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**\* IN SALE SALUS: HEALTH PROVISION FROM SALT AND SALINE WETLANDS IN EUROPE**

© *Kortekaas K. Hueso*

Institute of Saltscapes and Salt Heritage (IPAISAL), Apartado de Correos 50

28450 Collado Mediano, Spain

ICAI Higher Technical School of Engineering, Department of Mechanical Engineering,

Universidad Pontificia de Comillas

Alberto Aguilera 25, Madrid, Spain

© *Vayá J-F. Carrasco*

Institute of Saltscapes and Salt Heritage (IPAISAL), Apartado de Correos 50

28450 Collado Mediano, Spain

Among the often cited 14,000 uses of salt, many are related to wellness and health. Its different physical-chemical properties allow many health-related applications of salt itself, brine, mother lay and saline muds. Salt can be used as skin rubs or in blocks, for building halochambers; inhaled as aerosols or even ionised by lamps. Brine can be ingested or used for bathing and exercising in it. Mother lay is usually employed as a basis for cosmetics and skin treatments and muds are traditionally applied directly on the skin for similar ailments. Many of these applications have been known since the Antiquity and are still in use today. Some have disappeared or are only known at local scale, while others are growing in popularity, amid the surge of spa and wellness facilities worldwide. The also increasingly popular natural and alternative treatments have included salt-related healing. In this contribution, we will review among others the traditional uses of brine and salt for health provision; the therapeutic and wellness uses of mother lay and mud as a side activity for traditional salinas, some of which have built ad hoc spa and wellness centres; the now widespread phenomenon of salt caves and mines for halotherapy and the historical spas built around saline lakes, now in disuse. Some treatments can also be applied away from the source of salt, in homes, clinics or urban wellness centres. Examples from many European saline sites, be it mines, solar evaporation salinas, graduation and seething sites, as well as saline lakes, will be drawn. A distinction will be made among those treatments that have been acknowledged by medical science and are applied under professional supervision, as opposed to those that have a weaker scientific support, as well as those that mainly rely on popular belief or superstition.

**Keywords:** salt; brine; traditional uses salt; human health; saline wetland; salt mines; halotherapy; balneotherapy; health.

What is commonly known as salt -NaCl- is a deceivingly simple chemical compound, but that has a variety of physical-chemical properties that allow its use for many different purposes, aside from food seasoning and preservation employed universally. Some even speak of the “14,000” uses of salt, which includes the applications of its basic components, sodium and chlorine, as separate substances in multiple industrial processes [1, 2].

Salt is highly hygroscopic and bactericide, and therefore lends itself well as a disinfectant and anti-inflammatory substance, two of its main human health-related

uses. In fact, the salt found in our own bodies, dissolved in blood, sweat and tears, among others, acts as an efficient, natural barrier against germs. Given its high solubility in water, it can also help maintain the osmotic balance in our bodily fluids, depending on the amount and concentration ingested, inhaled or applied on the skin. Salt and brine can also enhance the health effects of other substances, such as micronutrients, marine aerosols, algae or even the sun. Well known are the benefits of a stroll by the sea, in fact a combination of helio- and thalassotherapy, which was prescribed by physicians already in the Antiquity.

Indeed, there is a long lasting tradition of using salt and its by-products for health purposes. Physicians from the Atiquity and Early Middle Ages, such as the Greeks Hippocrates (460 BC) and Galen from Pergamon (129–200 AD); the Roman Dioscorides (100 AD), the Arab Avicenna (980–1037 AD) or the Jew Maimonides (1135–1204 AD), were keen on indicating salt-based therapies to their patients. One of the typical uses at the time was a mixture of salt and vinegar as emetic or disinfectant, relief against bites and gargles. Steam from brine was used to alleviate respiratory conditions. Depending on the combinations with other elements, salt could be used as a remedy for skin diseases, dropsy, infections, callosities, ear-ache, mycosis, digestive upsets, sciatica, etc. [3].

