

Engineering a biosynthetic pathway for high-value glycosaminoglycans production

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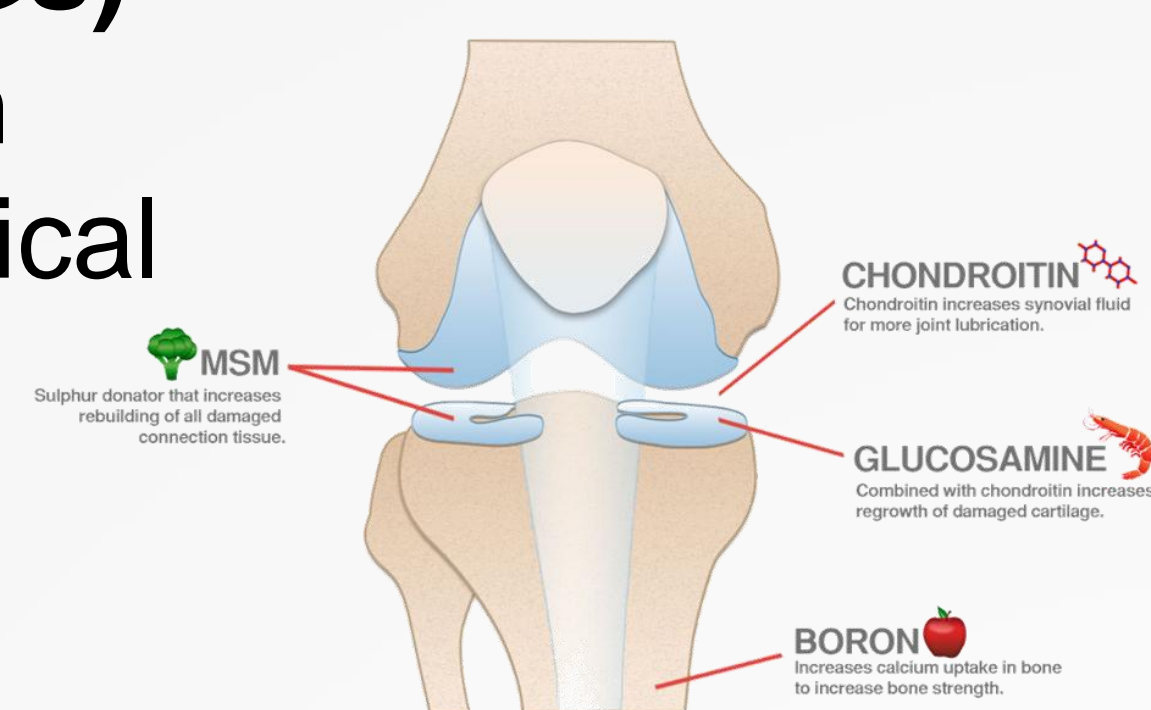
INTRODUCTION

Glycosaminoglycans (GAGs)

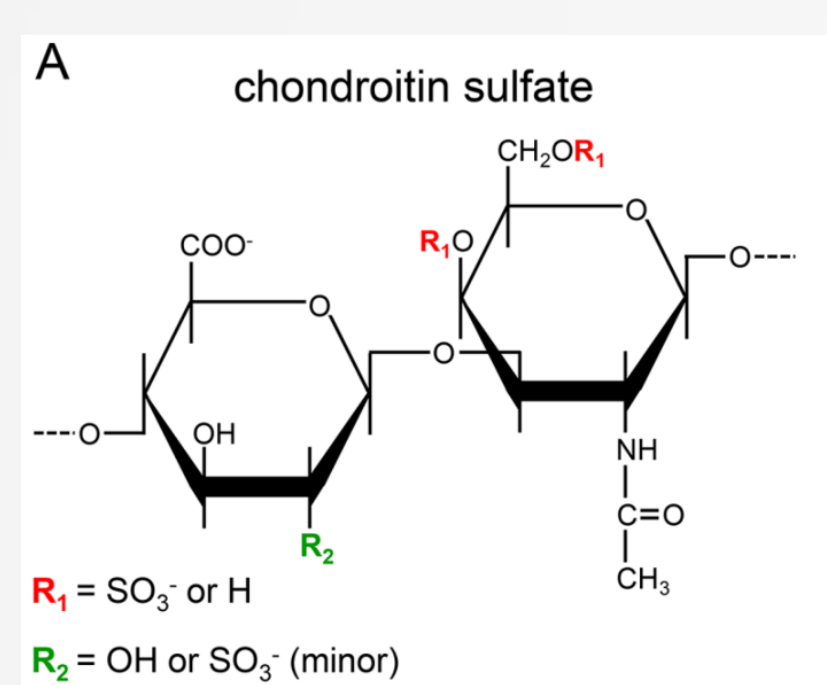
Natural polysaccharides with important cosmetic and medical applications

