





Abstract

# Study of Melanoidins of the Maillard Reaction in Dulce de Leche<sup>†</sup>

Micaela Escobal<sup>1,\*</sup>, Analía Rodríguez<sup>2</sup>, Luis Panizzolo<sup>2</sup>, Cristina Olivaro<sup>1</sup>  and Fernando Ferreira<sup>1</sup> 

<sup>1</sup> Espacio de Ciencia y Tecnología Química, Cenur Noreste, Sede Tacuarembó, Universidad de la República (UdelaR), Tacuarembó 45000, Uruguay

<sup>2</sup> Departamento de Ciencia y Tecnología de Alimentos, Facultad de Química, Universidad de la República (UdelaR), Montevideo 10800, Uruguay

\* Correspondence: micaelaescobal@gmail.com

<sup>†</sup> Presented at the 3rd International Electronic Conference on Foods: Food, Microbiome, and Health—A Celebration of the 10th Anniversary of Foods' Impact on Our Wellbeing, 1–15 October 2022; Available online: <https://sciforum.net/event/Foods2022>.

**Keywords:** melanoidins; Maillard Reaction; Dulce de Leche



**Citation:** Escobal, M.; Rodríguez, A.; Panizzolo, L.; Olivaro, C.; Ferreira, F. Study of Melanoidins of the Maillard Reaction in Dulce de Leche. *Biol. Life Sci. Forum* **2022**, *18*, 54. <https://doi.org/10.3390/Foods2022-12988>

Academic Editor: Arun Bhunia

Published: 30 September 2022

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“Dulce de leche” (DL) is a dairy product elaborated by milk and sucrose concentrated in favorable conditions for the Maillard Reaction (MR). This reaction develops organoleptic properties, like aroma and color. The MR is a type of non-enzymatic browning which involves the reaction of carbonyl compounds, reducing sugars with compounds that possess a free amino group such as amino acids, amines and proteins. The final stage of the chemical reaction is typified by the production of brown nitrogen-containing polymers and co-polymers, melanoidins. Recent research relating these products explores their antioxidant, antimicrobial, anti-inflammatory, antihypertensive or prebiotic activity. In food, melanoidins are linked to proteins in a complex structure—melanoproteins—which are difficult to analyze; thus, it is relevant to investigate the separation and isolation of melanoidins from a complex matrix.

The aim of this work is the separation, isolation and structural elucidation of melanoidins from DL.

In this research, DL was elaborated in the laboratory with skim milk and sucrose, with an initial pH of 7.6. Firstly, it was separated with dialysis and centrifugation to obtain melanoproteins. Moreover, the insoluble and colored fraction was digested by the pronase enzyme. Next, the digested enzymatic product was fractionated by gel filtration (cut-off 1.8 kDa). Finally, the melanoidins were separated from the colored fractions of gel filtration by SPE using a C18 cartridge with different mixtures of methanol and water. The colored fractions obtained were monitored by TLC and analyzed by mass spectrometry.

TLC shows compounds that reveal ninhydrin and orcinol. In addition, some compounds were fluorescent (detection at 365 nm), in agreement with reported compounds obtained in models of the MR. Mass spectrometry analysis shows a complex mixture of compounds with  $m/z$  less than 1200 and with some structural motifs that could correspond to melanoidins. More studies are needed to determine the structure of these compounds.

**Supplementary Materials:** The presentation materials can be downloaded at: <https://www.mdpi.com/article/10.3390/Foods2022-12988/s1>.

**Author Contributions:** Conceptualization, F.F., C.O., A.R. and L.P.; methodology, F.F., C.O. and A.R.; formal analysis, M.E.; investigation, F.F., C.O., A.R., L.P. and M.E.; writing—original draft preparation, M.E.; writing—review and editing, F.F., C.O. and A.R.; supervision, F.F., C.O. and A.R. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research received no external funding.

**Institutional Review Board Statement:** Not applicable.

**Informed Consent Statement:** Not applicable.

**Data Availability Statement:** Data is contained within abstract or supplementary material.

**Conflicts of Interest:** The authors declare no conflict of interest.