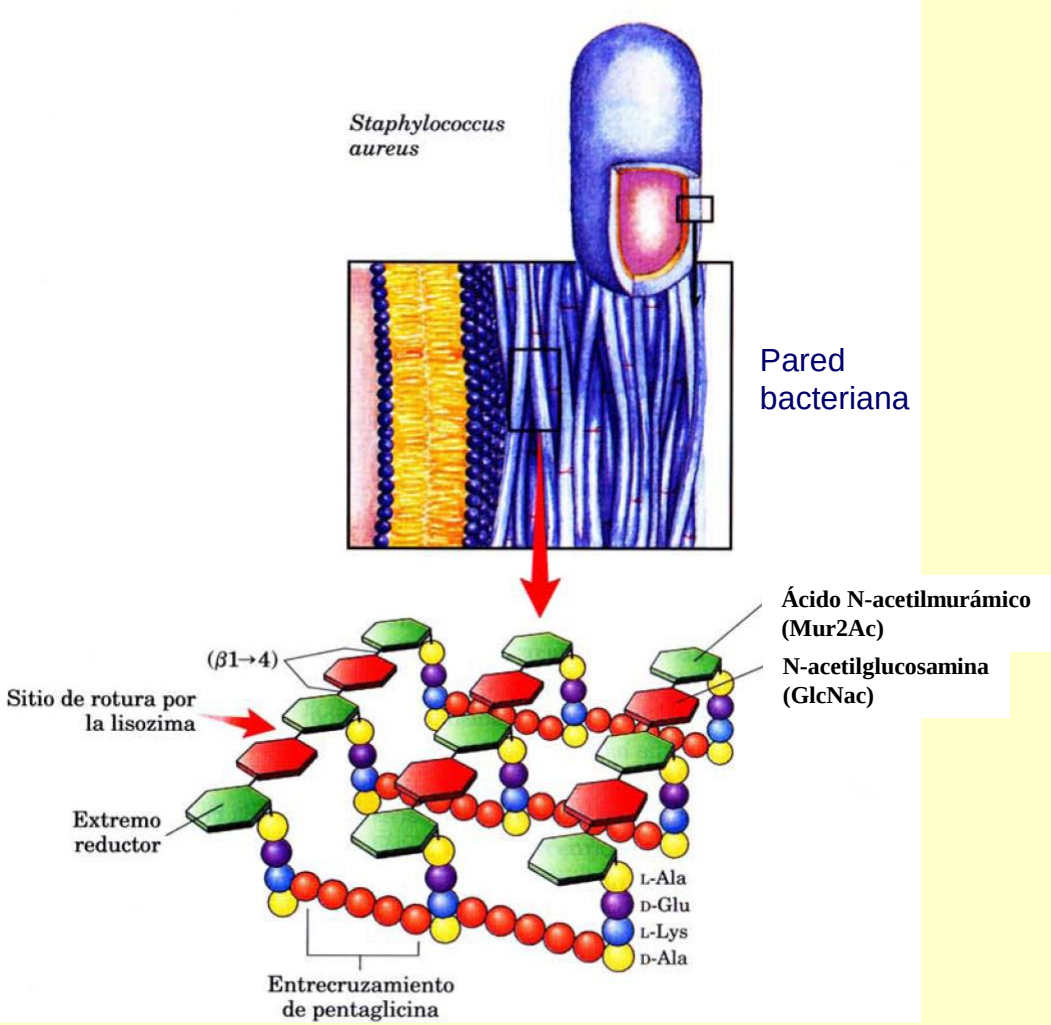
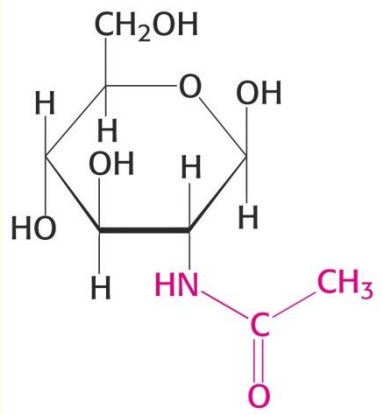
- Pueden formar agregados: cartílago