Especially beneficial are salty environments, such as the seashore or saline lakes, and even the areas around brine springs or inside salt mines. The natural presence of salt allows its use in multiple forms, providing a holistic approach to treat the condition of the patient or simply providing a more integrated feeling of wellbeing. By simply being there, saline aerosols can be inhaled, but brine or saline water can also be ingested or used for baths. Balneo- or thalassotherapy were widely used in the Antiquity and Romans were keen bathers. Saline waters were especially appreciated for this purpose [4].

Today, many of the traditional uses of salt for medicinal purposes may have changed, especially with the advent of modern pharmacopeia, but salt still remains one of the few substances we use with frequency for all sorts of domestic purposes or low-intervention remedies [5]. There is also a renaissance of balneotherapy, traditionally focused on the elderly, and now strongly marketed as a source of health and wellbeing for all, children included. Saline sources are being exploited for their minero-medicinal content in such facilities. Also, the benefits of salt mines and other saline environments can be reproduced elsewhere, under controlled conditions, and offered also to a broader public. While salt making sites in Central Europe have long since been used for medical purposes too, solar evaporation salt making sites are gradually adapting for this use, too. Traditional solar salt making areas are slowly taking advantage of the natural presence of salt and offer a combination of ecocultural tourism and health-related products and services. Lagging somewhat behind are bodies of natural saline waters, often protected for their ecological values and therefore with restricting regulations that control the exploitation of their resources. However, a sustainable approach towards the use of salt and brine may provide these saltscapes with new opportunities to draw the attention of the public and the authorities towards their values, while guaranteeing the preservation of these values. In addition, the creation of sound health-related products and services, may provide new livelihoods to the local communities in the hinterland. This contribution aims at providing an overview of

modern health and wellness applications of salt and brine, both as isolated elements as within their landscapes of reference, within the European context.

### **Material and methods**

***Bibliographic survey.*** This work relied mainly on the consultation of written literature, complemented with field visits to most of the sites cited in the text, over the last two decades. The written sources covered both scientific as non-scientific literature, as explained below. Given the lack of specific literature on the subject, the search has been eclectic by nature. Firstly, the library of IPASAL, containing ca. 1,000 monographs on salt as well as ca. 3,000 articles and reports about salt-related issues, was consulted. In addition, systematic key word search in google scholar was performed, including the terms: *balneotherapy, halotherapy, brine, salt, saline, health*, always in combination with each other, as some were too generic to be researched individually. The search also included cross references from any written document detected previously or oral referral during the field visits.

The scientific literature covered different areas of interest: human health, heritage, local development, landscape, tourism, wetlands...etc. Occasionally texts from specific disciplines (anthropology, law, economy, ecology...) have been reviewed, when needed. However, part of the literature examined consisted of grey literature, that is, of unpublished reports, plans and projects or internal documents and has usually been provided by non-profit organisations and authorities. Conference proceedings have also proven to be an essential source of information. These sources are cited and included either in the references section or in footnotes.

***Field visits and observations on site.*** The main purpose of the field visits was to know the sites by first-hand experience. The direct observation allowed to better understand the background, history and natural features of the site, as well as to obtain and overview –and even try some– of the products and services offered on site. No two sites were alike and a personal visit significantly increased the insight into the health aspects being treated in them. The personal observations contributed to have a holistic view of the strengths and opportunities as well as the challenges and difficulties that may arise in the implementation of health-related products and services.

### **Results and discussion**

The uses of salt and brine for therapeutic purposes are very diverse. Table summarizes the main uses per product (salt – as a solid, or brine – dissolved in water). The latter category also includes mother lay, which is a concentrated brine that results from the processo of solar evaporation of salt. Mother lay has a high concentration of magnesium and other minerals, and has a more oily texture than brine, which confers it other properties of interest for health and wellness.

Depending on the type of therapeutic application, it can be done either *on site* - that is, where the salt/brine is being present, either in natural form, or being obtained directly from nature- or *off site*, that is, being processed and brought elsewhere, to the convenience of the user. In the first case, some infrastructure may be needed for the production of salt (from the relatively simple solar evaporation salinas to more

sophisticated graduation towers or underground mines), but can also be used in natural environments such as the seashore or in saline lakes. In some cases, specific facilities are present for the health-related use of salt and brine, such as bathshouses, spas or full-scale thalassotherapy centres.