Hyaluronic acid
Heparan

Chondroitin Sulfate



Osteoarthritis supplement
Global Market US\$457.7 M (2025)
CAGR of 3.3% (2017-2025)^[1]

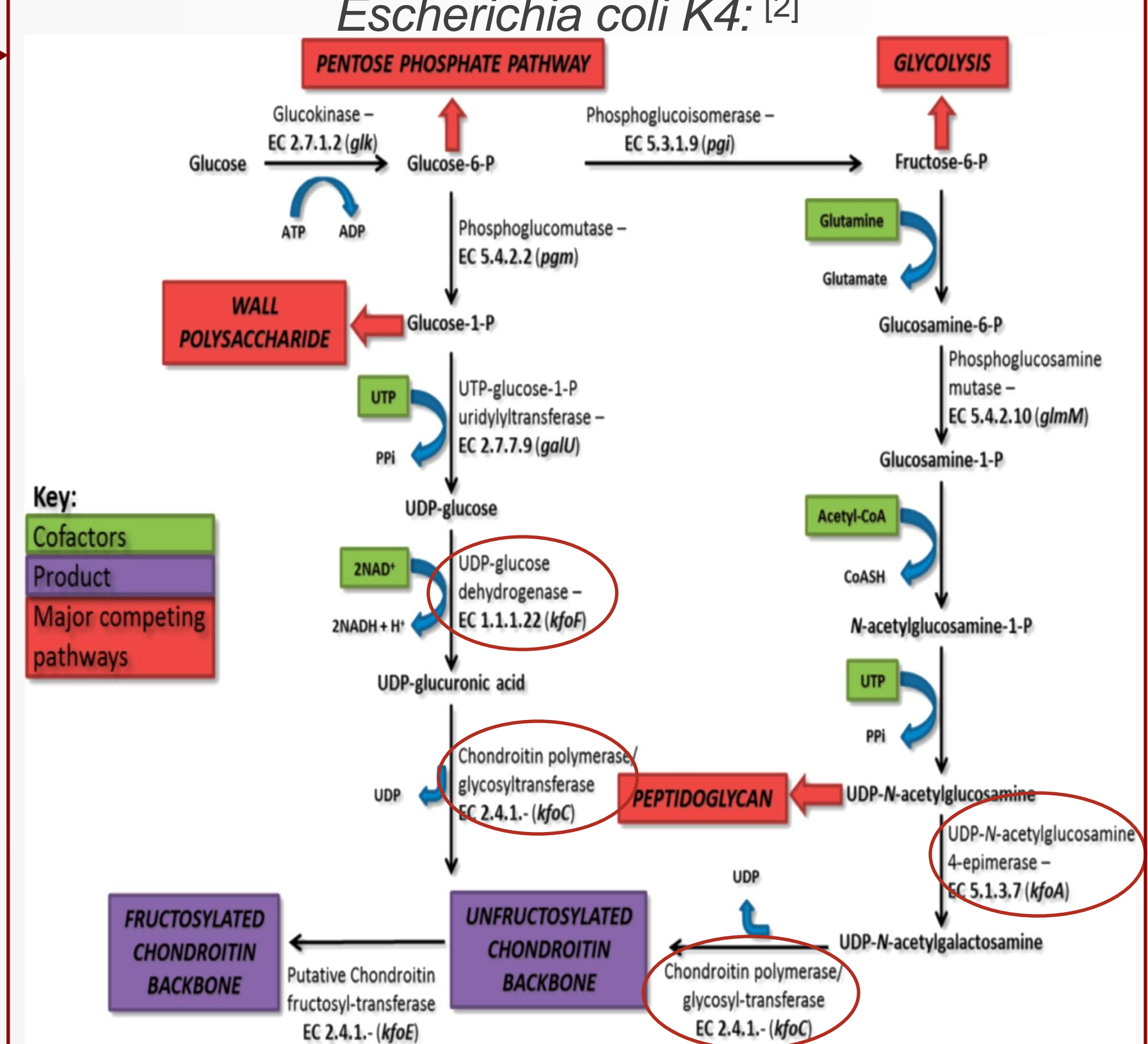


Shark fins and cartilage



GAG-like polysaccharides

E.g. *Pasteurella multocida*
Escherichia coli K4: [2]



