SARA CUNHA

→ **Sara Cunha** is a biotechnology PhD student at ESB-UCP. Her doctoral project, being carried out at CBQF-UCP is focused on the study of extracts rich in bioactive peptides from marine sources, such as algae and mussels, with the goal of developing cosmetic ingredients with anti-aging and anti-inflammatory properties. Sara has a BSc in Biochemistry from the University of Porto and MSc in Health Biochemistry from the Polytechnic Institute of Porto. She has worked in research projects in different areas including marine biology, microbiology, immunology and biotechnology. She has taught Inorganic and General Chemistry as invited assistant at the Polytechnic Institute of Porto.

Antioxidant Peptides Produced from Unexplored Marine Resources

Sara A. Cunha[a]*, Rita de Castro[a], Manuela Pintado[a]

[a] Universidade Católica Portuguesa, CBQF - Centro de Biotecnologia e Química Fina – Laboratório Associado, Escola Superior de Biotecnologia, Rua Diogo Botelho 1327, 4169-005 Porto, Portugal– Centro de Biotecnologia e Química Fina – Laboratório Associado, Escola Superior de Biotecnologia, Universidade Católica Portuguesa/Porto, Rua de Diogo Botelho 1327, 4169-005 Porto, Portugal.
*Corresponding author: ORCID iD - 0000-0003-1336-9993; e-mail - scunha@porto.ucp.pt.

The sea contains about one half of the global biodiversity, thereby being a good source for novel compounds of interest, such as bioactive peptides. Mussels are consumed and appreciated over the world, although commercialized mussels are pre-selected before being delivered for sale, so small or broken mussels are discarded. Microalgae are photosynthetic organisms, easy to cultivate since they do not require cultivable land.

The microalgae used in this work are produced in a company in which the CO_2 generated in the production of cement is injected to microalgae growth tubes transforming it in oxygen, resulting in a decrease of CO_2 emission. The chosen species, *Chlorella vulgaris* and *Nannochloropsis oceanica*, have interesting protein content, making them a promising sustainable protein source. Discarded mussels from the specie *Mytilus galloprovincialis*, supplied by a national mussel trading company, and the microalgae grown up with CO_2 generated from cement production, were used to produce water soluble extracts rich in proteins and bioactive peptides, showing potential to the development of sustainable industrial alternatives, promoting new perspectives for a circular economy.

Four extracts were produced and analysed: Mussel_Sub, hydrolysed with subtilisin (1.5%,3h); Mussel_Cor, hydrolysed with corolase (3%,3h); Chlorella, hydrolysed with acetic acid (0.5%,1h), cellulase (5%,2h) and subtilisin (3.9%;2h); and *Nannochloropsis*, hydrolysed with cellulase (5%,2h) and subtilisin (1.7%,5h). The protein content was determined by Kjeldahl and the antioxidant activity by ORAC and ABTS assays. The Chlorella extract showed 44.71±1.75% protein, 462.83±39.37 (ORAC) and 76.12±7.53 (ABTS) µmol TE/g. *Nannochloropsis* showed 31.01±0.27% protein, 361.32±49.29 (ORAC) and 68.07±6.97 (ABTS) µmol TE/g. Mussel_Cor showed 48.00±0.15% protein, 389.50±0.29 (ORAC) and 62.76±8.88 (ABTS) µmol TE/g; Mussel_Sub showed 45.23±0.14% protein, 485.62±60.65 (ORAC) and 66.11±2.35 (ABTS) µmol TE/g.

The enzymatic hydrolysis of marine species may allow to produce extracts rich in proteins and antioxidant peptides useful for industrial applications, contributing to the valorisation of these species and to a circular economy, since mussel commercialization generates waste and microalgae can transform CO_2 from other industries to O_2, reducing the environmental impact.

Keywords: algae; mussel; bioactive properties; enzymatic hydrolysis; sustainable industrial ingredients.