Table

Therapeutic possibilities of salt and salinas

Type of material	On site		Off site
	Type of therapy	Type of saltscape	Type of therapy
Brine / mother lay	<i>Maniluvium</i>	Solar evaporation salinas	<i>Flotarium</i> / brine baths
	<i>Pediluvium</i> Brine baths	Saline lakes	Pickle juice / sea salt drink Nasal spray Creams, cosmetics
Salt	Halotherapy	Salt mines	Halochambers
	Salt aerosol inhalation	Graduation towers Solar evaporation salinas Saline lakes	Salt lamps Halogenerator Salt scrubs Bath salts

Source: Own elaboration

The use of salt-related health products and services seems to have a strong cultural component. Whereas bathing seems to be found more often in Mediterranean and Atlantic cultures, inhaling brine and salt is a typical Central European activity. A variety of this application, performed in salt mines and caves, is typically found in central and Eastern European countries. Map 1 (Fig. 1) provides an overview of the sites cited in the text. It is far from exhaustive, but gives an idea of how salt and brine are used on site in the different regions of Europe.

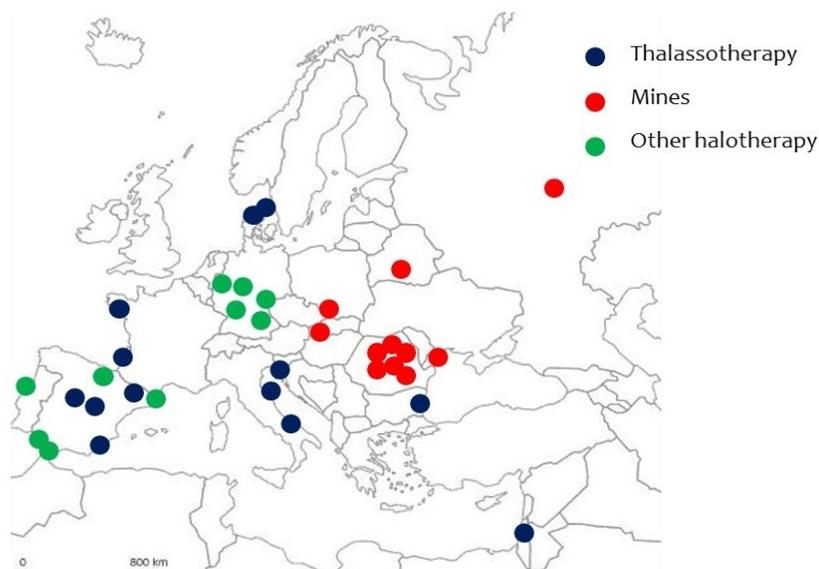


Fig. 1. Salt-related health and wellness facilities in European saltscapes (Source: Own elaboration)

The main advantage of enjoying salt-related therapies on site is the multiple possibilities of contact between the product and the patient. On site, salt and brine can be inhaled, applied, ingested... almost simultaneously. These settings provide a holistic, integrated approach to relieve different ailments, with a higher degree of effectivity [6]. Having said this, off-site, the possibilities are endless. Salt and brine can easily be transported to the end user, which can apply them at leisure, both at domestic and therapeutic settings. Both are cheap products, readily available throughout the world and do not decay. A few salt- and brine-based products are reviewed below.

### *Uses of brine*

**Saline balneotherapy.** Brine baths can be taken on site, that is, in saline lakes and solar evaporation sites, or in balneo- or thalassotherapy centres, which were traditionally located near the source of brine or salt water. Today, many such centres exist elsewhere, too, regardless of the existence of a nearby salt making site. A distinction should be made between acknowledged minero-medicinal waters (whether for bathing or ingesting, see below), which need to comply with certain requirements and regulations, and other waters, which can be labelled as “spa”, “wellness” or similar terms, but have not been acknowledged or proven as having therapeutic properties. Each country has its own regulations and comparing them goes beyond the scope of this work; suffice to say it is an issue subject to commercial interests and, therefore, prone to terminological manipulation.

