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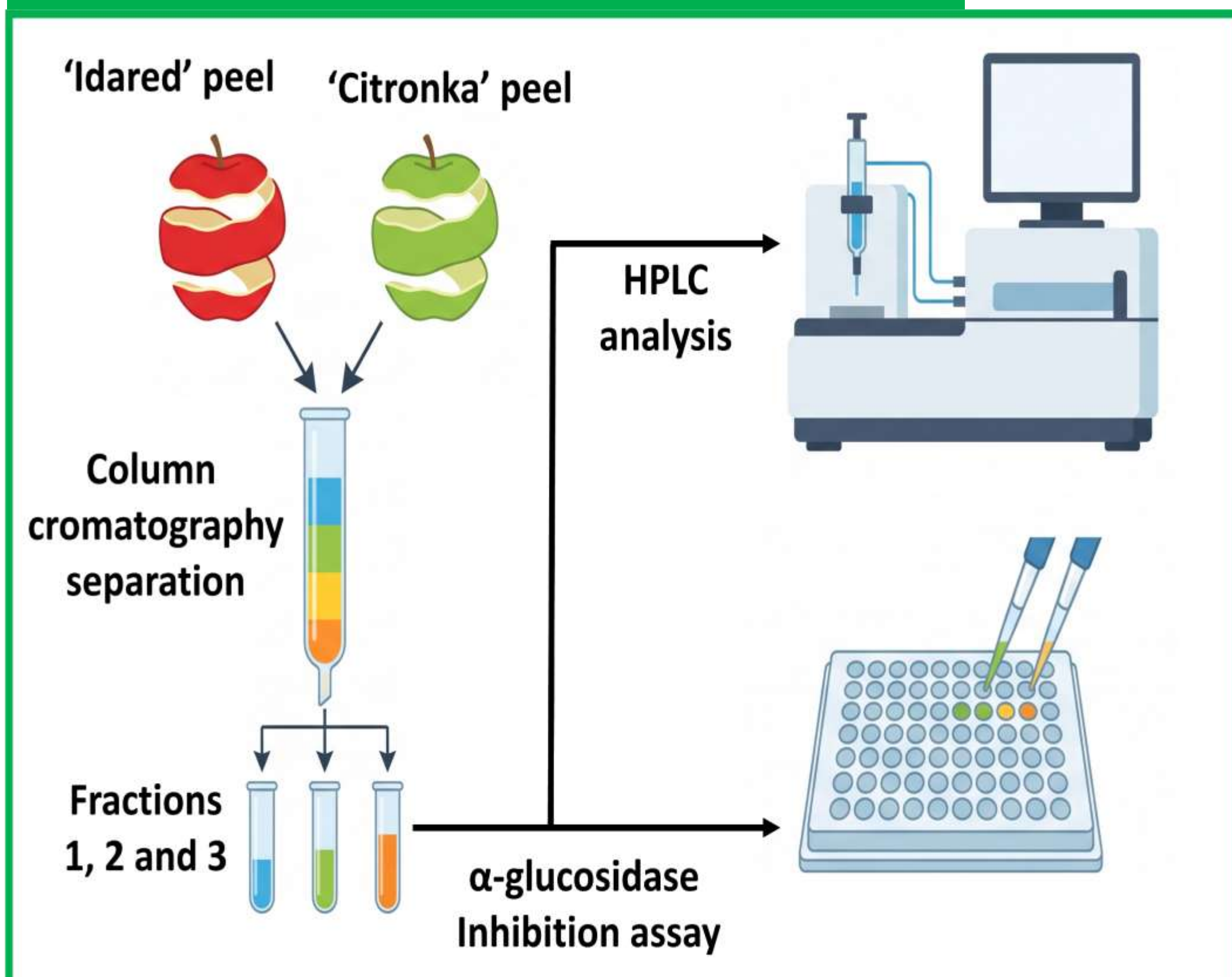
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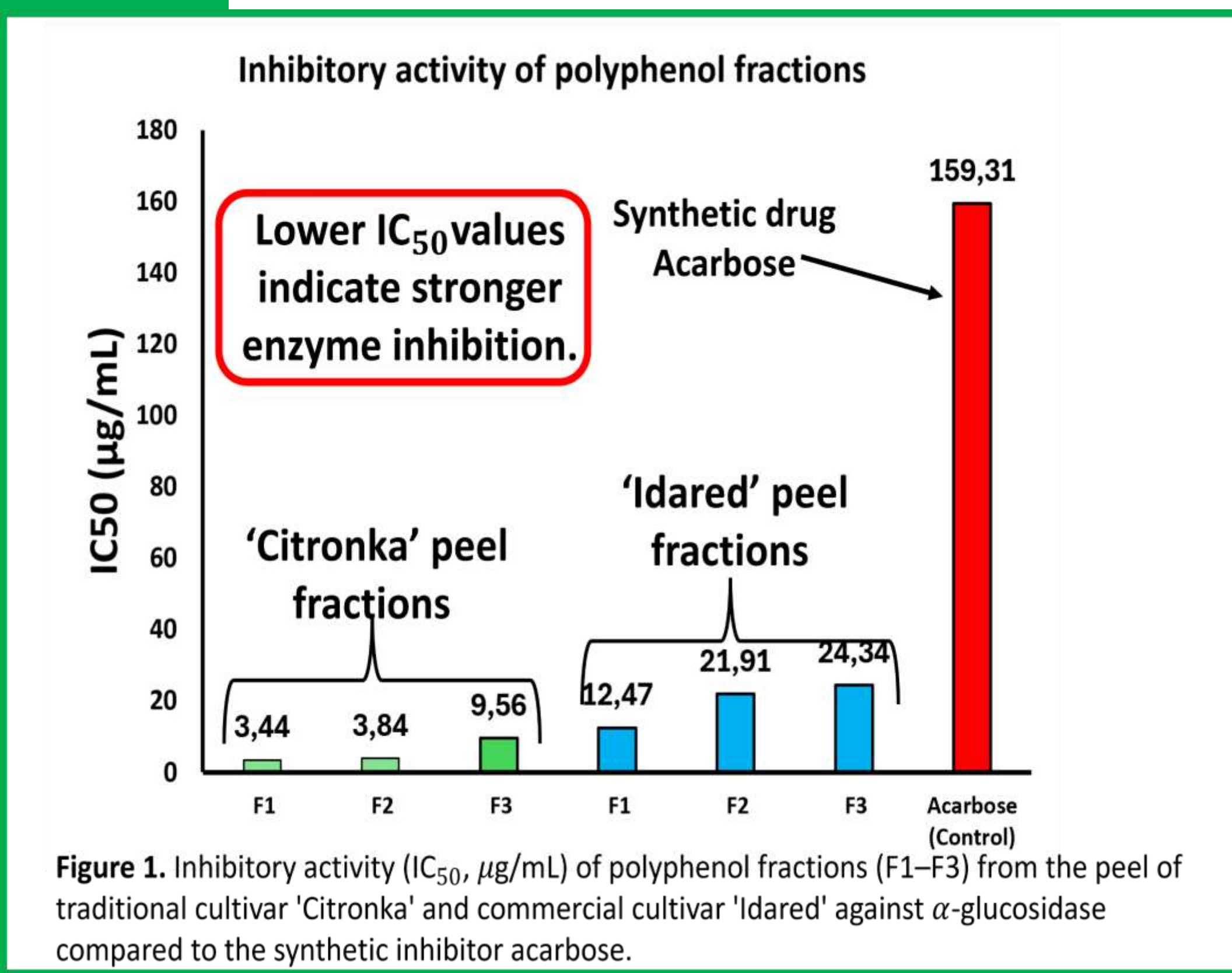
Abstract

