

BACTERIORUBERIN: THE NATURAL PIGMENT SET TO REVOLUTIONISE THE FOOD AND COSMETICS INDUSTRIES



CONTACT DETAILS:

Research Results Transfer Office-
OTRI
University of Alicante
Tel.: +34 96 590 99 59
Email: areaempresas@ua.es
<http://innoua.ua.es>

ABSTRACT

The *Applied Biochemistry (AppBiochem)* group at the University of Alicante has developed a **system to optimise the production of bacterioruberin**, using cultures of the halarchaeon *Haloferax mediterranei* (a halophilic microorganism that grows in coastal and inland saltwater bodies, as well as in salt lakes), with a view to incorporating it into cosmetic formulations, nutraceuticals or processed foods. The resulting product exhibits biological activities between 100 and 300 times more potent than those described for other natural carotenoids, such as its antioxidant, anti-tumour, anti-lipid, anti-glycaemic, immunomodulatory and colouring properties.

The process is currently at the **laboratory stage**, and the aim is to incorporate the pigment into new formulations for the **cosmetics** and **food industries**.

ADVANTAGES AND INNOVATIVE ASPECTS

MAIN ADVANTAGES OF THE TECHNOLOGY

It exhibits **biological activities between 100 and 300 times more potent** than those described for other natural carotenoids such as β -carotene (C40):

- **Antioxidant:** ability to slow down or prevent the oxidation of cells and tissues, in both animals and plants.
- **Antitumour:** selective cytotoxic effect against breast cancer and lymphoma cell lines.
- **Antilipid:** ability to reduce elevated levels of fats —lipids— in the blood, primarily cholesterol and triglycerides.
- **Antiglycaemic:** ability to lower elevated blood sugar (glucose) levels in people with diabetes.
- **Immunomodulator:** stimulates or suppresses the immune system, and may help the body fight cancer, infections or other diseases.
- **Colouring agent:** High red/orange colouring capacity depending on its concentration (see Figure 2).

INNOVATIVE ASPECTS

The key innovation lies in the fact that **a single molecule can be used in lower concentrations for different purposes**, thereby reducing costs and enabling the development of formulations for new nutraceutical products that offer greater and better health benefits.

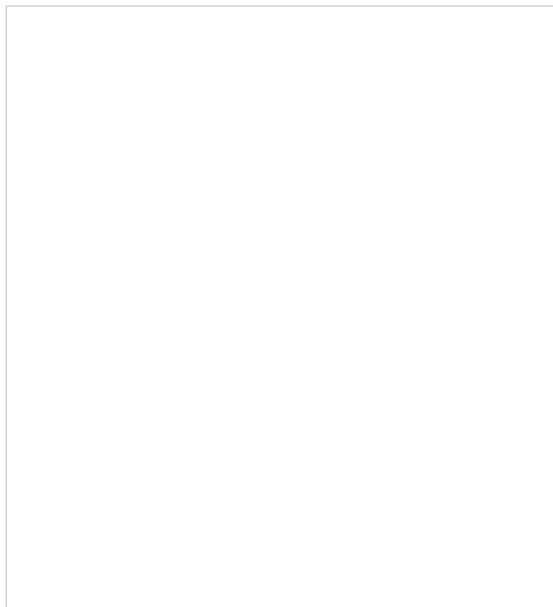


Figure 2: Bacterioruberin extracts (a natural pigment) ready for use in various formulations.

MARKET APPLICATIONS

It has a wide range of applications in the **food, nutraceutical and cosmetics industries**, for example:

- As an **antioxidant** for food preservation.
- As a **colouring** agent in the production of creams, sweets and candies.
- As a **lipid-lowering agent, hypoglycaemic agent and antioxidant** in the manufacture of nutraceuticals.
- Specifically in the **cosmetics sector**, it has great potential as:
 - o Skin barrier / anti-redness (soothing)
 - o Anti-ageing (antioxidant)
 - o Complementary sun protection

COLLABORATION SOUGHT

We are seeking **companies** interested in collaborating with the research group on:

- Development of **co-formulation and product stability projects** based on bacterioruberin, covering both oil-in-water (O/W) and water-in-oil (W/O) systems. Micro/nano-encapsulation is also a possibility.
 - Projects on **photostability and the compatibility of UV filters** with other components of the formulation (such as preservatives, antioxidants and thickeners).
 - Projects on **efficacy** focused on specific properties:
 - o Antioxidant (food preservation).
 - o Antioxidant, anti-lipid, anti-inflammatory and anti-glycaemic (nutraceuticals).
 - o High pigmentation capacity.
 - **Safety and regulations:** ingredient dossier (toxicology, stability, specifications, IFRA where applicable), labelling/INCI, compatibility with EU markets.
 - **Product development:** oils, sauces, vinaigrettes, fortified salts or nutraceutical formulations.
 - **Market launch:** narrative on natural origin and extremophiles, comparative testing against reference antioxidants.
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