Bathing can be done in low concentrated brine –sea water or similar– or in saturated brine, close to precipitation. Spas usually offer a range of baths. Those situated at the coast may benefit directly from sea water and those inland use brine from nearby sources or create their own brine by dissolving salt in freshwater. Low concentrated baths consist of larger pools and are usually employed for more leisurely activities. These are also typically found in many similar centres that use mineralized waters, spread throughout the world. Saturated brine baths are more commonly used for treatment and are used under professional guidance. Given the pain this brine can inflict to our eyes or nostrils, the activity in such baths is minimal and usually consists of simply floating. In some cases, a time limit is given to patients. The health indications are very diverse, e.g. skin and respiratory conditions, inflammatory and non-inflammatory rheumatic diseases, gynaecological diseases and infertility, and general susceptibility to infection and psycho-fatigue [7].

In Spain, over 700 inland salinas and saline lakes exist [8, 9]. However, given their generally modest size and productivity, few have had enough entity to build specific infrastructures for therapeutic purposes, save a few exceptions, as shall be seen. Informal brine bathing has been commonplace in Spanish inland salt making sites. People from the neighbouring villages would flock to the salinas in order to take a bath in the concentration basins, a practice sometimes tolerated, or sometimes clandestine, but still much remembered today. This was a regular practice in Imón, Peralta de la Sal, Salinas de Añana, Poza de la Sal or Saelices de la Sal. In the rest of Europe, some Mediterranean salinas have been used for informal bathing too. Such was the case of saline Ettore e Imfersa in Sicily (pers. obs.). Elsewhere, the idea has even been recovered in Naval, in Huesca; Cambrils and Vilanova de la Sal, in Lleida; and vague plans were mentioned for Carcaballana in Madrid, for a larger sized facility. Some

inland salt making sites even had proper bathhouses, such as Belinchón, in Cuenca, now in disuse. Near the salinas of Imón, one of the historically most relevant sites in inland Spain, the Spa *Baños de Ymón* was built in the early 2000, but in fact, this centre was totally unrelated to the salt making activity and used brine that was obtained by mixing salt and water. Interestingly, one of the concentration basins in the salinas of Tragacete, in the same province, has been transformed into a private swimming pool. It is uncertain whether their owners knew the health implications of bathing in brine or was it simply a convenient infrastructure?

Saline lakes, especially abundant in the regions of Monegros (NE Spain), hosted a few bath houses, such as the Salada de Chiprana, Salada de Mediana or the Salada of Bujaraloz [10, 11], now disappeared. Elsewhere in Spain, some spas have made use of saltwater or brine springs that have not been exploited for salt making purposes. A classical example is the *Hotel Balneario Las Salinas*, in Medina del Campo (Valladolid), opened in 1891. A more modern thalassotherapy centre using a local brine spring, *Balneario Elgorriaga*, is located in Navarra. Central Europe has a strong tradition of bathing in mineralized waters. Many brine springs have been used as sources of bathing waters, as well as for the production of salt. In France, the *Thermes* of Salies de Béarn, Salies du Salat or at Salinas-les-Bains are traditional thalassotherapy centres associated with (former) inland salt making sites.

In German-speaking areas, traditional bathing towns are typically named “Bad...” and toponymy comes to an aid with numerous references to salt. Examples are Bad Salzelmen, Bad Salzingen, Bad Sooden-Allendorf, Bad Salzdettfurth, Salzkotten, Bad Salzuflen, Bad Soden Salmünster, Salzgitter-Bad, etc. In Salzkammergut, a mountain district in Austria rich in salt springs and former salt mines, several such centres exist, too. More recently, salt making sites as far apart as Læsø, in Denmark, and Sečovlje, in Slovenia, host modern thalassotherapy centres: *Læsø Kur* and *Lepa Vida*, respectively. Elsewhere at the coast, the Mar Menor region in eastern Spain, home to three salt making sites, has a tradition of health bathing, but is unrelated to the salt making activity. In Aveiro, Portugal, following the example of similar sites, two salinas –the Marinhas Grã Caravela and Peijota– have opened the *Piscina e Spa Cale do Oiro* (Pool and Spa Cale do Oiro) to the public. Otherwise, there is not such a strong tradition of thalassotherapy associated with coastal salinas as it exists elsewhere in the interior.