Apples are an important dietary source of polyphenols, and apple peel is particularly rich in these bioactive compounds. Traditional cultivars remain an underexplored source of polyphenols with potential health benefits. Apple polyphenols exhibit several biological activities, including inhibition of digestive enzymes such as α -glucosidase, which is relevant for postprandial glycemic control. This study evaluated the α -glucosidase inhibitory activity of polyphenols from the peel of one traditional apple cultivar ('Citronka') and one commercial cultivar ('Idared'). Samples were extracted with 80% methanol, and peel polyphenols were separated into three fractions by Sephadex LH-20 column chromatography, with fraction 2 enriched in phenolic acids and dihydrochalcones and fraction 3 enriched in flavonols and flavan-3-ols. Inhibition was measured spectrophotometrically using p-nitrophenyl- α -D-glucopyranoside as substrate, and IC_{50} values were determined from logarithmic curves. All tested fractions exhibited significantly lower IC_{50} values than acarbose (159,31 μ g/mL), indicating stronger α -glucosidase inhibition. In 'Citronka' peel, IC_{50} values were 3.44, 3.84 and 9.56 μ g/mL for fractions 1–3, respectively, while in 'Idared' peel they were 12.47, 21.91 and 24.34 μ g/mL. These results indicate that apple peel polyphenols, especially from the traditional cultivar, are strong α -glucosidase inhibitors and support the bioactive potential of traditional apple cultivars.

Methodology/Experimental Part



Results



Discussion

- **Fractionation:** Sephadex LH-20 column effectively separated apple peel polyphenols into 3 main fractions based on their structure.
- **Polyphenol Content:** F1 and F2 contained mostly phenolic acids and dihydrochalcones, while F3 was dominated by flavonols and flavan-3-ols.
- **Enzyme Inhibition:** All apple peel fractions inhibited α -glucosidase significantly better than the synthetic drug acarbose ($IC_{50} = 159.31 \mu$ g/mL).
- **Cultivar Comparison:** The traditional cultivar 'Citronka' ($IC_{50} = 3.44 - 9.56 \mu$ g/mL) was 3.5 to 6.5 times more potent than commercial 'Idared' ($IC_{50} = 12.47 - 24.34 \mu$ g/mL).

Conclusion

- Apple peel polyphenols represent significantly stronger *in vitro* α -glucosidase inhibitors compared to standard acarbose.
- Traditional 'Citronka' demonstrated superior bioactivity over commercial 'Idared', confirming the high functional value of native apple varieties.
- These natural fractions show high potential for future application in functional foods or supplements targeted at glycemic management.

Acknowledgements

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