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MOLECULAR MECHANISMS AND TECHNOLOGICAL APPLICATIONS OF NATURAL SWEETENERS

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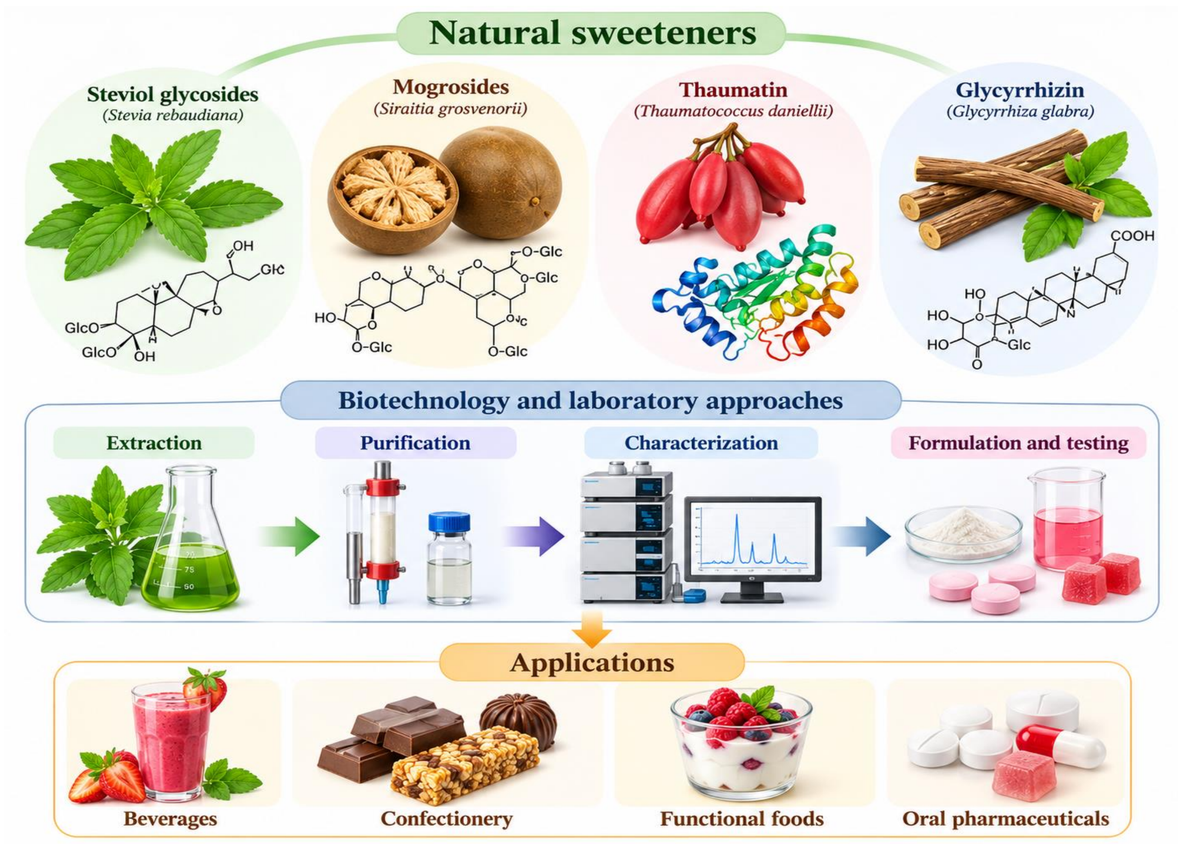
Abstract: Natural sweeteners offer alternatives to sucrose in food and pharmaceutical formulations. This review examines their molecular interactions with sweet taste receptors, sensory characteristics, and technological applications, highlighting formulation challenges, safety considerations, and opportunities for developing reduced-sugar products.