An additional twist to floating in brine in natural settings is doing it in a so called *flotarium*. This is a device in which one person can be lain to float in a confined recipient, isolated from external stimuli. The idea behind it is to achieve a deep state of relaxation without any distractions from the outside. In medical terms, this relaxation technique is also known as REST (Restricted Environmental Stimulation Technique) [12]. These devices can be installed almost anywhere, as they are slightly bigger than a bathtub. There are therefore versions for domestic use on the market, but are also often found in urban spas.

A more simple version of brine baths is the immersion of the extremities, with therapeutical purposes. Depending on the extremity concerned, it is called *maniluvium* or *pediluvium* (Fig. 2). The first consists on submerging the hand or the lower arm into brine and to perform some simple exercises while submerged. The *pediluvium* on the other hand may consist of simply standing or walking in brine, or making some exercises with the feet or lower legs. Some sites offer these services on the spot under pro-

fessional guidance, such as Salinas de Añana in Spain or Læsø in Denmark. Elsewhere, this idea is gaining popularity, give the simplicity of the facilities needed (often, actually, none). Examples are Salinas de Chiclana in Cádiz or Salinas Biomaris in Huelva, both in Spain.



Fig. 2. A group of people using the *maniluvium* in Salinas de Añana  
(©Jan-Pieter de Krijger/IPAISAL)

**Other uses of brine: Ingestion of brine and brine pads.** Many types of natural mineral water exist, some of which with a slightly higher content in sodium, and are readily available in the market for consumptions. Stronger mineralized waters, not fit for sale as drinking water, can still be ingested under the guidance of trained physicians. These waters need to pass specific controls as mineral medicinal water and obtain an official recognition as such. Regulations may vary from one country to another, in a similar way to bathing waters. In case, the saline concentration of these waters stays well below that of sea water.

However, drinking brine is one of those health trends that regularly hits the press. The internet brims with pros and cons and recipes for a good glass of “pickle juice”. Others claim the benefits of drinking purified sea water. Its defenders declare that it:

“can supply the body with the natural energy stored in the [salt] crystals, [...] can harmonize the alkaline/acidity balance in the body and normalize blood pressure, can dissolve and eliminate sediments which lead to stones and various forms of rheumatism like arthritis and kidney and gall bladder stones, can lower the craving for addictive desires and can help with skin diseases by cleaning from inside out”<sup>1</sup>.

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<sup>1</sup> Just an example of these lists of benefits, obtained from a randomly chosen website. URL: [http://www.gaiathera.com/e/salt/4\\_brine.html](http://www.gaiathera.com/e/salt/4_brine.html). Accessed on 2016-08-25

Some consensus seems to exist, though, on the beneficial effect of pickle juice on muscle cramps (e.g. [13]). Brine can also be used in numerous applications as a home-made substitute of physiological serum. Typically, it is used as a nose, eye and throat rinsing remedy (e.g. [14, 15]). Also, brine poultices or pads are useful remedies for skin, muscular and joint diseases and injuries. Insect bites can be easily alleviated with them [16].

***Brine and mother lay as a basis for cosmetics and wellness products.*** Mother lay can be used in cosmetics or for direct skin treatment, even for bathing, provided the necessary care is taken to avoid contact with the eyes or mouth. Direct application of mother lay to the skin has also been recovered as a common practice and can be done in places as far apart as Biomas in Spain or Læsø in Denmark. It is even sold as spray, to continue the treatment at home.

