



## Microbiota of hypersaline waters. Halobacterium, haloarchaea and microalgae, properties for the skin.

José Manuel Carbajo<sup>1</sup> & Francisco Maraver<sup>1-2</sup>

Editor: Constantin MUNTEANU, E-mail: [office@bioclima.ro](mailto:office@bioclima.ro)



Balneo and PRM Research Journal

DOI: <http://dx.doi.org/10.12680/balneo.2021.452>

Vol.12, No.3 September 2021

p: A04

1. *Research Group in Medical Hydrology (UCM-911757), Department of Radiology, Rehabilitation and Physiotherapy, Faculty of Medicine, Complutense University, Plaza Ramón y Cajal, s/n, 28040 Madrid, Spain*
2. *Department of Radiology, Rehabilitation and Physiotherapy, Faculty of Medicine, Complutense University, Plaza Ramón y Cajal, s/n, 28040 Madrid, Spain*

### Abstract

Carla Morer (2016), Gomes et al. (2019) and Gomes et al. (2021) have already studied the different concepts and history of Thalassotherapy, the physical and chemical properties of saline waters and the methods of application of seawater for therapeutic purposes, as well as its derivative products (mud, sand, algae, salt, and aerosols), where climotherapy has a notable influence on treatment (Maraver et al., 2011).

The benefits of thalassotherapy for human health are attributed to minerals (Morero et al., 2017), either dissolved in seawater or participating in the composition of sea products (Gomes et al., 2021).

Minerals are incorporated through the skin by osmosis or inhalation of aerosols. In the case of osmosis, skin contact with water usually lasts from 15 to 20 min and produce modifications in body physiology (Carbajo & Maraver, 2018) to which pharmacological properties can be attributed (El-Amawy & Sarsik, 2020).

In hydrology microbial load of saline waters has not been considered important, although we believe that it does not exist, always believed that life in hypersaline media is unlikely; it was not considered capable of exercising physiological activity.

This concept has changed radically (Carbajo, 2014). Hypersaline environments are frequent on the planet (Spear et al, 2003). When a brine is concentrated, fauna is dominated by halotolerant microorganisms, preventing the life of conventional microscopic beings of the water, remaining only moderately halophile organisms (up to about 150 g/kg of salinity) and extremely halophile (with salt concentrations above 250 g/kg) (Tamez, 2009).

The ecology of microorganisms in brines, depending on the characteristics of temperature, saline concentration, and luminosity, is generally constituted by phyto and zooplankton, bacteria, archaea, fungi, and yeasts (Martí, 2010).

These microorganisms generate active substances and under certain conditions of light, temperature, saturation, and pH, they can generate precipitates called "evaporites" that originate an active silt with beneficial properties for skin health (Revsbech et al., 1983; Van Gernerden, 1993; Singh and Singh, 2017).

Consequently, saline hypertonic media have their own environmentally dependent microbiota, and this microbiota has very important properties for use in dermatological and cosmetic preparations.

### BIBLIOGRAPHY

Carbajo JM. Evaluación de los cambios en la piel tras la aplicación de cosméticos elaborados a partir del sedimento de las aguas mineromedicinales Lanjarón-Capuchina mediante métodos de bioingeniería cutánea. PhD Thesis, Universidad Complutense Madrid, 2014.

Carbajo JM, Maraver F. Salt water and skin interactions: new lines of evidence. *Int J Biometeorol.* 2018; 62(8): 1345-1360. doi: 10.1007/s00484-018-1545-z

El-Amawy HS, Sarsik SM. (2020). Saline in Dermatology: a literature review. *J Cosmet Dermatol.* 2021; 20 (7): 2040-2051. doi: 10.1111/jocd.13813

Gomes CSF, Silva JBP, Viegas Fernandes J, Viegas Fernandes FM. Thalassotherapy in Porto Santo Island of the Madeira Archipelago: Facts and Prospects. *Bol Soc Esp Hidrol Méd.* 2019; 34(1):9-33. doi: 10.23853/bsehm.2019.0953

Gomes CSF, Fernandes JV, Fernandes FV, Silva JBP. Salt Mineral Water and Thalassotherapy. In: Gomes & Rautureau. *Minerals latu sensu and Human Health.* Springer. 2021. PP 631-653

Maraver F, Michán A, Morer C, Aguilera L. Is thalassotherapy simply a type of climotherapy? *Int J Biometeorol.* 2011; 55:107-108

Martí CM. Caracterización ecológica y establecimiento de los criterios para determinar el potencial ecológico en las salinas de la comunidad valenciana. Tesis Doctoral 2010. Valencia, España.

Morer C. Talasoterapia. *Bol Soc Esp Hidrología Médica.* 2016; 31:119-146

Morer C, Roques C-F, Françon A, Forestier R, Maraver F. The role of mineral elements and other chemical compounds used in balneology: data from double-blind randomized clinical trials. *Int J Biometeorol.* 2017; 61(12):2159-2173. doi: 10.1007/s00484-017-1421-2.

Tamez P. Diversidad filogenética de arqueas halófilas extremas cultivables de Exportadora de Sal, S.A., Guerrero Negro. Tesis Doctoral 2009. La Paz, México.

Revsbech NP, Jørgensen BB, Blackburn TH, Cohen Y. Microelectrode studies of the photosynthesis and O<sub>2</sub>, H<sub>2</sub>S and pH profiles of a microbial mat. *Limnology and Oceanography.* 1983; 28: 1062-1074.

Singh A, Singh AK. Haloarchaea: Worth exploring for their biotechnological potential. *Biotechnol. Lett.* 2017, 39, 1793-1800, doi:10.1007/s10529-017-2434-y.

Spear JR, Ley RE, Berger AB, Pace NR. Complexity in natural microbial ecosystems: the Guerrero Negro experience. *Biol Bull.* 2003; 204(2): 168-73. doi: 10.2307/1543553.

Van Gernerden H. Microbial mats: A joint venture. *Marine Geology.* 1993; 113: 3-25.