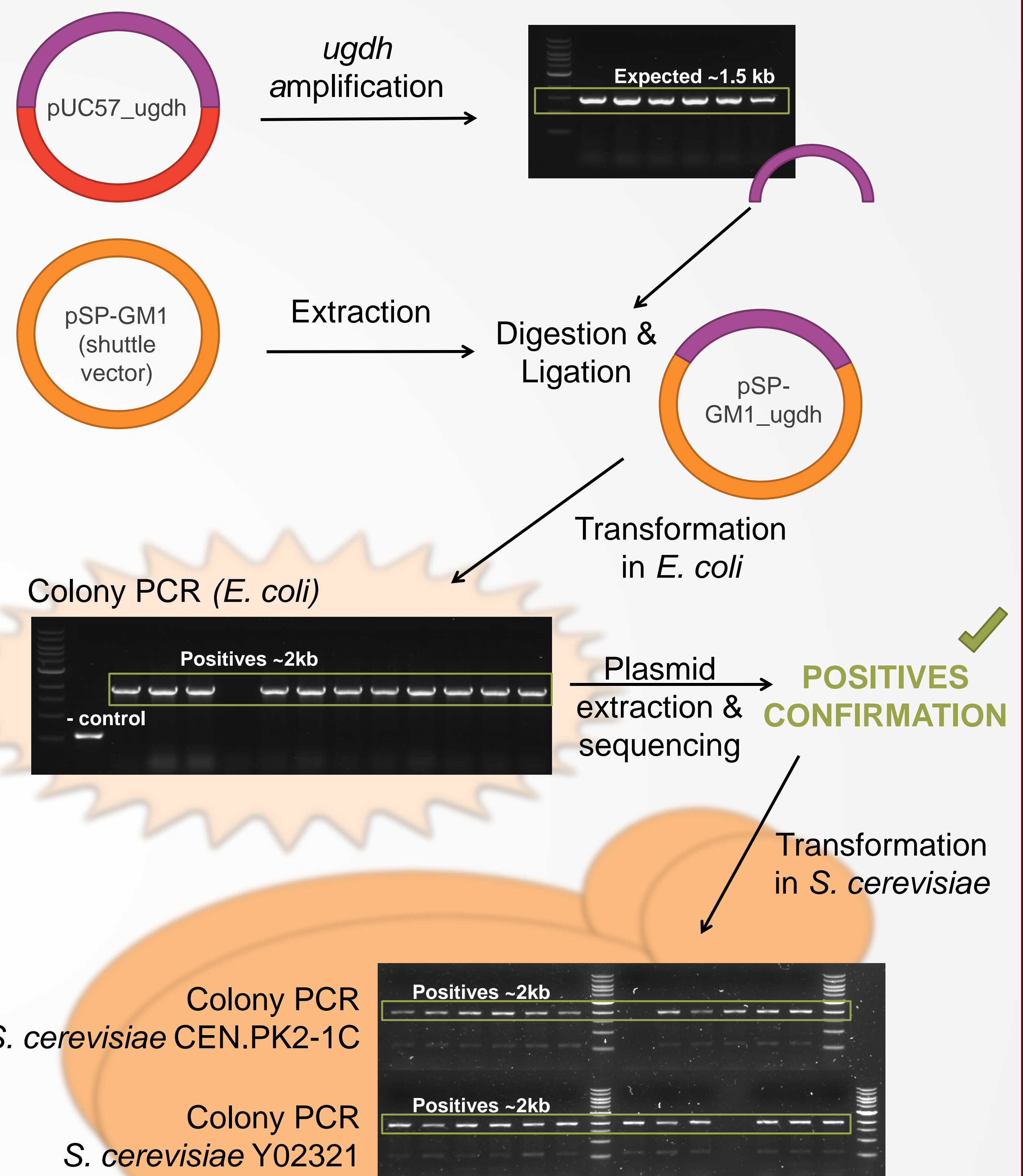
GOAL & METHODOLOGY



Design and engineer an artificial pathway for the production of chondroitin in *Saccharomyces cerevisiae*

- 1 UDP-glucose dehydrogenase
- 2 UDP-N-acetylglucosamine 4-epimerase
- 3 Chondroitin polymerase

PRELIMINARY RESULTS



- 1 **UDP-glucose dehydrogenase**
- 2 UDP-N-acetylglucosamine 4-epimerase
- 3 Chondroitin polymerase

Enzymatic activity evaluation

Pathway assembly

REFERENCES

- [1] Chondroitin Sulfate Market - Global Industry Analysis, Size, Share, Growth, Trends, and Forecast 2017-2025, Transparency Market Research, <https://www.transparencymarketresearch.com/chondroitin-sulfate-market.html> (visited on 10st September 2018)
- [2] He W *et al.* (2015) Production of chondroitin in metabolically engineered *E. coli*, *Metabolic Engineering*, 27:92-100.



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