### ***Uses of salt***

***Halotherapy.*** Halotherapy, literally, salt therapy, is usually associated with the therapeutic effect of being in a salty environment. It was already practised in the Antiquity [17] and ethnoarchaeological research has shown that many current traditional halotherapeutic practices (intra-cranial, aural, inter-costal, menstrual and rheumatic neuralgias, flu, dental hygiene, hemostasis, burns, asthma, bronchitis, etc.) are based on ancient practices, whereas some have disappeared over time and new ones have emerged [5, 18, 19]. [6] claimed that the salt marshes of Guérande in France offered a combination of therapies based on the sun, wind, salt and other minerals present in the sea aerosols. However, the term halotherapy is today more often associated with therapies applied in salt mines, therefore also known as speleotherapy, whereas other salt-related therapies have their own specific names. Halotherapy does not involve invasive procedures, nor the use of medication or supplements, immobilization in bed or diets. The salt enters the body through respiratory inhalation of saline aerosols and absorption through the skin [20-22] and the efficacy of this form of salt-based therapy has been demonstrated by biochemical, immunological and microbiological research [23]. The use of salt mines for these purposes, however, has been geographically restricted to Central-Eastern European countries, with well-known sites such as Wieliczka or Bochnia in Poland; Solotvyno in Ukraine; and Târgu-Ocna or Slanic Prahova, among others, in Romania [24-28], although it is gaining notoriety elsewhere in the world.

Beyond the mere therapeutic uses, salt making sites, whether in operation or inactive (salinas, mines and graduation towers), offer a unique combination of health and leisure possibilities that are being exploited at different scales in Europe. Mines such as Wieliczka, protected as a World Heritage Site, offer their facilities both for regular visitors and for patients. The latter also take the opportunity to practise “spa tourism”, that is, spending the time free from treatment for leisure activities [26, 29]; conversely, the salt mine of Turda in Romania, traditionally been open for halotreatment, has broadened their offer to include regular visitors, too [30]. Similarly, the solar saltworks of Nin in Croatia aim at offering combined cultural and ecotourism experiences (e.g. birdwatching) with the provision of health services [31], a trend found in many other solar evaporation salinas. Thus, leisure and health provision go hand in hand. This is a common situation in most therapeutic salt mines, in which

complementary infrastructures such as playgrounds, cafés, shops, rest areas and even worship rooms can be found (Fig. 3). The idea is that patients need to spend some time underground for the therapy to work and can be thus entertained; or may bring their family along for a day out. In Romania, a visit to the mine of Slanic-Prahova can also be combined with bathing in a saline lake and a visit to the local salt museum. Western European salt mines, whether abandoned or not, can increase their revenues by combining uses in a similar way.

Away from mines and natural salt caves, there are many salt caverns — the so called halochambers — newly built for health purposes<sup>2</sup>. It only needs a few large blocks of rock salt to create a similar environment to that of a mine, without the need of travelling to what usually is a remote location. Another option is the use of halogenerators, which are sophisticated devices used to simulate the atmosphere of salt mines, which provide controlled amounts of saline aerosols. Halogenerators crush rock salt into dry micrometer sized particles, which are then ionized and released into the air [17, 29]. These solutions allow having a more conveniently located venue with cheaper facilities than natural salt mines. But, above all, it allows the application of controlled halotherapy, that is, to manage the concentration and composition of the aerosols the patients inhale. Artificial salt caves have been developed since the end of 80s in Russia [32, 33] and can the concentration and composition of the aerosols the patients inhale. Artificial salt caves have been developed since the end of 80s in Russia [32, 33] and can now be found worldwide in clinics, schools, sanatoriums, rehabilitation centres, spas, hotels, sports halls, etc. They are even available for installation in private homes. Some salt mining companies offer salt blocks on sale for this purpose.



Fig. 3. The public enjoying a picnic inside the Târgu Ocna salt mine, in Romania (©Katia Hueso Kortekaas/IPAISAL)

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<sup>2</sup> In Australia, there is salt therapy even for horses (URL: <http://equinesalttherapy.com>. Accessed 2016-04-15)

A more domestic version of an ionizing halogenerator is the salt lamp. They are made of larger sized natural salt crystals, which have been carved and hollowed out. These are then heated — thus ionized, according to their manufacturers — by putting a tealight or lightbulb inside. Although these lamps were originally introduced in the western markets as Himalaya salt lamps, claiming the special benefits of being made of salt from this region (e.g. [16, 34], many salt mining districts have started to offer their own creations<sup>3</sup>.