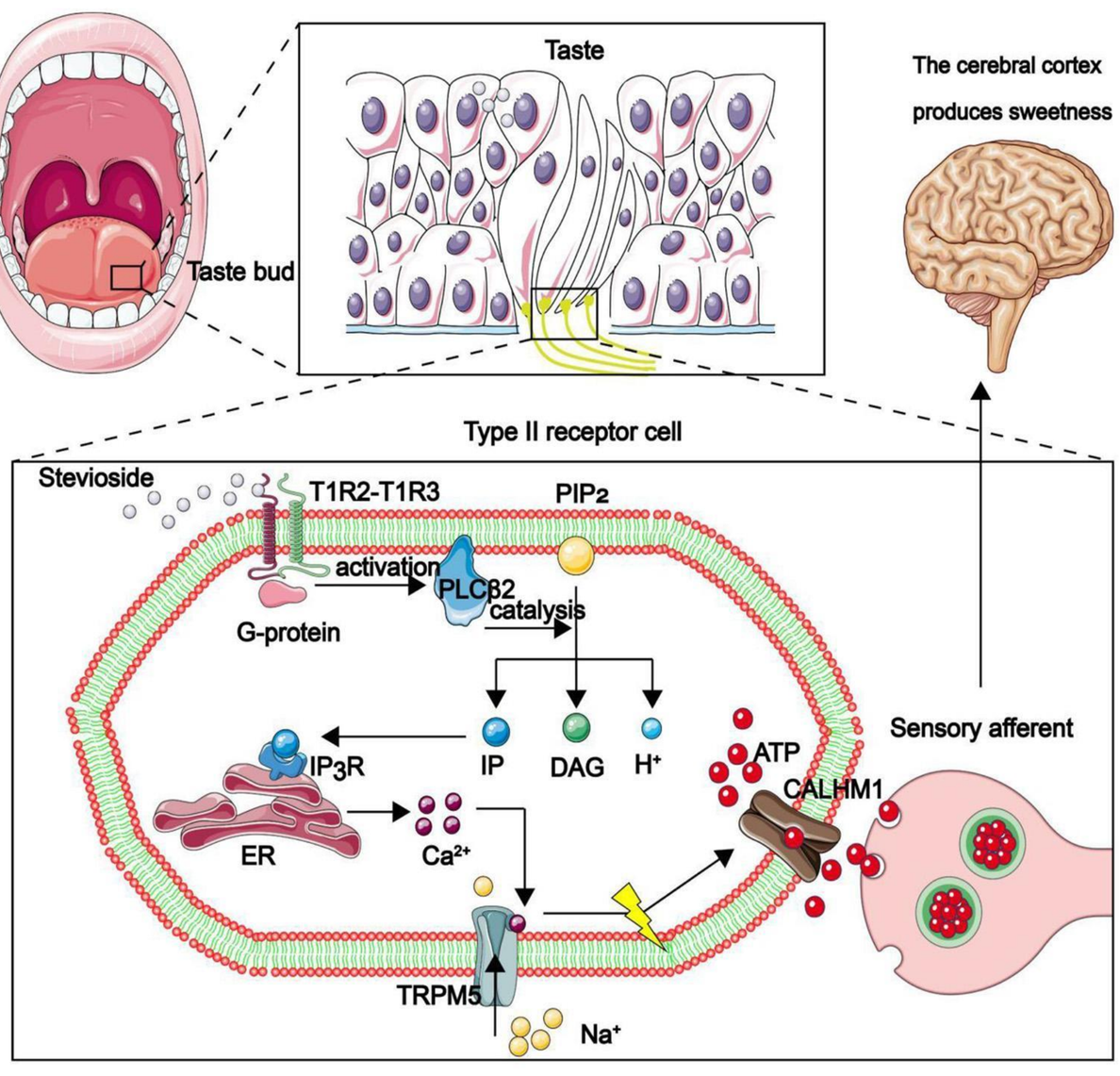
• Introduction

Reducing added sugar intake has increased interest in naturally derived sweeteners. Compounds such as steviol glycosides, mogrosides, and thaumatin provide intense sweetness through interactions with TAS1R2/TAS1R3 receptors, but differ in chemical structure, sensory profiles, and technological properties.

• Material and method

A narrative review of scientific literature was conducted, focusing on natural sweetener chemistry, molecular mechanisms of sweetness perception, physicochemical properties, technological applications, and safety considerations in food and pharmaceutical formulations.





• Results and discussions(continue)

Natural sweeteners exhibit distinct molecular structures and receptor interactions, influencing sweetness intensity, onset, duration, and aftertaste. Steviol glycosides and mogrosides offer high sweetness potency, while thaumatin provides intense sweetness through a protein-based structure. Their applications depend on thermal stability, solubility, and compatibility with food matrices. However, replacing sucrose requires additional formulation strategies to maintain texture, preservation, and consumer acceptance.

• Conclussions

Natural sweeteners provide valuable alternatives for reducing added sugars, although their technological performance varies considerably. Understanding molecular mechanisms and physicochemical properties supports appropriate ingredient selection, while optimized formulations and safety assessments remain necessary for successful food and pharmaceutical applications.