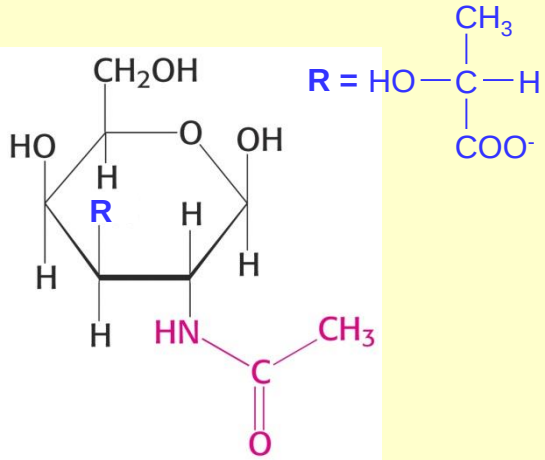
Heteropolisacáridos: peptidoglicano

Cadenas de N-acetilglucosamina y ácido N-acetilmurámico (b 1- 4) unidas por oligopéptidos



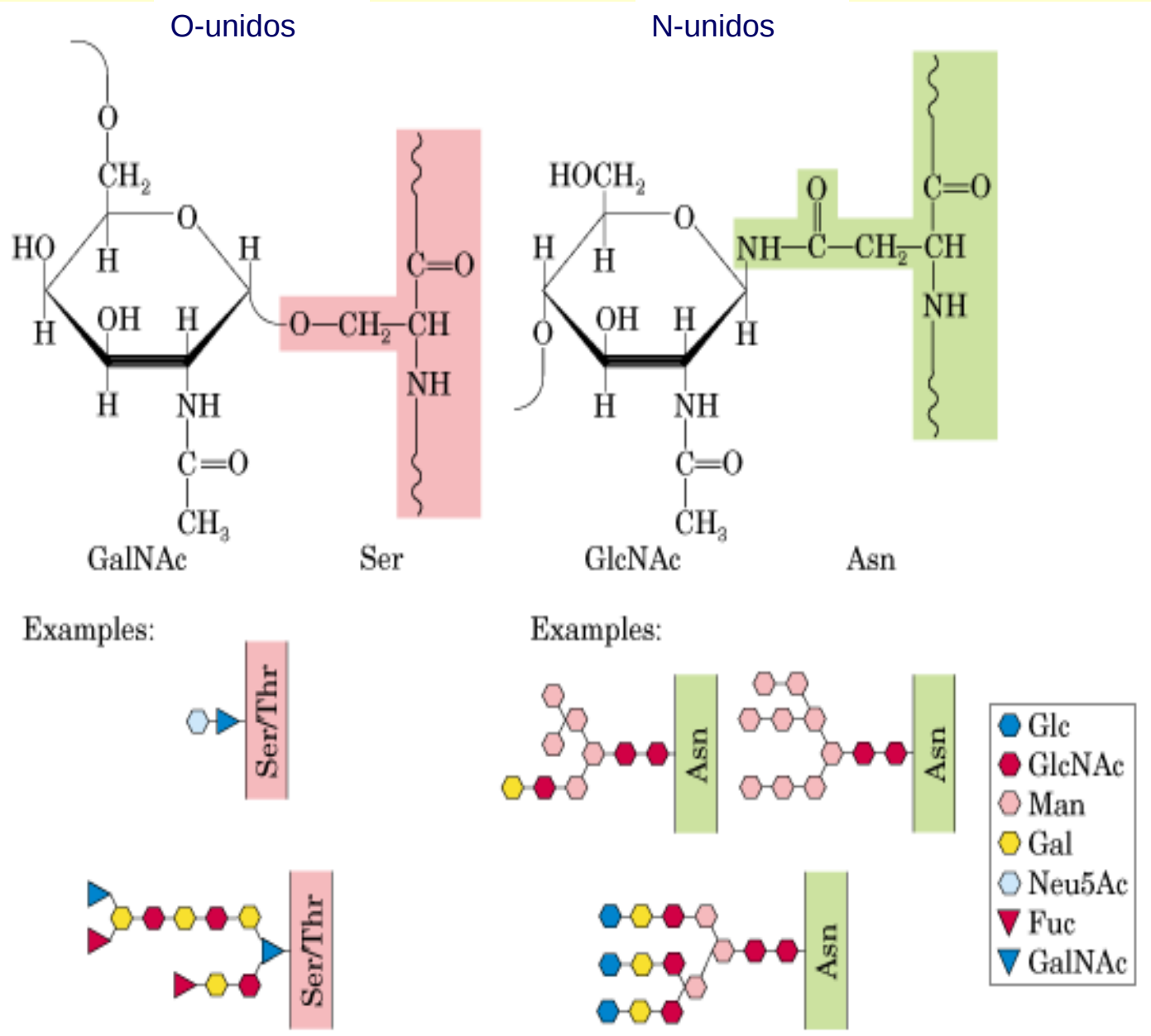
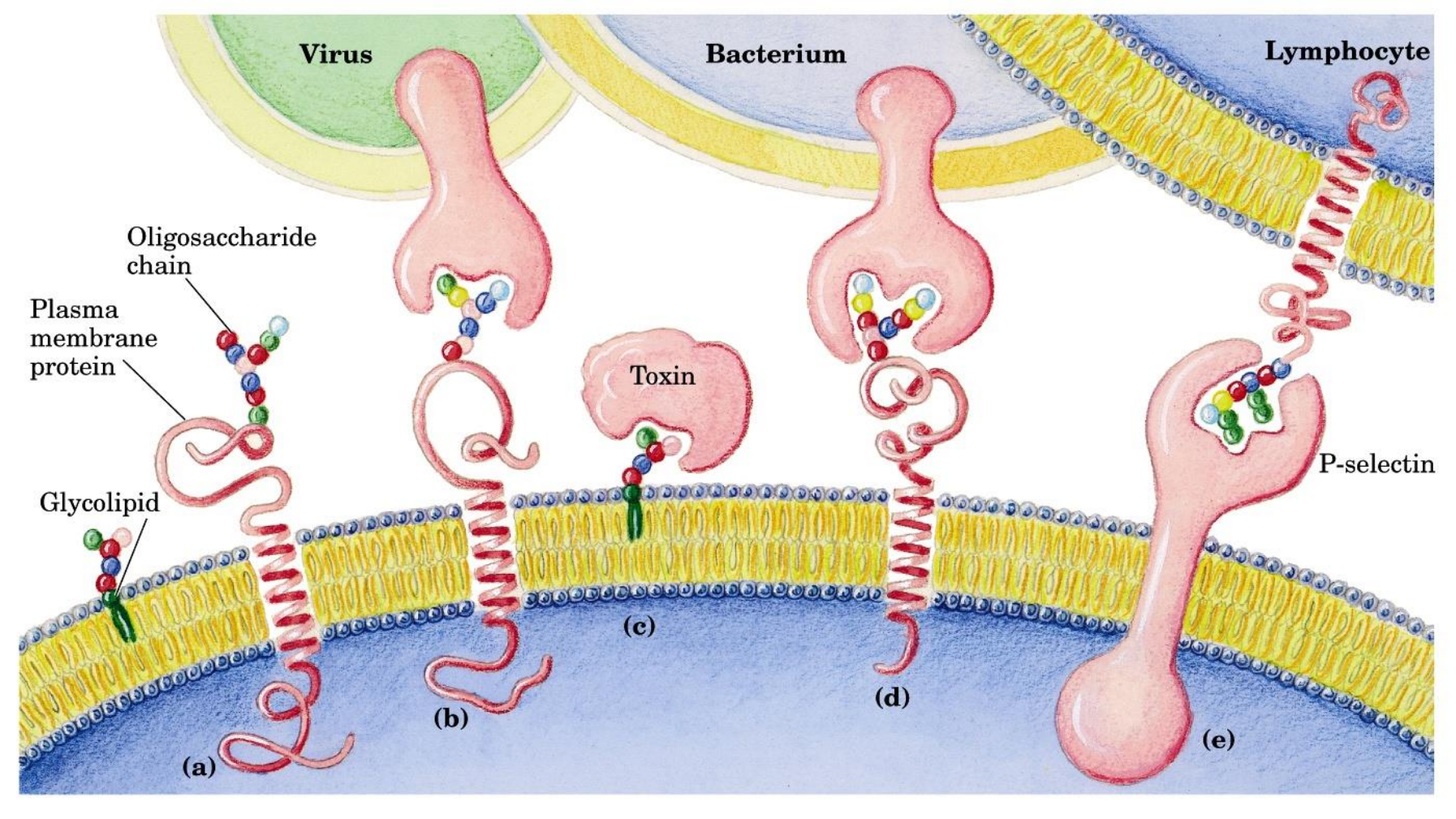


β-D-acetilglucosamina (GlcNac)



Ácido N-acetilmurámico (Mur2Ac)

Glucoproteínas



Interacción célula-célula