**Other uses of salt: Inhaling brine.** Graduation towers were traditionally used to concentrate the brine from inland saltwater sources before its crystallization in simmering pans. This construction was common in climates where salt making was not possible by solar evaporation. They would measure 6-16 m in height and could reach a few hundred meters to almost 2 km in length. These elongated towers were made of imbricated stacks of thin branches of, most usually, blackthorn (*Prunus spinosa*), on top of which the brine was sprinkled. The brine would then slowly trickle downwards until it was again collected in a pipe at the bottom of the stack. Due to the slow movement of the brine and its exposure to the wind, part of the water would have evaporated and the collected brine would be stronger<sup>4</sup>. This way, the final evaporation process by simmering would be faster and less costly in terms of fuel [35, 36]. These graduation towers were commonly used in central and northern Europe between the 16th and the early 20th century. Germany is especially rich in this type of facility (e.g. Bad Dürkheim, Bad Salzuflen, Bad Reichenhall, Bad Dürrenberg, Bad Hamm...<sup>5</sup>), but graduation towers can also be found in Poland (e.g. Ciechocinek), France (e.g. Arc-et-Senans), The Netherlands (e.g. Katwijk, which by the way used sea water; now disappeared), Austria (e.g. Hall), Denmark, Slovenia and even northern Spain.

Many of these facilities have had an application as health centres. Since the Antiquity, the inhalation of seawater aerosols has been considered healthy and graduation towers reproduced this type of environment in places far from the seashore. Patients of respiratory illnesses such as asthma or allergies, or skin conditions such as psoriasis, have been said to improve with brine aerosol treatments. Many of the former salt making sites that used graduation towers, are still being open as health centres, with more or less sophisticated treatments on offer. Former graduation towers have been recovered (e.g. [35]) not only for the purpose of heritage but also for renovated health uses. In some cases, even new, smaller sized graduation towers have been built, associated to spa and wellness centres that use the brine also for baths. This is the case of *Sole-Arena*, opened in 2010 in Bad Essen, Germany. Even indoor graduation towers have been built on purpose as part of larger wellness centres, as has been the case elsewhere in Germany or Switzerland.

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<sup>3</sup> Curiously enough, they are equally pink or orange in colour, a feature previously claimed as exclusive of Himalayan salt. Such lamps are for sale, for instance, at the Parc Cultural de la Muntanya de Sal in Cardona, Spain or in Salzburg, with salt from the Salzkammergut district.

<sup>4</sup> In some cases, such as Bad Salzungen in Germany, an increase has been registered from 6% salt in the original saltwater to 27% of salt in the resulting brine, almost to the point of crystallising (URL: <http://solewelt.de/>. Accessed 2016-08-20)

<sup>5</sup> A complete list of German graduation towers and their present uses can be found in URL: <http://www.gradierwerk-saline.de>. Accessed 2016-08-25.

***Salt as a basis for cosmetics and wellness products.*** Salt itself is a natural exfoliant that can be used at home or is simply mixed with hydrating cream. It is an environmentally friendly alternative to the plastic microbeads normally used in these products, which are becoming controversial due to their capacity to pollute the seas (e.g. [37]). At an industrial scale, cosmetics also use salt-related substances. Halophiles, mainly found in solar evaporation salinas, are said to contain certain microbiological solutes and compounds (e.g. beta-carotene, melanin, ectoines) useful in the production of cosmetics, especially those related to skin care [38-41].

From the wellness point of view, aromatised salts or bath salts have traditionally been used for bathing. These salts are very widespread due to the facility in manufacturing them and have become a star product in traditional salt making sites. In salt-related festivals or activities, children are typically invited to alternative to water treatment in swimming pools. It is said that it does not irritate create their own bath salts<sup>6</sup>. At a different level, salt is becoming a popular the eyes or the skin as much as chlorine does, and has a similar disinfectant power.

### Conclusion

Salt has contributed to human health since the Antiquity, whether as a crystal, dissolved as brine or mixed with other elements. The uses may have changed but our interest in the healing properties of salt has not dwindled, not even with the advent of modern pharmacopeia. Contemporary versions of the uses of salt and brine -such as halochambers or aerosols- allow patients to benefit from them in many different locations, even at home. In this paper we have reviewed different formats of salt and brine to be used for health purposes, as well as their use in natural and man-made settings.

The health benefits of salt and brine, however, are best obtained when used in natural settings, where these are present in the environment, in salt mines, solar evaporation salinas or saline lakes, allowing an integrated approach. All of them have traditionally been used from bathing or inhaling salt, but especially in the latter -saline lakes- these activities are in disuse. However, there is a renewed interest of the public in the healing power of water and salt, seeing the ever increasing number of visitors and patients to salt mines, former graduation towers and solar evaporation salinas and the number of spas and wellness centres being built around (former) salt making sites. Saline wetlands can therefore benefit from this renewed interest by offering not only a pleasing venue for eco-cultural tourism, but also for patients and other people wishing to improve their health and wellbeing. The Romans already said it: *In sale salus*.

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<sup>6</sup> Examples of sites where this is being offered routinely are the Salinar de Naval baths (Huesca) or at the *Jornadas Gastronómicas* (Gastronomical Days), celebrated each year in Salinas de Oro (Navarra), both in Spain. You only need to add concentrated aromas to the salt and let it dry. Some cookbooks guide their readers on how to prepare aromatised salts [40, 42-43].

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#### IN SALE SALUS: СОЛИ И СОЛЕННЫЕ БОЛОТНЫЕ УГОДЬЯ ЕВРОПЫ ДЛЯ СОХРАНЕНИЯ ЗДОРОВЬЯ

*Корткас К. Хуесо*

Институт Saltscapes и солевого наследия (IPAISAL), Апартадо-де-Корреос 50  
28450 Кольядо-Медиано, Испания  
ICAИ Высшее техническое инженерное училище,  
инженерно-механический факультет, университет Комильяс  
Альберто Агилера 25 Мадрид, Испания

*Вайя Х.-Ф. Карраско*

Институт Saltscapes и солевого наследия (IPAISAL), Апартадо-де-Корреос 50,  
28450 Кольядо-Медиано, Испания

Среди часто упоминаемых 14 000 видов применения соли, многие связаны со здоровьем и его профилактикой. Его различные физико-химические свойства позволяют использовать соли, рассолы и солевые грязи для поддержки здоровья. Соль может быть использована в блоках для строительства галокамер; вдыхания аэрозолей или даже с ионизирующими лампами. Соль можно принимать внутрь или использовать

для купания и физических упражнений. Соли обычно используется в качестве основы для косметики и лечения кожи, грязь традиционно наносится непосредственно на кожу при различных заболеваниях. Многие из этих приложений были известны с древности и до сих пор используются сегодня. Некоторые из них исчезли или известны только в местном масштабе, в то время как другие набирают популярность во всем мире на фоне всплеска СПА и оздоровительных услуг. Кроме того, все более популярны естественные и альтернативные процедуры какими являются лечебные процедуры, связанные с солью. В этом разрезе мы рассмотрим, среди прочего, традиционное использование рассола и соли для обеспечения здоровья; лечебное и оздоровительное использование соли и грязи в качестве побочного действия для традиционного сохранения здоровья, для чего были построены специальные СПА-и оздоровительные центры и теперь это распространенное явление в соляных пещерах и шахтах для галотерапии, в исторических курортах, построенными вокруг соленых озер. В настоящее время некоторые процедуры можно также применять вдали от источника соли, в домах, клиниках или городских оздоровительных центрах. Примеры таких процедур используются во многих европейских соленых участках, будь то шахты, участки с от солнечного испарения солей, болотных угодий, а также соленых озер приведены в работе. Приведены различия между теми процедурами лечения, которые были признаны медицинской наукой и применяются под профессиональным контролем, в отличие от тех, которые имеют слабую научную поддержку, а также теми, которые в основном опираются на популярные убеждения или суеверия.

*Ключевые слова:* соль; рассол; традиционное использование солей; здоровье человека; болотные угодья; соляные шахты; галотерапия; бальнеология; здоровье.